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# How Should I Know? Lack of Confidence Biases Stock Market Expectations Toward Zero

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## ABSTRACT

Consumers' expectations of stock market movements are important for understanding individual decisions about consequential financial outcomes and forming economic policy. Across three studies, we posit a new relationship underlying reported stock market expectations: that respondents lack confidence about their ability to forecast stock market movements and this lack of confidence biases reported probabilities toward 0%. In Study 1, using 10 years of nationally representative survey data, we show that stock market expectations are more pessimistic than warranted when compared to actual stock market movements. In Study 2, we measure stock market expectations in several nationally representative survey experiments over 12 monthly waves ( $n = 4,613$  participants providing 21,670 survey responses) where participants are randomly assigned to report the chances that the stock market will be "lower" or "higher" over the next month and year. Reported probabilities are biased toward 0% in each question frame, yielding a "framing effect" gap of more than 10 percentage points each wave. In Study 3, we find that confidence moderates this framing effect: when we manipulate confidence regarding one's ability to forecast the stock market, there is a smaller gap between "lower" and "higher" frames for those participants who have greater confidence. To our knowledge, this is the first research showing that a lack of confidence biases reported stock market probabilities toward 0%. It also uncovers a framing effect that is counter to psychological theory on "valence framing" and helps explain prior research showing that people are pessimistic about the stock market.

Keywords: stock market, subjective expectations, framing effect, confidence

JEL Codes: G4 (Behavioral Finance); G5 (Household Finance)

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## 1. Introduction

Individuals' expectations of future events predict a wide range of financial decisions and reliably reflect events in the macroeconomy. Consumers who report more optimistic expectations are more likely to hold stock market assets (Dominitz & Manski, 2007; Giglio et al., 2021; Hurd 2009), maintain a higher proportion of stocks in their portfolios (Vissing-Jorgensen, 2003), and buy stocks in the next few years (Hurd, Van Rooij, & Winter, 2011). Conditional on choosing to trade stocks, changes in expectations predict larger trades (Giglio et al., 2021). Stock market beliefs also vary with experiences of recent events, such as the 2008 stock market crash (Hudomiet, Kézdi, & Willis, 2011) and the market volatility experienced in the early months of the COVID-19 pandemic (Giglio et al., 2020). Due to this link between beliefs and behavior, policymakers, researchers, and firms frequently conduct surveys to assess beliefs and attitudes about macroeconomic variables, including stock market expectations (Bruine de Bruin et al., 2022; Vanguard, 2020; Weber et al., 2022).

Past research on stock market expectations reveals that average reported stock market expectations among U.S. households are pessimistic, meaning that they suggest a lower probability of a stock market increase than historical stock market performance would warrant (Hurd, 2009; Kézdi & Willis, 2009). Among a sample of the general population in Germany, estimates of stock market returns are also pessimistic, particularly for long-run growth (Bruenig et al., 2021). Regular pessimistic forecasts have led economists to puzzle over why people are not better informed. After all, stock market data — such as the movement of the Dow Jones Industrial Average (DJIA) or the S&P 500 index — are easily accessible public information, so it should be possible for consumers to learn about stock market trends. Nevertheless, in panel data, many respondents are persistently pessimistic (e.g., Giglio et al., 2021).

A second observation about stock market expectations is that people appear to lack confidence in their ability to forecast stock market movements, possibly because the stock market is known to have random fluctuations. National surveys often elicit stock market expectations by asking for the probability of a stock market increase over a given period. For instance, the New York Federal Reserve Bank's Survey of Consumer Expectations asks, "What do you think is the percent chance that 12 months from now, on average, stock prices in the U.S. stock market will be higher than they are now?" (responses from 0% to 100%). When answering expectations questions, respondents who lack confidence disproportionately give focal responses of "50%," indicating a "50/50" chance of an event happening (Fischhoff & Bruine de Bruin, 1999; Bruine de Bruin & Carman, 2012). Such 50/50 responses at times make up 40% of total responses to stock market expectations questions (e.g., Chin & Bruine de Bruin, 2018), suggesting that many people lack confidence in their ability to predict the market any differently than they might predict a coin toss. A lack of confidence also appears in research that directly asks people to evaluate their responses. In particular, two nationally representative surveys (the American Life Panel and the Health and Retirement Survey) elicited respondents' stock market expectations and then asked how confident they were in their reported expectations. More than half of respondents stated that they had "no idea about the chance" or that "no one can know the chance" (Chin & Bruine de Bruin, 2018). Therefore, a lack of confidence in stock market expectations appears common.

In the current paper, we propose a link between apparent pessimism and lack of confidence. Specifically, we posit that participants' lack of confidence in their ability to forecast stock market movements exerts a systematic downward bias on reported probabilities of stock market expectations questions, that is, toward 0%. Most stock market expectations questions

elicit beliefs that the stock market or certain stock market investments will increase — what we term a “positive frame” (see examples in Table 1). As such, a lack of confidence (that biases reported probabilities toward 0%) generally results in perceived pessimism about future stock market movements.

**Table 1.** Wording of Stock Market Expectations Questions.

Survey	Question Wording
Federal Reserve Bank of New York’s Survey of Consumer Expectations	What do you think is the percent chance that 12 months from now, on average, stock prices in the U.S. stock market <i>will be higher</i> than they are now?
Health and Retirement Study	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 <i>will be worth more</i> than they are today?
Michigan’s Survey of Consumers	Suppose that tomorrow someone were to invest one thousand dollars in a type of mutual fund known as a diversified stock fund. What do you think is the percent chance that this one thousand dollar investment <i>will increase in value</i> in the year ahead, so that <i>it is worth more</i> than one thousand dollars one year from now?
Understanding America Study (UAS)*	What do you think is the percent chance that the stock market <i>will be higher</i> in twelve months from today?  What do you think is the percent chance that the stock market will be at least 20% [ <i>higher/lower</i> ] in twelve months than it is today?
American Life Panel (ALP)*; data from 2008-2016	We are interested in how well you think the economy will do in the future. By next year at this time, what are the chances that mutual fund shares invested in blue chip stocks like those in the Dow Jones Industrial Average <i>will be worth more</i> 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 [ <i>increased/fallen</i> ] in value by more than 20 % compared to what they are worth today?
De Nederlandsche Bank (DNB) Household Survey; 2004 and 2006	Suppose you put the 10,000 Euro in the stock mutual fund and left it in for one year. What are the chances that <i>you would make money</i> where 0 means absolutely no chance and 100 means absolutely certain; that is what are the chances that in a year <i>your investment would be worth more</i> than 10,000 Euro?

Study 2, this manuscript	What do you think is the percent chance that <b>[1 month/12 months] from now</b> , on average, stock prices in the U.S. stock market will be <b>[higher/lower]</b> than they are now?
Study 3, this manuscript	What do you think is the percent chance that <b>1 month from now</b> , on average, stock prices in the U.S. stock market will be <b>[higher/lower]</b> than they are now, even by a fraction of a percentage point?

*Note:* Italics added to highlight positively framed questions. All surveys listed in the table are nationally representative in their respective countries, with the exception of Study 3 in this manuscript.

\*The ALP and UAS have multiple ways of asking for stock market expectations; the questions listed reflect long-running surveys within the panels.

To our knowledge, only one paper has explored a link between lack of confidence and *lower* probability judgments, rather than a biasing effect toward a specific value like 50%. Bagchi and Ince (2016) investigated how individuals perceive the confidence of forecasters who give different probability judgments. They showed that participants perceive a forecaster as less confident when the forecaster estimated a 30% chance of a binary outcome versus a 70% chance of the complementary outcome, even though these are mathematically equivalent expressions. Our paper similarly argues that low forecaster confidence is related to low probability judgments. However, we deviate from Bagchi and Ince (2016) by examining the process by which forecasters arrive at low probability judgments; we argue that when people experience low confidence in their ability to make a prediction about a given event, they subsequently give lower probability judgments of the target event. As such, we examine the opposite direction of causality relative to Bagchi and Ince (2016) — that confidence drives expectations, as opposed to expectations driving perceptions of confidence.

We proceed by providing evidence on the following points: (1) Stock market expectations elicited in a positive frame are more pessimistic than warranted when compared to actual stock market movements; (2) Since respondents report low probabilities regardless of

whether they are asked about the stock market being “higher” or “lower,” there is a difference in mean reported expectations based on how stock market expectations questions are worded; and (3) Causally manipulating individuals’ confidence in their ability to forecast future stock market movements moderates the higher versus lower framing effect in stock market expectations questions.

## **2. Study 1: Stock market expectations are more pessimistic than warranted**

In Study 1, we sought to provide evidence that stock market expectations are more pessimistic than warranted when compared to actual stock market movements. If expectations are elicited in a positive frame, and reported probabilities are generally biased toward 0%, average expectations would appear pessimistic. Given that past research on this point was conducted more than a decade ago (e.g., Hurd, 2009; Kézdi & Willis, 2009), we analyzed a more recent dataset.

### **2.1 Method**

We analyzed the Federal Reserve Bank of New York’s Survey of Consumer Expectations (SCE; <https://www.newyorkfed.org/microeconomics/sce>), a nationally representative, online survey panel with a rotating sample of approximately 1,300 U.S. household heads. Respondents participate for up to 12 months. For the purpose of this study, we analyzed the stock market expectations question that asked, “What do you think is the percent chance that **12 months from now**, on average, stock prices in the U.S. stock market will be higher than they are now?” Specifically, we used the survey microdata, which contains 52,941 forecasts from 10,560 individuals and the date of their survey response.



To understand how expectations compared to stock market movements, we merged in levels of the S&P 500 index and the DJIA from the Federal Reserve Economic Data website (FRED; <https://fred.stlouisfed.org/>). In addition, we thought that expectations could reflect consumer sentiment, a general sense of optimism or pessimism about the stock market, which is known to predict certain stock market movements (Baker & Wurgler, 2007; Da, Engelberg, & Gao, 2014; Lemmon & Portniaguina, 2006). As such, we merged in the sentiment index available from Baker & Wurgler (2007), which is extracted from principal components analysis on underlying variables.<sup>1</sup>

The merged data spanned May 2014 to July 2023. When looking at annual stock market movements over this time period, the S&P 500 index increased following 74.1% of the survey response dates, and the DJIA increased following 73.8% of survey response dates.

## 2.2 Results

Our primary aim was to determine whether reported stock market expectations are more pessimistic than actual stock market movements. Average stock market expectations—that is, the average reported subjective likelihood that the market will increase in value—ranged from 34% to 52% across survey months (average = 40%,  $SD = 3\%$ ). The proportion of respondents providing an expectation greater than 50% ranged from 23% to 48% across survey months; that is, there was not a single month in which the majority of participants reported a probability greater than 50% that the stock market would increase. Given the overall positive trend in stock market indexes over this time period, we conclude that respondents tended to be too pessimistic on average.

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<sup>1</sup> Sentiment data are available from <https://pages.stern.nyu.edu/~jwurgler/>. Additional details on the construction of the sentiment index are available in Baker and Wurgler (2007).



Despite the overall pessimism, stock market expectations were correlated with future stock market movements. Specifically, we regressed the percent change in the S&P 500 index over the next year on reported expectations. This regression shows a positive correlation between expectations and future stock market movements (Table 2). This relationship weakens after controlling for sentiment, however, suggesting that expectations are likely correlated with other consumer impressions that would likely be captured by financial and investment analysts. We found similar patterns among expectations and stock market movements when analyzing the DJIA rather than the S&P 500 (see Appendix A).

**Table 2.** Regression analyses predicting the percent change in S&P 500 index one year from the date of the survey response.

	(1)	(2)	(3)
Reported expectation of stock market increase	0.055*** (.005)	0.020** (.004)	0.006** (.002)
Sentiment index			-22.319*** (.102)
Constant	9.386*** (.147)	10.842*** (.113)	21.744*** (.106)
Participant fixed effects		Yes	Yes
$R^2$	0.006	.001	0.530

*Note.*  $N = 52,941$ . \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

## 2.3 Discussion

Using a sample of 10 years of nationally representative survey data, we found that average stock market expectations (i.e., the perceived likelihood that the market will increase rather than decrease over a given period of time) are more pessimistic than warranted when compared to the actual propensity of the stock market to increase over those periods. This pattern is consistent with previous findings on consumers' stock market expectations (e.g., Hurd, 2009; Kézdi & Willis, 2009). Despite overall pessimism, relative expectations correlate with stock

market movements – in other words, when respondents are relatively more optimistic, the stock market is generally more likely to increase. This relationship is unlikely due to households' innate ability to forecast the stock market. Rather, it appears that expectations could be related to consumer sentiment, as the relationship between expectations and stock market movements weakens after controlling for a measure of sentiment developed in prior financial research (Baker & Wurgler, 2007).

Alone, these data are consistent with at least two explanations: (1) our preferred hypothesis, that reporting low probabilities in response to positively framed expectations questions yields apparent pessimism, or (2) an alternative, that respondents are systematically pessimistic about future stock market movements regardless of question frame. To explore these competing hypotheses, we turn to Study 2 and two different ways of eliciting stock market expectations.

### **3. Study 2: A framing effect results from a bias toward 0% in probability responses**

In this study, we sought to understand whether there is a bias toward 0% in probability responses across stock market expectations questions. If respondents are not confident about their ability to forecast stock market movements and this lack of confidence biases their responses toward 0%, we should see that probability responses consist of low numeric figures regardless of question wording. Therefore, we administered two opposing questions about the stock market — one asking about the stock market being “higher” in the future and one about the stock market being “lower” — to see whether probability responses were low in each frame. In addition, we provided initial, suggestive evidence that confidence may be related to reported

expectations by seeing how expectations vary across likely correlates of confidence: financial literacy and subjective numeracy.

### 3.1 Method

**Sample.** This study was approved by the Institutional Review Board at NORC. Participants were sampled from NORC's AmeriSpeak panel (<https://www.amerispeak.org/>), a probability-based panel designed to be representative of the U.S. household population.<sup>2</sup> We analyzed a merged data set consisting of an onboarding survey and subsequent monthly surveys. In the onboarding survey, conducted in July and August 2020, 4,602 participants answered a 20-minute survey about their expectations of future events, recent events in their household, employment status throughout 2020, financial coping behaviors, and financial well-being, among other topics (response rate = 77.5%). Following that onboarding survey, a subsample of approximately 1,200 to 1,500 respondents were invited to answer 10-minute monthly surveys in which they answered a subset of questions from the onboarding survey, including stock market expectations. In particular, an initial sample of 1,193 respondents was invited to take the August monthly survey and every subsequent monthly survey. In September and October 2020, two supplementary samples of approximately 200 invitees were added. A third supplementary sample of 100 participants was added in January 2021. Finally, the April sample contained a larger set of respondents, before returning to the standard monthly survey in May. Each monthly survey was administered in the third week of the corresponding month.

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<sup>2</sup> Those excluded from the sample include people with P.O. Box only addresses, some addresses not listed in the USPS Delivery Sequence File, and some newly constructed dwellings. Although most AmeriSpeak households participate in surveys online, households without internet access can participate by telephone.

We analyzed data from the onboarding survey and 11 monthly surveys (response rates from 96.3% to 98.7%) meaning that the total fielding period was from July 2020 to June 2021. Because of the subject matter of our research, for both the onboarding survey and the monthly surveys, we oversampled respondents who were likely to hold securities. The median respondent was male (53% to 55% of respondents), non-Hispanic White (76% to 83%), had a college education (56% to 62%), was self-employed or working as an employee (61% to 64%), and had an annual household income of between \$50,000 and \$99,999.<sup>3</sup> On average, respondents were 55 to 56 years old ( $SD \approx 15$ ). Reflecting our oversampling, 84% to 86% of the participants were investors,<sup>4</sup> as opposed to approximately 58% of all U.S. families (Federal Reserve Board, 2023).<sup>5</sup>

**Stock market expectations.** Each month, respondents were randomly assigned to one of two framing conditions to provide monthly and yearly expectations. Those in the “positive” framing condition were shown questions that asked about the stock market being “higher” in the future, whereas those in the “negative” frame were asked about stock market declines. The specific wording was: “What do you think is the percent chance that **[1 month/12 months]** from **now**, on average, stock prices in the U.S. stock market will be **[higher/lower]** than they are now?” As the framing conditions were randomly assigned each month, participants who

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<sup>3</sup> Annual household income is collected in the following bins: Less than \$5,000; \$5,000 to \$49,999; \$50,000 to \$99,999; \$100,000 to \$149,999; \$150,000 to \$199,999; and greater than \$200,000.

<sup>4</sup> We asked respondents to report whether they or anyone in their household owned the following types of assets: “Retirement investment accounts (for example, IRAs, 401(k), 403(b), 457),” “College investment account which provides tax advantages (known as a ‘529 Plan’),” “Other investment accounts not covered (for example, a ‘brokerage’ account or an ‘advisory’ account),” and “Financial investment assets such as stocks, bonds, mutual funds, that you do not hold in an account (for example, because you purchased them directly from the company).” Anyone who reported “yes” to any of these four categories was considered an “investor.”

<sup>5</sup> The Federal Reserve calculates combined direct and indirect stock holdings (with indirect holdings including pooled investment funds and other managed assets). In the 2022 Survey of Consumer Finances, 58% of U.S. families had stock holdings.

responded in multiple months were likely to see both question frames. In a particular monthly survey, however, the frame was the same for both monthly and annual expectations questions.

Participants were asked to provide their expectations in an open text box that restricted answers from 0% to 100%. They could also decline to answer those questions by hitting the “next” button. The average non-response rate across the surveys was 2.2% ( $SD = 0.6\%$ ) for the monthly question and 2.6% ( $SD = 0.7\%$ ) for the annual question.

To make all responses equivalent for analysis, regardless of frame, we calculated the expectation of a stock market increase for all participants. Specifically, we took 100 less the responses given in the negative frame; for example, a reported 80% chance of the stock market being lower was converted to a  $100 - 80 = 20\%$  chance of it being higher. This method has been used in prior research (e.g., Payne et al., 2013).

**Demographic and background variables.** Sampling participants from the AmeriSpeak panel allowed us to link their survey responses to existing data. Demographic variables that are used by AmeriSpeak in weighting (e.g., age, gender) are initially collected by NORC when participants are invited to join AmeriSpeak and are refreshed approximately annually. In addition, we merged in measures of financial literacy (Lusardi & Mitchell, 2011) and subjective numeracy (based on Fagerlin et al., 2007) from prior surveys to explore whether our predicted framing effects were moderated by these variables.

## 3.2 Results

### 3.2.1 Are stock market expectations subject to a framing effect?

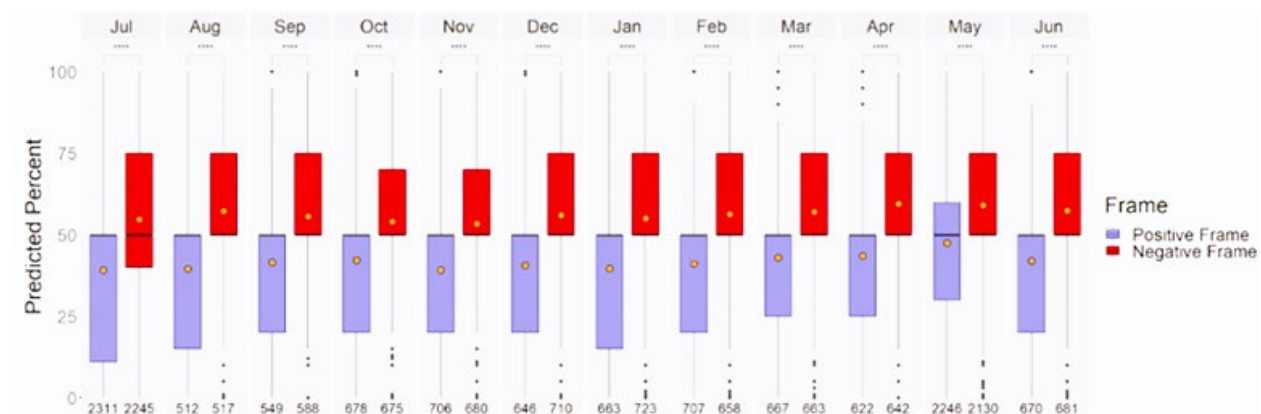
Every survey wave showed a substantial difference in average monthly expectations between the two framing conditions (Figure 1, top panel). For instance, in the onboarding

survey, respondents in the negative frame reported an average probability of 54.8% ( $SD = 26.9$ ) that the stock market would increase in the next month, relative to the 39.3% ( $SD = 25.1$ ) chance that was reported by participants in the positive frame ( $t = -20.02, p < .001$ ). As such, participants in the positive frame appeared to report more negative expectations of future stock market movements. When calculated across surveys, the average difference in monthly expectations across the frames was 14.3 ( $SD = 1.6$ ) percentage points.

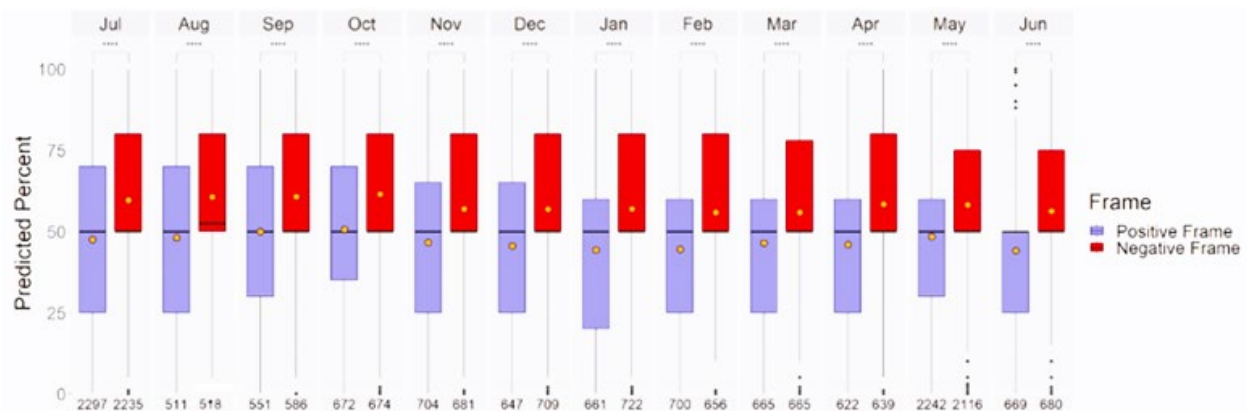
Annual expectations largely followed the same pattern (Figure 1, bottom panel). In the onboarding survey, for instance, average expectations for a stock market increase were 59.6% ( $SD = 25.2$ ) in the negative frame and 47.6% ( $SD = 27.3$ ) in the positive frame. Across all surveys, the average difference in expectations was 11.2 ( $SD = 0.9$ ) percentage points. Figure 1 also shows that participants tended to be more optimistic about the probability of a stock market increase over the next year, relative to the next month.

**Figure 1.** Average expectations for stock market increases over the next month and year, by survey and question frame.

*Expectations for a Stock Market Increase Over the Next Month*



### Expectations for a Stock Market Increase Over the Next Year



*Note:* Figure displays expectations of a stock market increase over the next month (top panel) and year (bottom panel) by frame. Responses in the “negative frame” condition are transformed by taking 100 minus the reported probability. Numbers below each boxplot show the number of participants answering that survey question that month. Mean expectations for each month are shown by dots within each boxplot. In every survey wave, mean expectations for stock market increases, over the next month (top panel) and year (bottom panel), differ between positive and negative frames at  $p < .001$ .

These simple analyses do not account for the panel aspect of these data. We also estimated the framing effect when including month-level fixed effects to accommodate potential differences in aggregate expectations due to recent events, and individual-level fixed effects to accommodate potential correlations between a given respondent’s answers over time. With this structure, we find an estimated difference of 15.1 and 11.7 percentage points for monthly and annual expectations by frame, respectively (see Appendix B for full regression table).

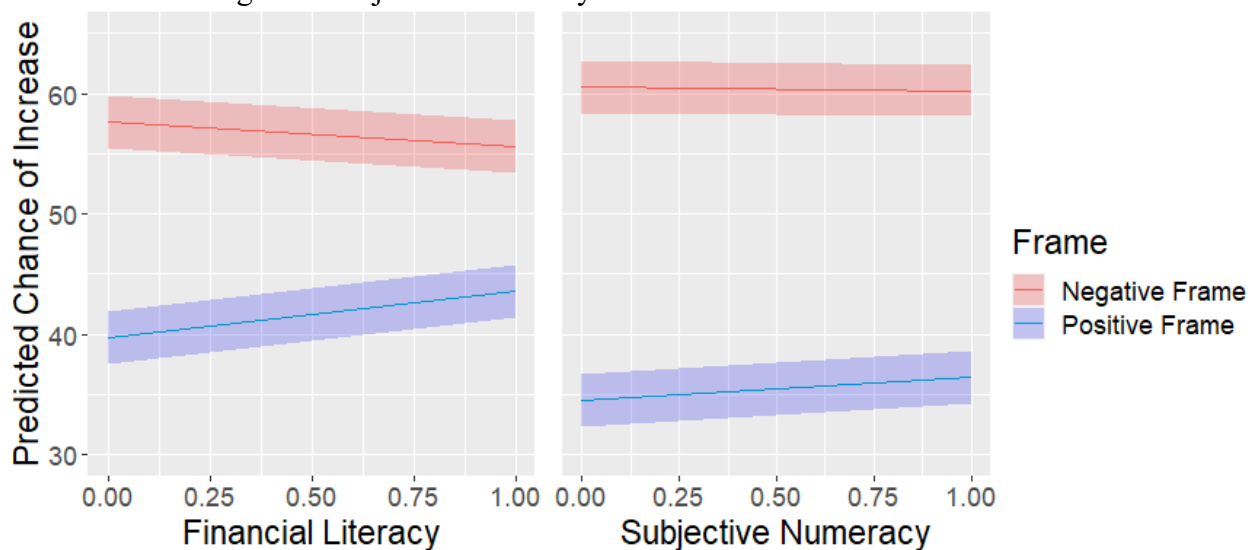
### 3.2.2 Is the framing effect moderated by respondents’ financial literacy or subjective numeracy?

The gap in expectations between the two monthly frames was smaller for both financially literate respondents and more numerate respondents, relative to those with lower levels of financial literacy or subjective numeracy (Figure 2; see Appendix B for estimating regression).



Notably, however, the framing effect held at all levels; a Johnson-Neyman test showed that the difference is statistically significant across the entire range. Annual expectations followed the same qualitative pattern (Appendix B). Possibly, more financially literate or subjectively numerate respondents felt more confident in their stock market forecasts, due to relative familiarity with investing or comfort with their ability to translate beliefs into a numeric probability, leading to slightly higher reported probabilities.

**Figure 2.** Reported monthly stock market expectations for respondents with different levels of financial knowledge and subjective numeracy.



*Note:* Graphs are generated using estimates from regressions in Appendix B. Shaded areas show 95% confidence intervals.

### 3.3 Discussion

In Study 2, we sought to show that probability responses to stock market expectations questions are generally biased toward 0%. To do so, we asked participants to forecast either the likelihood of a stock market increase or decrease over the next month and year. Consistent with our predictions, we found that average reported probabilities were regularly quite low (generally hovering between 35% and 50%, depending on the month), no matter which question was asked.

Accordingly, the reported probabilities yielded a robust difference in expectations of a stock market increase across question frames, with an average gap of approximately 15 percentage points in monthly expectations and 11 percentage points in annual expectations. Notably, the previously identified tendency for people to revert to 50/50 responses as an expression of uncertainty (Bruine de Bruin & Carman, 2012; Chin & Bruine de Bruin, 2018; Fischhoff & Bruine de Bruin, 1999) would not have produced this kind of framing effect. This study can therefore provide a partial (and novel) explanation for general levels of pessimism discovered in surveys that ask for stock market expectations using a positively framed question: People give low probability estimates when predicting *either* positive or negative stock market movements.

This study had two limitations that we sought to address in Study 3. First, a possible alternative explanation for the gap in expectations is that some participants interpret the questions as asking whether the stock market is going to be *substantially* higher or lower — essentially assigning a non-zero probability to the chances that it “stays the same” by moving within some relatively small margin. Indeed, a supplemental study showed that a more precise version of the stock market expectations question, that asks about a change as small as “a fraction of a percentage point,” narrows – but does not eliminate – the gap between the frames (see Appendix C). As such, we use this more precise wording in Study 3.

Second, according to our hypothesis, a lack of confidence in one’s ability to forecast the stock market leads to lower reported probabilities. To provide suggestive evidence on this point, we examined expectations for respondents with different levels of financial literacy and subjective numeracy, using these variables as proxies for confidence. Consistent with our hypothesis, the framing effect is smaller among these respondents. Ultimately, however, Study 2 did not have a direct measure or manipulation of confidence. We turn to this issue in Study 3.

#### 4. Study 3: Lower confidence can move reported probabilities toward 0%

In Study 3, we aimed to demonstrate a causal relationship between confidence in one's ability to forecast stock market movements and reported probabilities. To do so, we manipulated confidence and examined resulting expectations.

##### 4.1 Method

**Sample.** This study was approved by the Institutional Review Board at [redacted for review] and pre-registered at [https://aspredicted.org/VH7\\_VZ8](https://aspredicted.org/VH7_VZ8). We recruited 1002 U.S. participants from Prolific Academic, an online pool of research participants. The sample was 50% male (48.1% female; 1.9% another gender identity) and 40.0 ( $SD = 17.1$ ) years old on average. Overall, 73.6% of participants reported having at least some financial investments (mutual funds, stocks, bonds, cryptocurrency, or other). Similarly, 76.5% of participants reported that they had at least a little investing experience (23.5% reported no experience, 39.2% reported a little experience, 25.9% reported some experience, and 11.4% reported a lot of investing experience).

**Design.** The study was a 2x2 between-subjects design. The first factor was the confidence manipulation (high/low), and the second factor was the question frame (higher/lower). To manipulate confidence, we provided participants with the following information, inspired by our Study 1:

Surveys conducted by the New York Federal Reserve Bank have asked participants to predict the likelihood that U.S. stock prices will be higher in one year.

*High confidence condition:* Participants often find this question to be difficult, but

actually, their predictions are usually quite predictive; **most predictions are related to actual stock market performance.**

*Low confidence condition:* Participants often find this question to be difficult, and indeed, their predictions are usually quite inaccurate; **most predictions are far away from actual stock market performance.**

We view both of the manipulations as providing true, albeit incomplete information when viewed on a between-subjects level. Specifically, Study 1 shows that aggregate stock market predictions are positively correlated with future stock market movements (and therefore “related to actual stock market performance”), but also pessimistic on average (and therefore “far away from actual stock market performance”). A pre-test of U.S. Prolific participants ( $n = 124$ ) showed that the High Confidence condition led to significantly greater confidence in one’s ability to make forecasts about future stock market performance than the Low Confidence condition, measured using the same confidence questions described below,  $t(122) = 2.30, p = .023$ .

**Stock market expectations.** We asked: “What do you think is the percent chance that **1 month from now**, on average, stock prices in the U.S. stock market will be **lower/higher** than they are now, even by a fraction of a percentage point? (Please enter a number between 0 and 100 below).”

**Confidence measures.** We asked two questions: “How easy does it seem to make accurate predictions about stock market movements?” (1 = Not at all easy to 7 = Very easy) and “How confident are you about your ability to predict future stock market movements?” (1 = Not

at all confident to 7 = Very confident). These two items were highly correlated ( $r = 0.72$ ) and we averaged them together to form a confidence index.

## 4.2 Results

### 4.2.1 Does confidence in one's ability to forecast stock market movements affect reported probabilities?

In a pre-registered regression in which we interacted confidence and framing conditions on the expectations of a stock market increase, we found that confidence affected expectations.<sup>6</sup> Table 3 shows that those in the high-confidence condition provided more optimistic expectations than those in the low-confidence condition, but this effect was qualified by a significant interaction with framing condition. Specifically, the effect of confidence was concentrated among the participants who were in the “higher” frame. In addition, consistent with Study 2, those in the negative frame condition were more optimistic about future stock market movements overall. Figure 3 shows expectations graphically, demonstrating that the gap between the positive and negative frames is smaller in the high-confidence condition than in the low-confidence condition.

**Table 3.** Regression results predicting outcomes by confidence manipulation and frame.

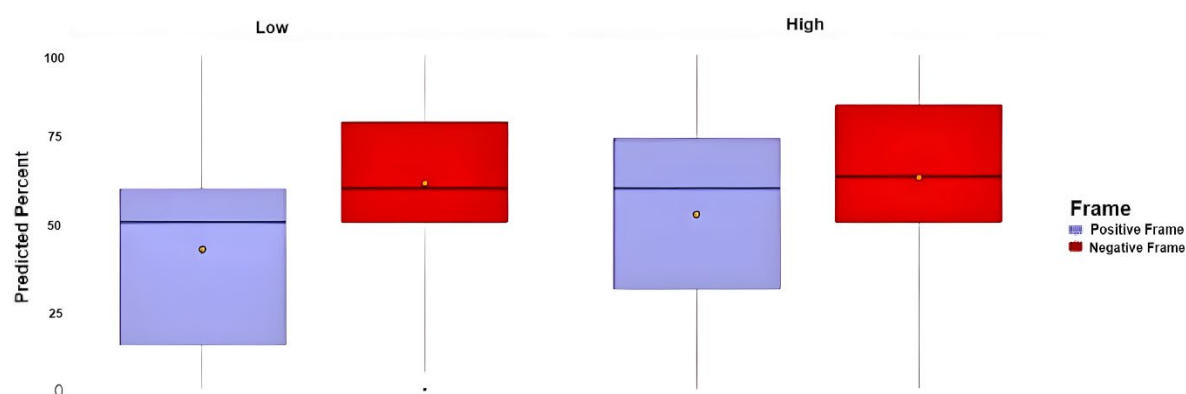
	Expectations of stock market increase	Confidence score
High-confidence condition	10.36*** (2.36)	0.59*** (.11)
Stock market lower (negative frame)	19.64 *** (2.36)	-0.13 (.11)

<sup>6</sup> In our pre-registration, we stated that we would regress on a dummy variable for being in the “stock market higher” condition. We instead regress on a variable for “stock market lower” to be consistent with Study 2.

Negative frame X high-confidence condition	-8.60** (3.33)	-0.22 (.16)
Constant	41.89*** (1.66)	2.22*** (.08)
$R^2$	0.10	0.04

Note:  $N = 1002$ . \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

**Figure 3.** Expectation of a stock market increase by confidence manipulation and frame.



Note: Figure displays expectations of a stock market increase over the next month by frame. Responses in the “negative frame” condition are transformed by taking 100 minus the reported probability. Mean expectations for each month are shown by dots within each boxplot.

**Manipulation check.** Participants in the high-confidence condition reported higher average confidence than those in the low-confidence condition (Table 3). There was no main effect of frame or interaction effect between the two conditions.

### 4.3 Discussion

This study demonstrates that confidence in one’s ability to forecast the stock market can affect reported probabilities on stock market expectations questions. In particular, among participants who view a question asking about the stock market moving “higher,” raising participants’ confidence also increases reported probabilities. While there is no effect of

manipulated confidence on participants viewing a question about the stock market falling, this question is less commonly administered on large-scale surveys (see Table 1). The pattern between confidence and expectations suggests that individuals' generally low confidence regarding their ability to predict stock market movements might have been partly responsible for the pessimism seen in Studies 1 and 2 and other large-scale surveys of stock market expectations. Indeed, average confidence is below the midpoint even for participants in the High Confidence condition, suggesting that the average consumer is unlikely to be confident about their forecasting ability.

## **5. General Discussion**

Expectations about stock market performance drive individual investment decisions, and measurement of these expectations, in turn, informs economic and regulatory policy. Reflecting this importance, many nationally representative surveys seek to elicit stock market expectations, typically by asking about stock market increases (Table 1). In the current research, we explored a new explanation for how expectations are formed: those who experience low confidence in their ability to forecast stock market movements also report expectations that are biased toward 0%. Our three studies addressed this hypothesis in different ways. In Study 1, with 10 years of nationally representative data, we showed that average expectations in response to a positively framed expectation question were lower than expected when compared to stock market movements. In Study 2, using panel data over the course of a year, we showed that low responses were prevalent in both positive and negative frames; Study 1's responses may be partially explained by a bias toward lower probabilities rather than general pessimism. In Study 3, we demonstrated a causal connection between confidence and stock market expectations, showing



that the framing effect in Study 2 is moderated by participants' confidence. Though we do not recommend using these confidence manipulations outside of research, our findings suggest that future work consider the role of confidence in determining reported expectations.

## **5.1 Relationship between confidence and expectations**

Significant research has documented pervasive pessimism about future stock market movements (e.g., Hurd, 2009; Hurd et al., 2011; Kézdi & Willis, 2009), as well as lack of confidence about reported stock market expectations (e.g., Chin & Bruine de Bruin, 2018). We believe that a lack of confidence provides a relatively straightforward explanation for the apparent pessimism characterizing stock market expectations: when individuals are asked to consider a target event (namely, an increase in stock market value), they try to recruit evidence to support that possibility (a positive test strategy, Klayman & Ha, 1987). When obvious confirmation of the event under consideration is missing—which it must be in the case of the stock market, since the market is known to be difficult to predict and individuals generally have no inside information—individuals substitute their confidence in the domain as information regarding what likelihood judgment to offer.

To test whether participants engage in this proposed process, substituting their confidence in a domain for the likelihood of the event in question, we altered the target event participants considered in Studies 2 and 3 by using a “framing effect” manipulation; some participants considered the likelihood that stock market prices would go up, while others considered the likelihood prices would go down. Framing effect studies conducted over multiple decades have shown that evaluations are affected by simple wording changes that shift the focus of evaluation, such as whether beef is described as “25% fat” or “75% lean” or whether a surgery is described

in terms of “mortality” or “survival” rates (Levin, Schneider, & Gaeth, 1998). Most framing effects are valence-consistent, meaning that wording with a positive valence creates positive evaluations (e.g., beef is evaluated more positively when described as “75% lean” instead of “25% fat”); indeed, in Levin and colleagues’ original (1998) review, *none* of the 36 papers studied showed valence-inconsistent effects. A more recent meta-analysis of 109 published articles investigating valence framing effects in moral judgments also showed a moderate but robust effect ( $d = 0.50$ ) in favor of valence-consistent framing (McDonald et al., 2021).

This extensive literature would seem to predict that positively-valenced questions about the stock market (i.e., those asking about a stock market increase) would lead to relatively *optimistic* expectations. Alternatively, past research purporting to show general pessimism about future stock market movements (e.g., Hurd, 2009; Hurd et al., 2011; Kézdi & Willis, 2009) does not touch on how the valence of a question drives expectations. Our research is in contrast to those two literatures. Specifically, we discovered a bias in reported probabilities toward 0%, regardless of frame, which manifested in respondents making *less* optimistic predictions about the future value of the stock market when asked to consider the likelihood that market prices will be *higher*, relative to situations in which they are asked to consider the likelihood that market prices will be lower.

Research exploring both framing effects and expectations questions is relatively rare. The closest relevant research may be a series of studies that assess how survival expectations differ depending on whether respondents are asked if they will “live to” or “die by” a particular age (Bruine de Bruin & Carman, 2012; Comerford, 2019; Comerford and Robinson, 2017; Payne et al., 2013). Among these studies, the effect of frame on reported probabilities is inconsistent, yet none of the papers shows a potential bias toward 0%. One possibility is that assessing one’s

own life expectancy is categorically distinct from assessing the probability of stock market movement—whereas individuals have unique information about their own survival and may therefore feel relatively expert in making those judgments, forecasting future stock market performance is a domain where many individuals feel relatively naïve and lack confidence in their ability to make predictions.

Accordingly, it is possible that a bias toward 0% in reported probabilities could be partially driven by ambiguity aversion. Such an account builds on work by Heath and Tversky (1991), who show a relationship between confidence and preference for ambiguous events. Specifically, they ask decision makers to report the probability that a given event will occur and then offer them unambiguous, matched gambles (e.g., for a judged 70% chance that an event will occur, consider a bet with a 70% chance of winning and 30% chance of losing). Individuals are more likely to prefer their own judgment in domains where they feel confident, and the unambiguous gamble in domains where they do not. If people treat stock market expectations questions as gambles that the stock market will go up or go down, it is possible that a reluctance to “bet” when feeling relatively incompetent could affect reported probabilities – contributing to the downward bias we explored. Because individuals fail to consider the likelihood of the opposite, complementary event (Teigen & Brun, 1995; Teigen & Brun, 1999), we hypothesize that this one-sided consideration of a target event’s likelihood—combined with a lack of confidence in the domain—leads to apparent pessimism in expectations. To our knowledge, no prior research has linked these two patterns of confidence and apparent pessimism in a causal manner.

## **5.2 Implications for measurement and research on expectations**

Our findings contribute to growing economic literatures on expectations measurement, elicitation, and modeling (Manski, 2004; Hurd, 2009), identifying subtle factors (confidence and question framing) that may affect the accuracy and reliability of surveyed expectations.

Researchers may want to consider the effects of two types of uncertain survey respondents: those who tend toward 50/50 probability judgments to express uncertainty (e.g., no one knows the answer; Fischhoff & Bruine de Bruin, 1999; Bruine de Bruin, et al., 2000), and those who manifest a bias toward 0% probability responses as documented here. Future research could better understand whether these are individual- or domain-specific tendencies, as well as moderators of these effects.

Other elicitation methods may suffer less from these response biases. For example, Lichtenstein and Fischhoff (1977) used a two-step elicitation process to ask participants about the likelier direction of a binary event and then the probability of the selected direction. When applied to our domain, that would mean first asking, “Do you think the market is more likely to go up or down in the next year?”, and then eliciting a probability estimate in the 50% to 100% range. As the full 0% to 100% response scale is not available, we expect this method would be less likely to elicit low reported probabilities as a result of low confidence. Furthermore, such a two-step elicitation process may clarify that the market is unlikely to stay exactly the same, and reduce the possibility that uncertain respondents would default to leaving some probability allocated to a sideways market movement. Additional alternative methods include “density forecasts” that ask participants to assign a total 100% probability across multiple bins (Armantier et al., 2017) or asking participants to indicate which of two events is more likely (e.g., that stock prices will change by 0% to 2% or 2% or more; Goldfayn-Frank, Kieren, & Trautmann, 2024). Each of these alternative approaches may take more time and effort for survey respondents than

a single probability judgment, but the possible reduction of bias may be worth the additional effort.

### **5.3 Implications for stock market investing and policy**

Low confidence about one's stock market forecasting ability is reasonable. Indeed, literature in financial economics warns that retail investors who pick stocks underperform relative to diversified index funds (Barber & Odean, 2013). Furthermore, the central theory of financial markets, the Efficient Market Hypothesis, suggests that stock market prices are subject to the “random walk” (Fama, 1965; Fama, 1970), meaning that prices are unpredictable. At the same time, major stock market indexes like the S&P 500 index have long-run positive trends that represent an opportunity to save for aspirations such as financing retirement and higher education. As such, it seems worthwhile for future research to explore ways to explain the long-run value of investing without falsely increasing confidence in one's forecasting ability, particularly among the millions of Americans who have no stock market assets (Federal Reserve Board, 2023). One finding from Study 2 is that individuals are more optimistic about the probability of a stock market increase over the next year, relative to the next month. As such, perhaps greater emphasis could be placed on long-run changes in major stock market indexes, so as to draw attention to these (potentially more positive) long-run trends.

Ultimately, future work is needed to better understand when survey questions will accurately capture people's true beliefs about present and future stock market conditions, and when they might instead tap into people's confidence in their forecasting abilities. Our findings suggest that expectations questions can be framed in ways that yield apparently different beliefs about future stock market movements—but these beliefs are expressed in terms consistently

biased toward 0%. We propose that individuals' confidence drives these effects, and that increased confidence may help to reduce such bias. However, because the stock market is inherently difficult to predict, standard expectations elicitation procedures may be especially prone to bias. To the extent that similar patterns affect a host of macroeconomic expectations, they are important to understand—and the questions used to capture these expectations are important to improve.

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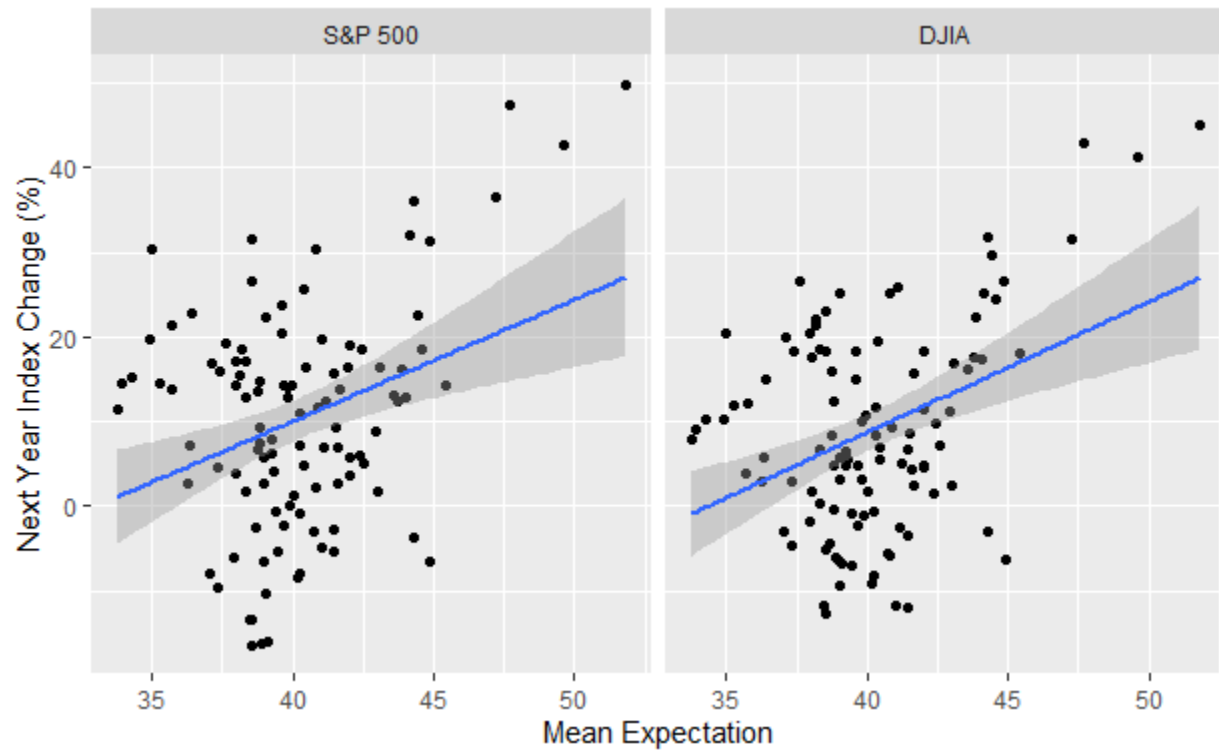
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## Appendix A: Materials Related to Study 1 (SCE)

**Figure A1.** Stock market expectations are correlated with future stock market movements.



*Note:* Left panel shows S&P 500 index, right panel shows Dow Jones Industrial Average. Each point on the x-axis represents the average expectation given by participants in a given month, as provided by the SCE.

## Appendix B: Materials Related to Study 2

**Table B1.** Regression results predicting monthly expectations.

	(1)	(2)	(3)	(4)
Negative Frame Condition	15.119*** (0.344)	14.286*** (0.329)	14.276*** (0.328)	14.460*** (0.326)
Subjective numeracy score (high vs. low)			0.838* (0.352)	2.034*** (0.494)
Financial literacy score (high vs. low)			1.092** (0.371)	4.082*** (0.520)
Investor (vs. non-investor)			0.817 (0.513)	0.797 (0.717)
College graduate			1.073 (0.557)	3.475*** (0.784)
Female			-3.125*** (0.342)	-5.764*** (0.481)
Age 60+			0.712* (0.335)	-1.846*** (0.469)
White			-1.070* (0.428)	0.285 (0.603)
Income low (vs. medium)			0.617 (0.604)	0.381 (0.851)
Income high (vs. medium)			0.837* (0.365)	0.924 (0.511)
<u>Interactions with negative frame</u>				
Subjective numeracy				-2.481*** (0.699)
Financial literacy				-6.042*** (0.737)
Investor				-0.020 (1.017)
College graduate				-4.691*** (1.107)
Female				5.372*** (0.679)
Age 60+				5.229*** (0.664)
White				-2.794** (0.849)
Income low (vs. medium)				0.532 (1.199)
Income high (vs. medium)				-0.086 (0.725)
Constant		42.104*** (0.233)	42.065*** (0.232)	41.973*** (0.230)

Time fixed effects	X			
Participant fixed effects	X			
Observations	21,670	21,670	21,658	21,658
$R^2$	0.103	0.080	0.087	0.101

*Note:* \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ . Each independent variable was transformed into an indicator variable, de-meanned and interacted with an indicator for being the Negative Frame.



**Table B2.** Regression results predicting annual expectations.

	(1)	(2)	(3)	(4)
Negative Frame Condition	11.699*** (0.342)	11.152*** (0.347)	11.120*** (0.346)	11.259*** (0.345)
Subjective numeracy score (high vs. low)			1.748*** (0.371)	2.894*** (0.522)
Financial literacy score (high vs. low)			1.753*** (0.392)	4.041*** (0.551)
Investor (vs. non-investor)			-0.392 (0.541)	-0.963 (0.759)
College graduate			2.006*** (0.588)	4.595*** (0.829)
Female			-1.677*** (0.361)	-3.498*** (0.509)
Age 60+			-0.600 (0.353)	-2.996*** (0.496)
White			-1.846*** (0.451)	-0.755 (0.638)
Income low (vs. medium)			0.022 (0.638)	0.221 (0.903)
Income high (vs. medium)			0.296 (0.385)	0.446 (0.541)
<u>Interactions with Negative Frame</u>				
Subjective numeracy				-2.371** (0.739)
Financial literacy				-4.614*** (0.780)
Investor				1.099 (1.077)
College graduate				-5.059*** (1.171)
Female				3.721*** (0.719)
Age 60+				4.868*** (0.703)
White				-2.243* (0.898)
Income low (vs. medium)				-0.391 (1.271)
Income high (vs. medium)				-0.232 (0.767)
Constant		47.135*** (0.245)	47.102*** (0.245)	47.032*** (0.244)
Time fixed effects	X			
Participant fixed effects	X			

Observations	21,606	21,606	21,593	21,593
$R^2$	0.066	0.046	0.052	0.061

*Note:* \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ . Each independent variable was transformed into an indicator variable, de-meaned and interacted with an indicator for being the Negative Frame.

## **Appendix C: Materials Related to Study 3**

### **Overview of Pilot Test**

The goal of this study was to determine whether the gap between the frames is due to participants assigning a probability to the chances that the market “stays the same,” despite the empirically small likelihood that market prices would stay exactly the same over a month’s or a year’s time. If participants do assign a probability to market prices remaining the same, a gap could emerge between frames when questions only ask about stock market increases or decreases. To explore this possibility, we employed an alternative, more precise question designed to clarify that the reported probabilities should be reported for any stock market movement, no matter how small. In this study, we compare this precise wording to the standard question used in Studies 1 and 2.

### **Method**

#### **Sample**

We sampled U.S. participants from Prolific and dropped observations from those with duplicate participant IDs and non-completes, resulting in a total of 1201 observations.

#### **Procedure.**

We ran a 2x2 between-subjects design. The first factor was framing (stock market lower/higher). The second factor was the question wording (standard vs. precise). Specifically, the wording of the standard question was:

What do you think is the percent chance that 1 month from now, on average, stock prices in the U.S. stock market will be [higher/lower] than they are now?

The wording of the precise question was:

What do you think is the percent chance that 1 month from now, on average, stock prices in the U.S. stock market will be [higher/lower] (even if just by a fraction of a percentage point) than they are now?

As elsewhere, we transformed all reported probabilities into expectations for stock market increases, by taking 100 less the probabilities in the negative frame.

## Results

There was a significant difference in stock market expectations across the positive and negative frames using standard wording ( $M_{\text{positive}} = 39.89$  (SD = 23.28) vs.  $M_{\text{negative}} = 56.05$  (SD = 22.92),  $t = -8.58$ ,  $p < .001$ ). Within the precise wording, there was also a significant difference ( $M_{\text{positive}} = 45.54$  (SD = 24.26) vs.  $M_{\text{negative}} = 50.52$  (SD = 23.55),  $t = -2.55$ ,  $p = 0.011$ ). A regression model (below) shows that there was a significant interaction between valence and precision. The narrowing of the framing effect from the standard wording to the precise wording suggests that participants may be assigning some probability to the chance the market stays the same. As such, we use the precise question wording in Study 3.

	Expectations of stock market increase
Stock market lower (negative frame)	16.16*** (1.92)
Precise wording	5.65** (1.92)
Negative frame X precise wording	-11.18*** (2.71)
Constant	39.89*** (1.35)
Observations	1,201
R <sup>2</sup>	0.061

Note. N = 1,201. \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .