Mental Models of the Stock Market

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Abstract: Investors' return expectations are pivotal in stock markets, but the reasoning behind these expectations remains a black box for economists. This paper sheds light on economic agents' mental models – their subjective understanding – of the stock market, drawing on surveys with the US general population, US retail investors, US financial professionals, and academic experts. Respondents make return forecasts in scenarios describing stale news about the future earnings streams of companies, and we collect rich data on respondents' reasoning. We document three main results. First, inference from stale news is rare among academic experts but common among households and financial professionals, who believe that stale good news lead to persistently higher expected returns in the future. Second, while experts refer to the notion of market efficiency to explain their forecasts, households and financial professionals reveal a neglect of equilibrium forces. They naively equate higher future earnings with higher future returns, neglecting the offsetting effect of endogenous price adjustments. Third, a series of experimental interventions demonstrate that these naive forecasts do not result from inattention to trading or price responses but reflect a gap in respondents' mental models – a fundamental unfamiliarity with the concept of equilibrium.

JEL-Codes: D83, D84, G11, G12, G41, G51, G53.

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1 Introduction

Stock markets revolve around market participants' return expectations. They shape investment decisions (Beutel and Weber, 2022; Giglio et al., 2021a), their heterogeneity generates trading (Laudenbach et al., 2023), and expectation anomalies can drive important market-level phenomena such as excess volatility and bubbles (Adam and Nagel, 2023; Barberis et al., 2015, 2018). Importantly, investors' return expectations are formed in light of their deeper understanding – their "mental model" – of the stock market. However, conventional data on aggregate stock prices, agents' trading decisions, and even data on subjective expectations remain silent on agents' reasoning and subjective understanding. Thus, even though return expectations are pivotal in stock markets, the mental models underlying agents' return expectations are not well understood.

In this paper, we aim to open this black box and explore the mental models that shape agents' stock return expectations. How widespread, for example, are beliefs in market efficiency (Fama, 1970)? Do agents consider and account for temporary mispricing (De Bondt and Thaler, 1985)? Do some agents neglect equilibrium forces and price adjustments when forming return expectations? To answer these questions, we adopt a tailored survey-based approach and combine rich expectation data with qualitative text data on agents' reasoning. We field our survey with a diverse group of economic agents: approximately 2,400 US households from a general population sample, 400 US retail investors, 400 US financial professionals, and 100 academic experts, who provide a state-of-the-art academic benchmark. In addition, we run a series of experiments with over 3,000 additional US households to further explore the roots of households' mental models.

Our empirical methodology is comparable across samples and hinges on scenarios that present participants with news relevant to the future earnings stream of a specific company. Participants read two alternative scenarios, one describing a relatively neutral and expected event (e.g., "Nike maintains supplier partnership"), the other describing either good or bad unexpected news (e.g., "Nike secures cost-saving partnership"). Crucially, the news is four weeks old and hence "stale". Participants predict in which scenario the expected future stock return of the company would be higher. Then, they explain the reasoning underlying their return forecast in a qualitative, open-ended question. Lastly, they predict differences in the company's earnings and risk profile across the two scenarios for multiple horizons. We mostly rely on hypothetical news scenarios, which allows us to hold constant information sets across respondents and simplifies the collection of text data on respondents' reasoning. However, we demonstrate the robustness of our main results to relying on real news items instead.

Focusing on stale, earnings-relevant news and combining expectation with qualitative

text data allows us to differentiate between beliefs in different models of how financial markets work. Throughout our analysis, we study three broad classes of mental models: beliefs in market efficiency, beliefs in temporary mispricing, and a naive neglect of equilibrium pricing, i.e., the tendency to directly equate higher expected earnings with higher expected returns. For instance, respondents believing in efficient markets should predict and explain that four-week-old news about future earnings are already fully incorporated into the stock price, with lasting effects on expected returns arising only from changes in risk factor exposure that investors need to be compensated for. By contrast, if respondents neglect equilibrium forces and price adjustments in response to news, they will directly link the prospect of a higher future earnings stream with persistently higher future returns. While offering the possibility to distinguish between different mental models, earnings-relevant news are also a subject frequently covered in financial media, making our scenarios relevant and meaningful to respondents.

We document three main sets of results. In a first step, we investigate the extent to which respondents believe that stale news about future earnings still matter for companies' future stock returns. Few academic experts believe so, with about 70% predicting no change in future returns in response to stale news. This stands in stark contrast to the forecasts among general population respondents, retail investors, and financial professionals. Across the different scenarios, 60% to 80% of the general population respondents predict higher returns over the next 12 months in response to four-week-old positive news about future earnings (and lower returns for negative news, respectively). This share declines for periods exceeding 12 months, yet remains high at around 40% even for returns four years into the future. We find similar patterns when eliciting forecasts about overall stock market returns in scenarios describing stale macroeconomic news with implications for future aggregate economic growth. Among retail investors and financial professionals, we observe a similar picture as among households: around 75% of retail investors and financial professionals predict higher (lower) returns in response to stale good (bad) news.

In a second step, we explore which mental models of the stock market are underlying respondents' return forecasts. An open-ended question asks respondents to explain why they made a specific prediction. These responses provide a direct lens into participants' reasoning, and the open-ended format ensures that respondents express what is on top of their mind without being primed on any specific mechanism or argument. To preserve the richness of the data, responses are manually classified according to a pre-designed coding scheme. We find that reasoning in line with market efficiency is dominant in the expert sample. For example, a typical expert would argue that "[t]he effect on future profits and dividends should already be reflected in the current price." By contrast, respondents from the general population, retail investors, and financial professionals often justify their return forecasts by referring to changes in companies'

earnings, arguing, for example, in terms of profit margins, sales volume, or production costs. Households and financial professionals thus directly link differences in future company earnings with differences in expected future returns, consistent with a full or partial neglect of the equilibrium price adjustments that should have occurred over the previous four weeks. Respondents' reasoning is strongly correlated with their return forecasts, and the differential tendencies to reason in terms of market efficiency or to neglect equilibrium pricing statistically account for the differences in return forecasts between academic experts and the other samples.

We confirm this observation based on two complementary approaches. Using our rich expectation data, we study how respondents' return predictions are related to their forecasts about uncertainty, risk-factor exposure, and earnings, and to proxies for beliefs in overoptimism or undue pessimism among other market participants. A belief in market efficiency and risk-based asset pricing would imply that expectations about uncertainty and risk factor exposure drive expected return differences. This is indeed what we observe among experts. A neglect of equilibrium pricing, on the other hand, would imply that return expectations co-move closely with earnings expectations, and this is indeed what we observe among general population respondents, retail investors, and financial professionals. If respondents believe in temporary mispricing due to over-optimism or undue pessimism by other market participants, they should attach positive probability to a market correction. Yet, our proxies for over-optimism or -pessimism are only weakly related to respondents' return forecasts.

Moreover, we conduct an additional experimental intervention with US households (n=1,182) designed to detect previously unobserved traces of reasoning about risk or temporary mispricing. The experimental conditions explicitly ask respondents to envision that risk exposure and uncertainty are the same across the two scenarios or that the news has already been fully priced in. If risk-based reasoning or beliefs in temporary mispricing were underlying households' forecasts, we would expect strong shifts in their return predictions in response to these interventions. Yet, neither intervention significantly reduces the proportion of respondents forecasting higher returns in response to stale news of higher future earnings. Taken together, the data show that, while experts reason in terms of market efficiency, the mental models of general population respondents, retail investors, and financial professionals largely link changes in expected earnings to changes in expected returns and neglect equilibrium price adjustments.

In a final step, we conduct two additional experiments to better understand the origins of equilibrium neglect with general population samples. The neglect could result from inattention to the trading responses by market participants and the ensuing changes in stock prices, in line with the behavioral phenomenon that indirect, contingent, and downstream consequences typically receive less attention (Bordalo et al.,

2022; Eyster, 2019; Gabaix, 2019; Niederle and Vespa, 2023). Therefore, the first experiment draws participants' attention to potential trading reactions and the ensuing price changes over the four weeks since the news announcement. Yet, even though households report that investors traded in response to the news and that stock prices changed accordingly, these interventions do not affect the proportion of respondents who infer higher returns from stale good news. The neglect of equilibrium pricing thus seems to result from a deeper "gap" in respondents' mental models: they simply do not understand that the price adjustment triggered by the news will exactly offset the change in expected future earnings. To experimentally test this idea, an additional intervention explains to respondents the concept of equilibrium and the way expected future earnings get incorporated into prices in financial markets. This intervention substantially reduces the fraction predicting higher returns in response to good news by 21 percentage points. The effect persists in a follow-up survey conducted a few days later. Thus, rather than inattention, a fundamental unfamiliarity with equilibrium seems to be central to households' return predictions. This failure to understand equilibrium leads households to neglect that earnings news tend to trigger price responses that exactly offset differences in expected future returns.

Taken together, our results highlight that heterogeneity in return expectations has deep roots. Different types of economic agents rely on systematically different mental models when forming stock return expectations. Importantly, these models do not necessarily align with prevailing economic theories, rendering it necessary to empirically study and uncover mental models "in the wild". In fact, households and financial professionals struggle to grasp the consequences of equilibrium price adjustments.

This important gap in their mental model of financial markets might help to shed light on a series of previously documented anomalies in expectation and trading data. For instance, households' expectations about aggregate stock returns are pro-cyclical: they are positively related to expectations about future economic growth (Giglio et al., 2021a), they are high during economic booms and low during recessions (Amromin and Sharpe, 2013), and they respond positively to the provision of information increasing beliefs about earnings growth (Beutel and Weber, 2022). These phenomena could be driven by a mental model that directly links expected future earnings with expected future returns, that is, a model that neglects equilibrium price adjustments. Similarly, many economic agents extrapolate past returns (Greenwood and Shleifer, 2014; Vissing-Jorgensen, 2003) – an inference that is quite natural from a mental model that links expected earnings and returns: high past returns often reflect price increases due to good news about future earnings, which, in turn, lead agents to expect high future returns. Mental models featuring equilibrium neglect could also contribute to retail investors' tendency to trade on stale news (Tetlock, 2011), to over-trade (Barber and Odean, 2000; Odean, 1999), or to prefer active investment strategies (Haa-

land and Næss, 2023), or investors' failure to understand that dividend payout reduces stock prices (Hartzmark and Solomon, 2019). To the extent that naive agents' behavior affects asset prices, equilibrium neglect would also contribute to aggregate market patterns such as short-run momentum (Jegadeesh and Titman, 1993).

Related literature We contribute to multiple strands of research. An emerging empirical literature studies subjective expectations in financial market contexts (see the review by Adam and Nagel (2023) and the references therein). These studies have mostly used observational data (Adam et al., 2017; Bordalo et al., 2019, 2023b; De La O and Myers, 2021; Giglio et al., 2021a,b) or information provision experiments (Beutel and Weber, 2022; Haaland et al., 2023; Laudenbach et al., 2023) to understand how expectations are formed and how they affect individual- and market-level outcomes. We contribute to this literature by providing the first direct evidence on economic agents' reasoning – the mental models – behind their return expectations. We show that economic agents rely on systematically different mental models when forming stock return expectations and that many agents are not aware of the important role of equilibrium price adjustments.

These empirical insights speak to a theory literature that integrates non-standard belief formation mechanisms into macro-finance models and illustrates how they can matter for aggregate market outcomes. Some studies adopt "reduced-form approaches", e.g., incorporating a subset of "extrapolators" into otherwise standard models (Barberis et al., 2015, 2018; Cutler et al., 1991; De Long et al., 1990). Other studies explore the equilibrium consequences of inference problems in financial markets (Hong and Stein, 1999). For example, Bastianello and Fontanier (2022, 2023) study learning from prices when market participants neglect that others do so as well, which they term "partial equilibrium thinking". Eyster et al. (2019) show that financial markets in which participants neglect that prices reflect others' private information generate more trade. Glaeser and Nathanson (2017) present a model of the housing market in which home buyers assume that prices only reflect contemporaneous housing demand, overlooking that future demand is also incorporated into today's prices – a mechanism closely related to the type of equilibrium neglect we document in our data. Our study provides empirical evidence on the micro-foundations of such models and highlights promising avenues for future theoretical work.

We also contribute to a literature studying economic agents' mental models and lay economic thinking in different economic contexts. Andre et al. (2022a) study households' and experts' beliefs about how macroeconomic shocks affect unemployment and inflation. Andre et al. (2022b) provide evidence on the narratives economic agents use to explain the post-pandemic surge in US inflation. Stantcheva (2021, 2023) explores

laypeople's reasoning about tax policies and trade. Our study extends this literature by offering the first direct insights into the mental models shaping people's expectations about stock returns. The observation that equilibrium consequences are often not well understood potentially reflects a general propensity to underestimate equilibrium effects, which has significant implications for people's policy views (Dal Bó et al., 2018) and strategic business decisions (Greenwood and Hanson, 2015). Moreover, we show that this important facet of financial knowledge is not captured by previous measures of people's familiarity with financial concepts and their financial literacy (Lusardi and Mitchell, 2014).

Lastly, we contribute to recent work in behavioral economics on the foundations of attention and model misspecification (Bordalo et al., 2023a, 2022; Enke, 2020; Esponda et al., 2022; Eyster, 2019; Gabaix, 2019; Gagnon-Bartsch et al., 2023; Graeber, 2023; Hanna et al., 2014; Schwartzstein, 2014; Schwartzstein and Sunderam, 2021). In our mechanism experiments, we show that, if the model is misspecified and does not attribute an important role to the market response, increasing attention to the market response is futile. Instead, an effective intervention needs to address the gap in individuals' mental models. Our evidence highlights the complementary nature of attention and mental models and emphasizes the importance of studying mental representations of the world.

2 Data and design

Studying mental models of the stock market requires (i) access to data from different groups of economic agents, (ii) observing their expectations in a context that is informative of their underlying mental models, and (iii) the ability to ask in-depth follow-up questions to uncover agents' reasoning. In this section, we describe how we recruit our samples and design our own survey module with these goals in mind.

2.1 Samples

General population We collect our US general population sample in June and July 2023 in collaboration with the survey company Dynata, which is widely used in economic research (Haaland et al., 2023). Summary statistics for the 2,434 respondents who completed our survey are shown in Appendix Table B.2, Column 2, while Column 1 provides benchmarks from the 2022 wave of the American Community Survey (ACS).[1] Our sample closely aligns with the general population in terms of gender, age, region,

[1]As preregistered, we exclude respondents in the top and bottom percentiles of response time in all our collections except the expert survey, as extreme response times likely indicate inattention to our survey. The indicated sample sizes refer to our final samples after excluding such respondents.

and income. Only in terms of education does our sample differ from the population in that it features a somewhat higher proportion of respondents with a college degree (47% versus 36%), a common phenomenon in online surveys (Armantier et al., 2017). 58% of our respondents report owning stocks. We also conduct additional experiments with general population samples, details of which are introduced later in the paper. Appendix Table B.1 provides an overview of all our data collections.

Retail investors To reach a population that actively trades in the stock market, we also conduct our survey with a sample of retail investors. We conduct this survey in August 2023 with Prolific, a survey platform that is commonly used in the social sciences (Peer et al., 2021) and allows targeting special respondent characteristics (here: high income and stock ownership). Summary statistics are shown in Appendix Table B.2, Column 3. Our sample of 408 retail investors is on average more highly educated than our general population sample (81% have a college degree), and 91% of retail investors report an income of $100,000 or more. The average investor holds financial wealth of $225,000, out of which 47% is invested in stocks or stock mutual funds. As such, our retail investor sample consists of individuals who invest a substantial share of their wealth in the stock market.

Financial professionals We also conduct surveys with a group of financial professionals. Our goal was to measure the mental models of a population whose daily professional activities revolve around investment in the stock market and whose decisions significantly influence financial outcomes of households. We collaborate with CloudResearch, a provider specializing in surveys with hard-to-reach populations, which has been used in prior work on stock investment decisions (Chinco et al., 2022). In June 2023, we collect a sample of 405 financial professionals. Summary statistics are displayed in Appendix Table B.2, Column 4. 49% of the respondents report that providing financial advice is part of their professional activities. They advise a median number of 21 clients and have on average 10 years of experience in providing financial advice. 70% of the respondents report financial analysis and 42% trading as part of their professional activities. The professional investors have a median annual trading volume of $500,000. Thus, many of the financial professionals in our sample trade substantial amounts. That said, our sample does not aim to be representative of the entirety of professional investors but best reflects professionals at the base segments of the industry.

Academic experts In June 2023, we also invite academic economists to participate in a shortened version of the main survey. We invite experts who have published articles

with the JEL code "G: Financial Economics" in a set of leading finance journals or the "top five" economics journals between 2015 and 2019 (see Appendix Section C.1 for more details). A total of 116 experts participated in our survey. Appendix Table B.3 provides summary statistics for the expert sample. 40% of the experts are based in the United States, and 96% are male. On average, they completed their PhD 18.6 years before the survey. They have on average 1.7 publications in the "top five" economics journals and 4.2 publications in the "top three" finance journals. Their average Google Scholar h-index is 20.98, and their average citation count amounts to 6,594 (as of August 2023). Thus, our expert sample consists of highly experienced researchers in financial economics with significant academic impact. Their responses provide us with a state-of-the-art academic benchmark for the forecasts elicited in our survey.

2.2 Main survey module

Structure of the survey The survey starts with a series of demographic questions. Respondents then receive a non-technical definition of stock returns to ensure a common understanding. In particular, we clarify that the return of a stock comprises both price changes – i.e., capital gains/losses – and dividend payments. Subsequently, respondents proceed to the main part of the survey, where they make predictions about differences in returns, earnings, and risk across a pair of scenarios. Finally, respondents answer a set of background questions concerning their financial situation and financial literacy. To account for time constraints, the expert survey is a condensed version of our main survey module. Appendix D.1 presents the instructions for our key survey questions. The complete instructions are available online at https://osf.io/b83gf.

Scenarios Each of our respondents is introduced to a randomly selected pair of hypothetical scenarios: a scenario with neutral news and a scenario describing either positive or negative public news regarding the future earnings stream of a company. Importantly, the news is stale and described as being four weeks old. We repeat this information multiple times, including in all of the subsequent prediction questions, and even ask for it in a comprehension quiz to ensure that the information is salient.

Our primary scenarios describe news about Nike, the multinational athletic footwear and apparel corporation, and its production costs. The neutral scenario is identical in the *Nike good news* and the *Nike bad news* survey arms and reads as follows:

> **Nike maintains supplier partnership**
> Four weeks ago, on [. . .], Nike Inc. announced the continuation of its partnership with major polyester supplier Toray Industries Inc., in a move aimed at retaining its current supply chain. The continuation of the partnership is expected to maintain

the company's current cost structure. Industry experts were not surprised by the announcement, as continuity in supplier relationships is a common practice in the industry.

In the *Nike good news* arm, respondents are then shown the following alternative scenario:

Nike secures cost-saving partnership [*Nike good news* arm]
Four weeks ago, on [...], Nike Inc. announced a new strategic partnership with leading recycled polyester supplier Unifi Inc., aimed at reducing raw material costs by 20%. The deal is expected to have a significant impact on Nike's bottom line, making its products more price-competitive. Industry experts were pleasantly surprised by the news and dubbed it an "unexpected success" for the company. They projected the move to significantly enhance Nike's market position in the sports apparel industry.

For respondents in the *Nike bad news* arm, the alternative scenario instead reads as follows:

Nike faces supply chain disruption [*Nike bad news* arm]
Four weeks ago, on [...], Nike Inc. announced that it is discontinuing its long-standing partnership with major polyester supplier Toray Industries Inc., in a move that is expected to increase the company's production costs by 20%. The sudden termination disrupts Nike's supply chain, leading to higher raw material costs. Industry experts were negatively surprised by the news and dubbed it an "unexpected setback" for Nike. They projected the move to significantly weaken the company's market position in the sports apparel industry.

Respondents are told that the news "received a lot of attention from stock market traders", highlighting that the scenarios feature public news. After viewing both scenarios, respondents are asked to complete a short quiz. They have to select true statements from a list of summary statements. Among others, this list includes statements referring to the staleness of the news and the extent to which the news has come to the attention of market participants. If respondents fail to select the correct set of statements, they are required to retake the quiz. Respondents can only proceed once they have answered the quiz correctly.

The hypothetical nature of the scenarios has three key advantages. First, it gives us full control over all the details of the news events. Second, it allows us to ensure comparable information sets across participants, which is crucial given the diverse background knowledge of our heterogeneous respondent groups. Third, it allows us to present each

respondent with both a neutral and an alternative positive/negative news scenario, which implies that we can directly elicit our object of interest at the respondent level: the perceived *difference* in expected returns across the two scenarios. This approach controls for heterogeneity in the level of return expectations across individuals and samples. It also simplifies measuring the reasoning underlying the perceived effect of the news on the expected return. Nonetheless, we also demonstrate the robustness of our main result in a study with real news scenarios (discussed in Section 3).

We deliberately use real-world companies and realistic business news and present them in a journalistic style to render the situation concrete, tangible, and naturalistic. Not every group of our respondents might be equally able to access or articulate an abstract mental representation of the stock market, but their underlying views and understanding will become visible in concrete examples. However, a potential drawback of this approach could be that respondents' reasoning is sensitive to the details of the specific scenarios. This could be particularly relevant for general population respondents, who are the least familiar with the general principles governing stock markets. To address this concern, the general population survey incorporates four additional arms with scenarios about the future earnings prospects of other firms, including market entry/exit (Amazon), patent loss (Novartis), and a technological breakthrough (BioNTech). We also design four additional arms that describe four-week-old macroeconomic news with positive or negative implications for future economic growth, namely an oil price shock, a technology shock, a government spending shock, and a monetary policy shock. Our experts, retail investors, and financial professionals surveys only include the *Nike good news* and *Nike bad news* arms to maintain statistical power given the smaller sample sizes.

Forecasts After passing the quiz, respondents are asked to make a series of directional predictions. First and most importantly, respondents are asked to envision that they invest $1,000 into the company's stock (or the US stock market in the aggregate scenarios) on the survey day, four weeks after the news was released. They are then asked to predict whether the expected return will be higher in the first scenario, similar in both scenarios, or higher in the second scenario. Respondents are told that "similar" indicates a return difference of at most 0.5 percentage points, and the order of the response options is randomly reversed across participants. We focus on directional predictions (higher/similar/lower) to ensure that the question remains meaningful and answerable among groups with lower levels of financial knowledge. On the subsequent page, respondents provide an open-ended explanation for their return prediction – our second main measure, which we discuss in detail in Section 4.

Then, to study respondents' longer-term return expectations, households and finan-

cial professionals predict the (directional) annual return differences across the scenarios for an investment one year, two years, three years, and four years into the future. To study the co-movement of return expectations with other expectations, they also forecast (directional) differences in earnings, the uncertainty of the return, and the exposure to systematic risk factors for each of the next five years. The macroeconomic scenarios further include forecasts about (directional) differences in the risk-free interest rate and investors' risk aversion. We thus cover the key determinants of expected returns according to standard risk-based asset pricing. Following these predictions, households and financial professionals also make quantitative forecasts about the return over the next 12 months as well as forecasts about other market participants' return expectations. By contrast, the shorter expert survey only includes additional predictions about the differences in earnings, uncertainty, and risk factor exposure for the next 12 months.

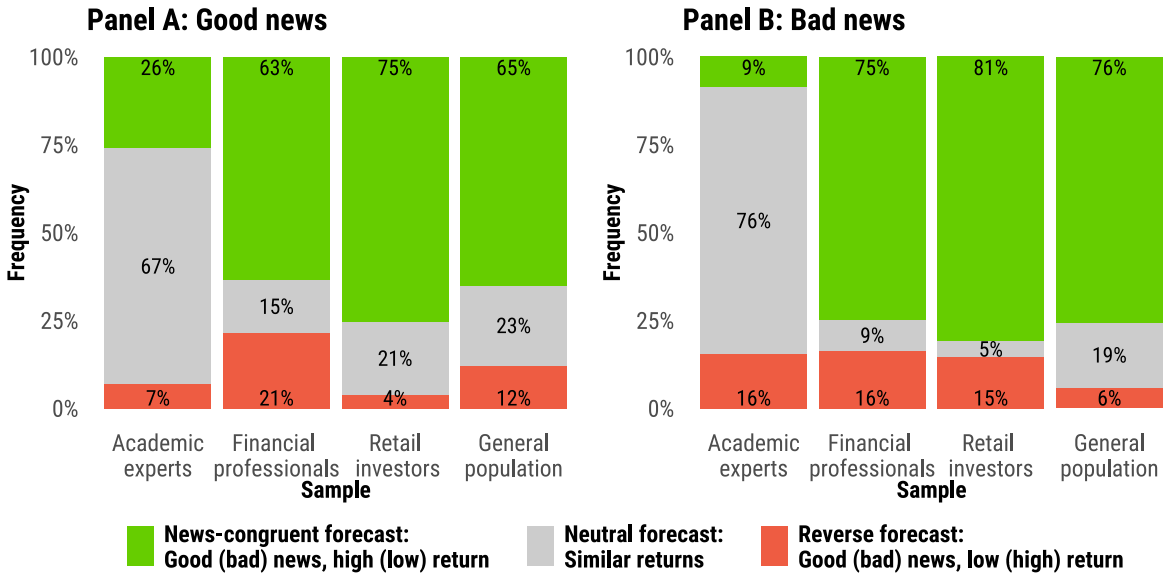
Differentiating mental models Our design enables us to differentiate between different mental models of the stock market. We study three broad classes of mental models: beliefs in market efficiency, beliefs in temporary mispricing, and a naive neglect of equilibrium pricing. For example, respondents subscribing to the idea of market efficiency (Fama, 1970) should predict and explain that any news about future earnings is fully incorporated into prices four weeks after the announcement. Lasting effects on expected returns would only arise from changes in risk factor exposure for which investors need to be compensated. By contrast, a respondent who neglects equilibrium forces and price adjustments would directly equate the prospect of a higher future earnings stream with higher expected returns. Respondents believing in temporary overreaction or underreaction of stock prices (De Bondt and Thaler, 1985; Lakonishok et al., 1994) might also predict differences in returns across the two scenarios, based on arguments referring to a temporary deviation from efficient pricing. The scenarios featuring company-specific news allow us to abstract from changes in the risk-free rate or risk aversion, which enables us to more clearly distinguish between different mental models than in the aggregate scenarios. A consequence of our focus on four-week-old news is that beliefs in very short-run mispricing (e.g., Medhat and Schmeling, 2022) should not play a role in respondents' return forecasts.

3 Return forecasts: Inference from stale news

In this section, we describe how respondents expect stale news to affect future returns.

Return forecasts across samples Figure 1 compares the directional forecasts about differences in returns between the neutral and the good/bad news scenario across our

Figure 1 Directional return forecasts across samples



Notes: This figure shows the distributions of directional forecasts about the difference in the expected stock return over the next 12 months between the *Nike good news* and neutral scenario (Panel A) and between the *Nike bad news* and neutral scenario (Panel B) in our samples of academic experts, financial professionals, retail investors, and respondents from the general population.

different samples. Panel A focuses on the *Nike good news* survey arm, whereas Panel B focuses on the *Nike bad news* arm. Among academic experts, a large majority predict returns to be similar in the good/bad news and the neutral scenarios (67% for the good news and 76% for the bad news arm). In other words, most experts do not think that stale news matter for future returns.

This contrasts strongly with the patterns in the other samples. Majorities of financial professionals, retail investors, and general population respondents expect returns to be higher in response to four-week-old good news about future earnings and lower in response to four-week-old bad news. The tendency to make such "congruent" predictions is most pronounced among retail investors, with 75% and 81% of respondents making news-congruent forecasts in the good and bad news arms, respectively. However, the fractions are also large among financial professionals (63% and 75%) and general population respondents (65% and 76%). In all three samples, news-congruent predictions are somewhat more common in the bad news than in the good news scenario. The remaining respondents are split between predicting no difference in returns or predicting returns to move in the opposite direction of the earnings news. One difference in the results for financial professionals compared to the other samples is a somewhat higher fraction of "reverse" predictions, in particular in the good news scenario.[2]

[2]Panels A and B of Appendix Figure A.1 display households' and financial professionals' average *quantitative* expectations for the good news and the bad news survey arms. Respondents predict substantial differences in expected future returns across the scenarios. For instance, retail investors anticipate Nike's stock return to be 3.7pp higher in response to good news and 7.3pp lower in response to bad news, as

We also examine how return forecasts vary with respondent characteristics within our samples of financial professionals, retail investors, and general population respondents (see Appendix Table B.7). Most importantly, in all samples, a higher level of financial literacy – as measured with the "Big 3" questions commonly used in the literature (Lusardi and Mitchell, 2014) – is associated with a *stronger* tendency to expect future returns to move into the direction of stale earnings news. News-congruent forecasts are also more common among older respondents in all three samples. By contrast, we do not find systematic patterns for gender, education, or stock ownership.

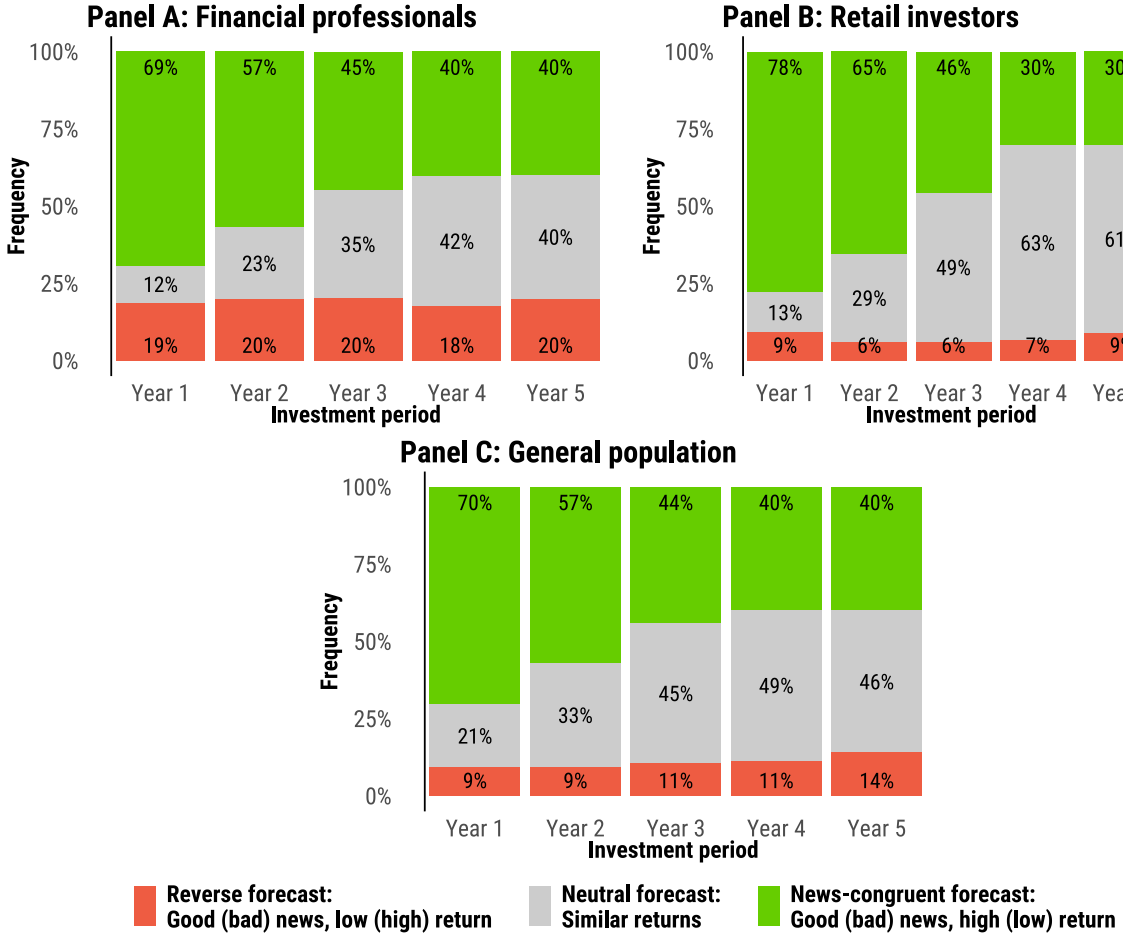
Return forecasts for later horizons Figure 2 displays respondents' forecasts about differences in annual returns between the positive/negative news and the neutral news scenario for later future horizons. For simplicity, the figure pools forecasts from the *Nike good news* and the *Nike bad news* survey arms. In the general population, the proportion of respondents expecting higher returns following good news declines from 70% for investments made today (four weeks post-announcement) to 40% when investing four years from now (Panel C). Conversely, the proportion predicting similar returns increases with the horizon. We find very similar patterns among retail investors (Panel B) and financial professionals (Panel A). Thus, while neutral return predictions become more common with increasing distance to the news, a considerable portion of respondents continue to make news-congruent forecasts for returns several years into the future.

Return forecasts in other scenarios In Figure 3, we present return forecasts for the various other scenario arms included in the general population survey. We document very similar results as for the Nike scenarios. Most respondents expect that future returns will align with the direction of stale earnings news across diverse firm-level scenarios, such as scenarios featuring good or bad news about Amazon's expansion plans or scenarios featuring the loss of a patent suit or the development of a new cancer drug by pharmaceutical companies. Likewise, in our scenarios featuring macroeconomic news, majorities of the respondents expect returns of the US stock market to be lower following four-week-old bad news, namely the announcement of an oil price increase or an interest rate hike. Conversely, they expect the stock market to yield predictably higher returns following stale good news, namely a government spending program or a breakthrough in solar technology. Thus, households' tendency to equate higher company earnings with higher stock returns carries over to the aggregate stock market.

Taken together, our first main result is the following:

compared to the neutral scenario. General population respondents and financial professionals expect similar return differences as retail investors. We did not elicit quantitative return forecasts in the shorter expert survey.

Figure 2 Directional return forecasts across horizons

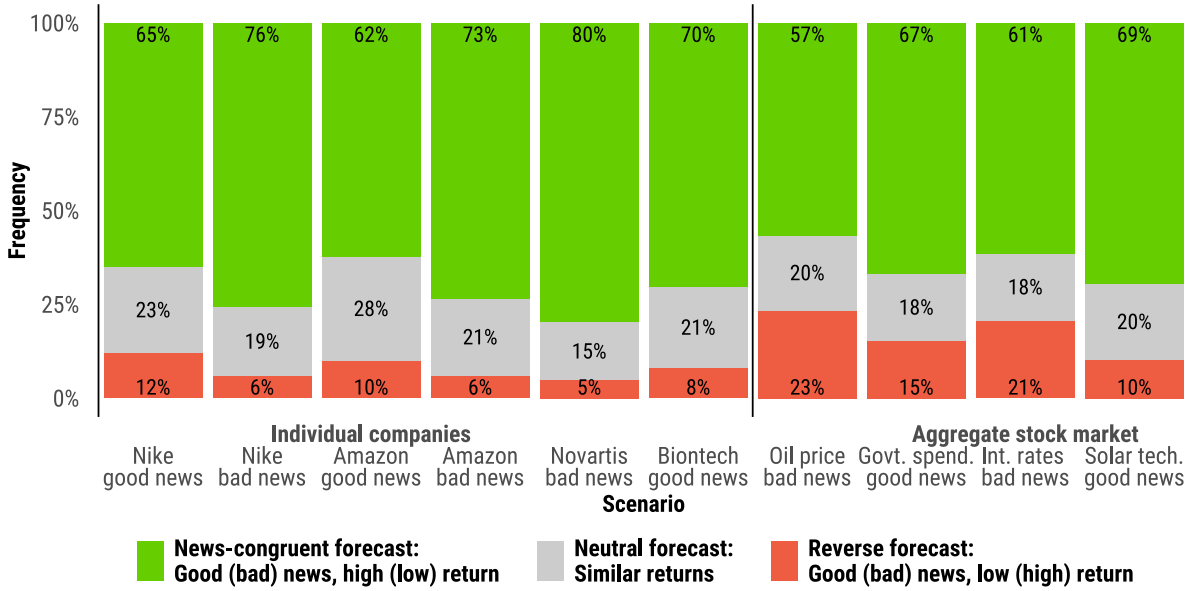


Notes: This figure shows the distributions of directional forecasts about the difference in the expected 12-month stock return when investing now (four weeks after the announcement) or when investing in one, two, three or four years from now between the *Nike good news / Nike bad news* and the Nike neutral scenario. Forecasts are pooled across the *Nike good news* and the *Nike bad news* survey arms. The samples consist of financial professionals (Panel A), retail investors (Panel B), or respondents from the general population (Panel C).

Result 1. *Most households, retail investors, and financial professionals consider stale positive or negative news regarding future company earnings to be predictive of correspondingly higher or lower future stock returns. This perception is prevalent across various future horizons and different company-specific and aggregate scenarios. By contrast, the overwhelming majority of academic experts do not consider such news to be predictive of future returns.*

Real news robustness study Our design based on hypothetical scenarios has the advantages that it offers control, allows for a comparable methodology across samples, and helps us to directly identify beliefs about the effect of stale news on returns. However, potential concerns are that respondents may find hypothetical news less credible, that we cannot incentivize forecasts, and that presenting each respondent with two

Figure 3 Directional return forecasts across scenarios



Notes: This figure shows the distributions of directional forecasts about the difference in the expected stock return over the next 12 months between a good/bad news and a neutral scenario. The first six bars focus on firm-level news and company stocks, while the last four bars focus on aggregate news and the US stock market. The samples consist of respondents from the general population.

scenarios could make participants overly sensitive to the differences between the scenarios. To address these issues, we conduct an additional robustness study that relies on real news, a between-subject design, and incentives (Prolific, n=483 households, September 2023).[3]

We use real news about the German energy company Siemens Energy. Respondents in the good news condition are shown a four-month-old piece of news stating that Siemens Energy announced a $7bn wind power deal. Respondents in the bad news condition are instead shown a two-month-old piece of news that Siemens Energy was retracting its profit forecast for the ongoing year due to complications in its wind turbine business. We describe this news to respondents in the form of short summaries and highlight that the news is four or two months old and has received a lot of attention from market participants. We keep other survey features comparable to our main survey (e.g., the comprehension quiz). Subsequently, respondents make an incentivized quantitative forecast about the return of the Siemens Energy stock over the next 12 months. Lastly, respondents are asked to divide an investment of £100 into Siemens Energy stock and a savings bond that pays a fixed interest rate of 2%.[4] They are told that ten respondents will be selected at random and will be paid out according to their choices 12 months later, depending on the actual development of the Siemens Energy stock.

Replicating our main result, we find that respondents who are assigned to the good

[3]Summary statistics are shown in Appendix Table B.4. Our sample is balanced across the two included treatment arms (see Appendix Table B.5). The survey instructions can be found in Appendix D.2.

[4]The UK-based survey company Prolific pays US respondents in Pounds.

news condition predict a 6.4pp higher return of the Siemens Energy stock over the next 12 months, compared to an expected return of 4.2% in the bad news condition ($p < 0.01$, Appendix Table B.8, Column 1). Differences in return expectations are strongly reflected in respondents' decisions in the investment game: respondents in the good news arm invest a 26.7pp higher share into the Siemens Energy stock, compared to an average share of 40.1% in the control group (Column 2, $p < 0.01$). These findings not only highlight that our main result replicates in a between-subject design featuring real news and incentives, but they also show that households act on their "naive" return forecasts by allocating significantly more money to a company's stock depending on which piece of stale news they have been exposed to.

4 Mental models underlying return forecasts

In this section, we explore the mental models underlying respondents' return forecasts, focusing on three broad classes of mental models: (i) beliefs in market efficiency and standard risk-based pricing, (ii) beliefs in temporary mispricing, and (iii) non-equilibrium reasoning. To study the prevalence of different mental models, we follow three distinctive approaches. We analyze direct measures of reasoning, the co-movement of forecasts about different variables, and experimental interventions.

4.1 Respondents' reasoning

Qualitative text data Our first approach exploits our direct measure of the reasoning behind respondents' return forecasts. Specifically, after respondents have made their forecast about the difference in stock returns between the two scenarios, the subsequent survey screen reminds them of their forecast and invites them to explain why they made their prediction in an open-text field. Open-ended elicitations have become increasingly common in the context of understanding mental models (Andre et al., 2022a,b; Stantcheva, 2021, 2023). Compared to more structured question formats, open-ended questions offer a lens into respondents' reasoning without priming them on any available response option.

Even a glance at the qualitative data reveals that experts, on the one hand, and respondents from the general population, retail investors, and financial professionals, on the other hand, reason very differently about the effect of stale news. Experts tend to invoke the idea of market efficiency, as illustrated by the following response:

> "The effect on future profits and dividends should already be reflected in the current price."

Many experts additionally explain that differences in exposure to systematic risks should be the only source of differences in expected returns:

> "In efficient markets, the information should be fully incorporated into the stock price four weeks after the announcement. Thus, going forward Nike will earn its expected return which is the same in both scenarios (as beta did not change due to the announcement)."

By contrast, respondents from the general population tend to directly invoke differences in company earnings to justify their return forecasts. They directly link stale changes in expected earnings to changes in expected returns:

> "[. . .] In scenario 2, a disruption in their supply chain would lead to difficulty in maintaining production and therefore income and therefore profits."

The following general population respondent even refers to changes in the stock price since the announcement but still expects higher future dividends to lead to higher expected returns:

> "Because although the market had already increased the stock price on the announcement the profit margins would be higher and thus dividends."

Retail investors tend to follow similar lines of reasoning as households in the general population sample, as exemplified by the following response:

> "Because Nike will continue a positive relationship with its partner and therefore the company can continue to grow profits, increasing the value of the stock."

Financial professionals' reasoning closely resembles retail investors' and general population respondents' reasoning. For instance, the following respondent refers to higher company earnings to explain their return forecast:

> "Cost savings of 20% will increase the bottom line of Nike, and therefore increase EPS for the company. I expect my $1000 investment to also increase as a result."

The differences in explanations also become apparent in a simple quantitative text analysis. The word clouds in Appendix Figure A.2 display the most commonly used words for each sample. Academic experts often use words such as "price", "information", "already", or "incorporated". Households and financial professionals talk more often about "costs", "profit", "supply chain", or "product", that is, they talk about the expected future earnings stream to justify their prediction for future expected returns.

Coding scheme To more systematically compare the fractions of responses expressing arguments in line with specific mental models, we devise a coding scheme.[5] In this scheme, each response is assigned a unique code depending on which line of reasoning is expressed by the respondent. Our codes encompass references to (i) market efficiency, (ii) changes in uncertainty, (iii) changes in risk factor exposure, (iv) temporary overreaction of stock prices, (v) temporary underreaction, (vi) changes in expected earnings, and (vii) a change in traders' sentiment, excitement, or outlook for the company. Responses that cannot clearly be assigned to one category are assigned to a residual category. Codes (i)-(iii) describe arguments in line with standard risk-based asset pricing. Codes (iv) and (v) capture arguments related to temporary mispricing. Codes (vi) and (vii) capture "naive" forms of equilibrium neglect, where higher expected earnings or the improved outlook among traders are equated with higher expected returns, neglecting the offsetting effect of price adjustments. In the aggregate scenarios, we include two extra codes capturing (viii) changes in the risk-free rate and (ix) changes in risk aversion – additional drivers of expected returns according to standard models. Appendix Table C.1 provides an overview with example responses for the different codes.

We instruct research assistants to apply our coding scheme to our main descriptive data collections with households, financial professionals, retail investors, and experts.[6] For the Nike scenarios, we can categorize 86% of the responses from the expert sample using our coding scheme, compared to 49% in the general population sample, 64% among retail investors, and 58% among financial professionals. The smaller fractions in the non-expert samples reflect that non-expert responses are often less precise and harder to classify. We instructed the research assistants to be conservative and to err on the side of avoiding misclassification. The coding scheme and procedure are explained in more detail in Appendix C.2.

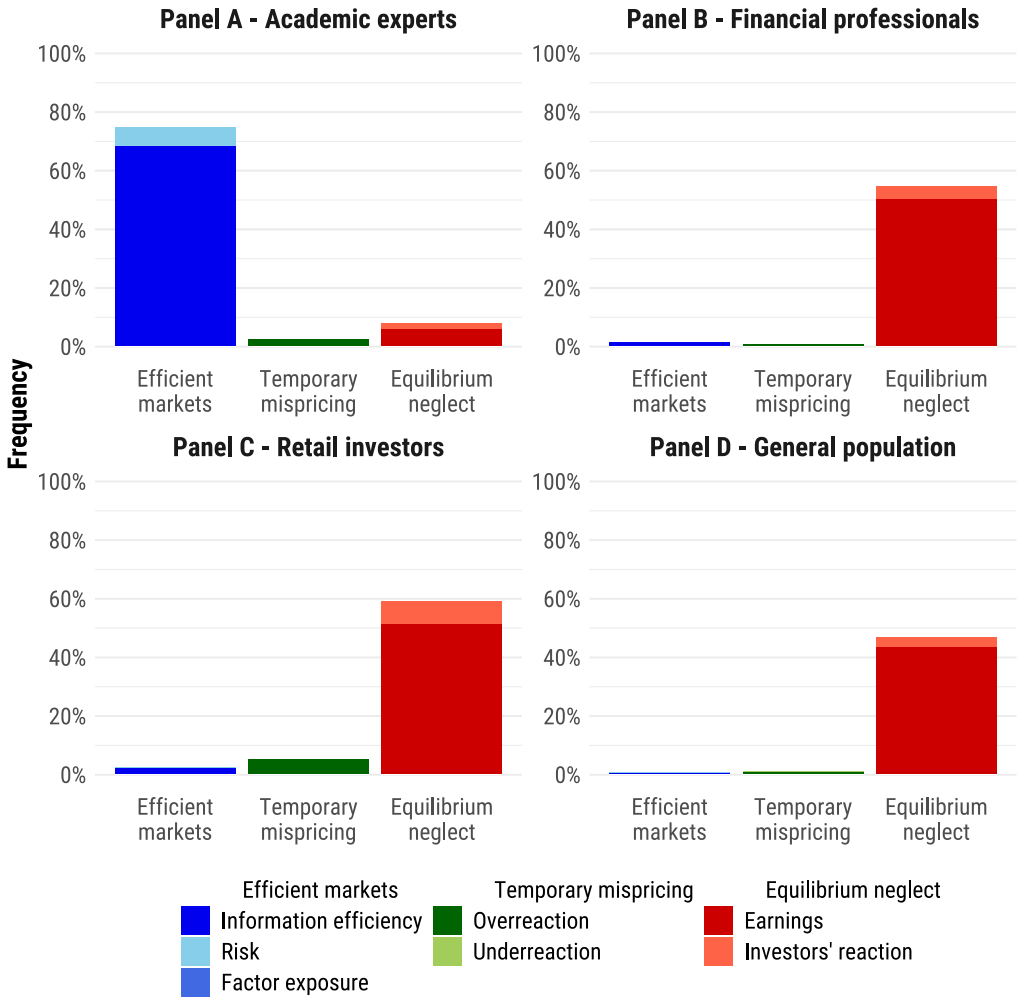
Reasoning across samples Figure 4 displays the distribution of open-ended responses across our main surveys, categorized using our coding scheme. We focus on the *Nike good news* and the *Nike bad news* survey arms, as these arms are present for all samples. Among academic experts, 75% employ arguments aligned with standard risk-based asset pricing. Merely 3% attribute their return forecast to temporary over- or underreaction of stock prices. Only 8% are classified as exhibiting "naive" equilibrium neglect reasoning directly linking their return forecasts to changes in corporate earnings.

In stark contrast, 47% of households in the general population sample express "naive" arguments and explain their return forecast with changes in expected earnings or in-

[5]The coding scheme was devised before the main data collection and informed by both pilot surveys with households and leading asset pricing theories.

[6]Each coder has economics training and participates in an extensive joint training session in which we introduce the coding scheme and discuss various examples.

Figure 4 Reasoning underlying return forecasts across samples



Notes: This figure displays the distributions of reasoning underlying respondents' return forecasts as expressed in the open-ended question, categorized using our coding scheme. The underlying samples are academic experts (Panel A), financial professionals (Panel B), retail investors (Panel C), or the general population sample (Panel D).

vestors' excitement about the company outlook. Arguments in line with market efficiency or temporary mispricing are almost absent in the general population sample. The fact that respondents do not seem to consider changes in risk factor exposure when making return forecasts is striking, given the central role of risk factors in contemporary asset pricing models.[7] The patterns observed in our retail investor and financial professional samples mirror those in the general population sample: naive reasoning, which directly associates higher earnings with higher expected returns, is the predominant view (60% among retail investors and 55% among professionals), while arguments referring to market efficiency or transitory mispricing are almost absent. Consistent with the heterogeneity in respondents' return forecasts, older and more financially literate

[7]This finding aligns with recent evidence that many investors do not consider the correlation of stock returns with consumption growth in their investment decisions (Chinco et al., 2022). Our evidence suggests that – in addition to neglecting systematic risk exposure in their own investment decisions – households do not view asset prices and expected returns as primarily reflecting exposure to such risks.

respondents are more likely to express naive arguments reflecting equilibrium neglect (Appendix Table B.9).

Relationship between reasoning and forecasts We also investigate the correlation between respondents' reasoning and their return forecasts, again focusing on the Nike scenarios. Appendix Table B.10 presents regressions of a dummy variable indicating whether the respondent makes a news-congruent return prediction for the next 12 months (higher returns for stale good news, lower returns for stale bad news) on dummies indicating whether the respondent expresses reasoning consistent with market efficiency and standard risk-based asset pricing or reasoning consistent with a neglect of equilibrium price adjustments. We omit the codes indicating temporary mispricing, as such reasoning hardly occurs in our samples. The omitted base category otherwise mostly includes responses that were not assigned to any category. Across all our samples, respondents whose explanation shows a neglect of equilibrium price adjustments are significantly (between 39pp and 63pp) more likely to make news-congruent forecasts. Conversely, respondents who use reasoning aligned with efficient markets or risk-factor-based asset pricing are significantly (between 33pp and 49pp) less likely to make such forecasts.

We also explore whether the differences in reasoning can statistically account for the differences in return forecasts across samples, specifically, the differences between academic experts, on the one hand, and financial professionals, retail investors, and general population respondents, on the other hand. For this purpose, we pool the four samples and regress forecasts on dummy variables for financial professionals, retail investors, and the general population sample. In a second specification, we regress the forecasts on the same sample dummies *plus* dummy variables for reasoning about market efficiency or neglecting equilibrium price adjustments. As shown in Appendix Table B.11, the differences in the tendency to make news-congruent predictions between experts and non-experts are strongly reduced in size and statistical significance once we control for reasoning. In fact, the difference only remains marginally significant for retail investors, but even here it drops to only about 16% of its original size. Thus, the differential reasoning across samples can almost fully account for the differences in return forecasts between experts and non-experts.

Robustness: Structured elicitation A potential concern with the qualitative text data is that some responses are not sufficiently nuanced to clearly distinguish between different lines of reasoning. Moreover, there could be measurement error due to respondents being reluctant to write down their thoughts. To address these concerns, we also include a structured, closed-form question that reminds respondents of their return fore-

cast and presents them with a set of pre-formulated statements, largely corresponding to the codes used to categorize the open-ended responses. Respondents are asked to identify the statement that best represents their main consideration when making their return forecast. We place this question at the very end of the survey to avoid influencing respondents' forecasts about returns over future horizons, earnings, uncertainty, and risk-factor exposure, which are elicited after the open-ended question. However, this means that respondents have to recall the forecast they made several minutes earlier and that their response to the structured question is likely influenced by the various forecasts they provided in between. Nevertheless, we replicate our main finding. Experts are much more likely to reason in line with efficient markets, and non-experts display a much stronger tendency to cite changes in corporate earnings as a driver of expected returns (Appendix Table B.12).

4.2 The co-movement of expectations

Our second approach to studying respondents' mental models analyzes how respondents' predictions about returns are related to their forecasts about other variables. Rather than relying on respondents' own explanations, we explore which models are "revealed" by respondents' predictions about the joint movement of different variables across scenarios. While this exercise is purely correlational, it still assesses the potential of different mental models to account for respondents' forecasts.

In our survey, respondents predict not only in which of the two scenarios returns would be higher but also in which scenario earnings, the uncertainty of the stock return, and the stock's "exposure to circumstances that investors deem unfavorable" – i.e., to systematic risks – would be higher. Respondents subscribing to the notion of market efficiency and risk-based asset pricing should predict returns to co-move with uncertainty and risk-factor exposure. Respondents neglecting endogenous price adjustments should predict returns to co-move with earnings. For financial professionals and households, we also leverage quantitative first- and second-order beliefs about returns over the next 12 months in the two scenarios to shed light on beliefs in mispricing (Appendix Figure A.1). Specifically, a respondent may think that other market participants are overly optimistic about the increase in future company earnings implied by the news. In the eyes of such a respondent, market participants' buying behavior would have driven the stock price to an over-valued level. If the respondent attaches some probability to a market correction, they would decrease their first-order expectation about the future return relative to their second-order expectation going from the neutral to the good news scenario. The reverse logic applies to respondents who believe that other market participants are too pessimistic about the increase in future company earnings implied by the news. Thus, relative differences in second- versus first-order expectations across

Table 1 Correlations between directional return expectations and other expectations

	Dummy for predictions: **Good news ⇒ High return** or **Bad news ⇒ Low return**			
	Academic experts	Financial professionals	Retail investors	General population
	(1)	(2)	(3)	(4)
Earnings $\mathbb{E}$ aligned	0.086	0.417***	0.388***	0.416***
	(0.066)	(0.046)	(0.057)	(0.036)
Uncertainty $\mathbb{E}$ aligned	0.233**	0.136***	0.053	0.075**
	(0.096)	(0.041)	(0.038)	(0.033)
Risk factor $\mathbb{E}$ aligned	0.437***	−0.090**	0.073*	−0.012
	(0.166)	(0.044)	(0.038)	(0.035)
Others overoptimistic		−0.100*	−0.007	−0.028
		(0.052)	(0.050)	(0.039)
Others overpessimistic		0.031	0.143***	0.039
		(0.046)	(0.043)	(0.038)
Constant	0.007	0.430***	0.388***	0.415***
	(0.048)	(0.052)	(0.060)	(0.036)
Observations	102	405	408	672
R^2	0.196	0.272	0.194	0.211

Notes: This table regresses respondents' directional return forecasts on their forecasts about other variables, pooling across the Nike good news and the (reversely coded) Nike bad news survey arms. The outcome is a dummy variable for expecting the stock return over the next 12 months to be higher (lower) in the good news (bad news) than in the neutral scenario. The independent variables are dummy variables indicating whether a respondent expects earnings, the uncertainty of the return, or the exposure of the return to circumstances investors deem unfavorable, i.e., to systematic risk, to be higher (lower) in the good news (bad news) than in the neutral scenario, and dummy variables indicating whether the respondent updates the quantitative second-order return expectation more or less strongly (by more than 0.5pp) than the quantitative first-order expectation in response to the news ("Others overoptimistic" or "Others overpessimistic", respectively). The underlying samples are academic experts (Column 1), financial professionals (Column 2), retail investors (Column 3), or the general population sample (Column 4). Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

scenarios are proxies for beliefs in particular forms of mispricing, which could play a role in respondents' directional return forecasts.[8]

We study the co-movement of expectations by regressing an indicator for news-congruent forecasts (higher returns for stale good news, lower returns for stale bad news) on dummy variables indicating whether a respondent predicts earnings, uncertainty of the return, or exposure to systematic risk to increase in response to good news or to decrease in response to bad news. We also include dummy variables indicating beliefs in over-optimism or over-pessimism among other market participants constructed

[8]Such beliefs could stem from overconfidence in one's own belief about what a specific piece of public news implies for a company's future earnings – a key source of disagreement in return expectations in an influential class of asset pricing models (e.g., Scheinkman and Xiong, 2003). They could also originate in respondents holding a model consistent with the findings in Bordalo et al. (2023b), namely that other stock market participants seem to become too optimistic about future earnings growth in response to good news.

from the quantitative first- and second-order expectations. We conduct these estimations separately for each of our samples.

As shown in Table 1, Column 1, earnings forecasts are not significantly related to return forecasts among experts. Instead, experts' return forecasts are significantly positively correlated with forecasts about uncertainty ($p < 0.05$) and even more strongly with forecasts about exposure to systematic risk ($p < 0.01$). By contrast, among financial professionals, retail investors, and general population respondents, earnings forecasts seem to be the most central variable in return forecasts (Columns 2–4). For instance, when a retail investor predicts company earnings to be higher, the likelihood that the respondent also predicts the return to be higher increases by 39 percentage points ($p < 0.01$). While forecasts about the uncertainty of the return are also correlated with return forecasts in the expected direction in these samples (sometimes significantly so), their role is quantitatively much smaller than the role of earnings forecasts. The coefficient estimates for risk factor exposure are small and in two out of the three cases negative – contrary to standard asset pricing logic. Respondents believing in over-optimism among other market participants are less likely to predict higher returns in response to good news. Conversely, those believing in over-pessimism of others are more likely to do so. These patterns are consistent with the future market corrections that would be implied by such over-optimism or -pessimism. However, these effects are much smaller and less precisely estimated than the effects of earnings forecasts.

Appendix Table B.13 shows that the patterns for non-experts are robust to focusing on good and bad news separately and to extending the analysis to all five-year horizons, with or without the inclusion of respondent fixed effects. Importantly, this also suggests that the increasing share of neutral return predictions for later horizons (Figure 2) does not reflect a belief in delayed market efficiency but rather simply reflects respondents' belief that the news' relevance for future earnings fades over time. The table also highlights that the return forecasts general population respondents provide in the macroeconomic scenarios are strongly positively correlated with their forecasts about aggregate firm earnings and only weakly related to forecasts about other variables.

Taken together, the results confirm the conclusions from the qualitative text data: households' and financial professionals' return forecasts closely co-move with their forecasts about company earnings, whereas expert forecasts are most closely related to experts' beliefs about exposure to systematic risk, in line with standard risk-based asset pricing theories.

4.3 An experiment with households: Ruling out risk-based reasoning and beliefs in temporary mispricing

Our third approach zooms in on the mental models of general population respondents. We design experimental interventions to detect previously unobserved traces of reasoning in line with risk-based asset pricing or temporary mispricing. Arguably, the previous evidence already strongly suggests that neither of the two views plays an important role in households' reasoning. However, one might worry that respondents find it difficult to articulate reasoning in line with risk-based pricing or temporary mispricing or that their predicted co-movement of expected returns with other variables is confounded by measurement error or omitted variables. To address these concerns, our additional interventions explicitly rule out that return differences could arise from changes in risk exposure across scenarios or from temporary mispricing. If either of these two mechanisms were important for respondents' return forecasts, we should see strong shifts in their forecasts in response to our interventions.

Sample We run the experiment in June 2023 with Prolific. 1,182 respondents completed our survey and our sample is balanced across the three included survey arms (see Appendix Table B.5). Appendix Table B.4 provides summary statistics.

Design Our experiment focuses on the *Nike good news* scenario and includes three arms. The survey instructions can be found in Appendix D.3. In the control group, respondents simply complete a shortened version of our main survey. In the *No changes in risk exposure* arm, respondents complete a modified version of the survey, which contains an additional, saliently placed message on the survey screen on which respondents make their return forecast. The message explicitly rules out changes in volatility and exposure to systematic risk:

> **[No changes in risk exposure]** Please assume that there are no differences in the investment-relevant uncertainty between the two scenarios. In particular, this means
>
> - identical volatility: while deviations from the best forecast for the future return of Nike stock are possible, the possible deviations are equally sizable and equally likely in both scenarios,
> - identical protection against general developments that are deemed unfavorable by investors: in both scenarios, an investment in Nike stock provides the same degree of protection against general developments that are deemed unfavorable by investors, such as the risk that the economy as a whole performs poorly.

Table 2 Ruling out risk-based reasoning and beliefs in mispricing

	Dummy for predictions: **Good news** ⇒ ...			**Reasoning**	
	Return higher	Return similar	Return lower	Eq. neglect	Efficiency
	(1)	(2)	(3)	(4)	(5)
Ruling out risk	−0.041	0.027	0.014	−0.004	−0.012
	(0.032)	(0.028)	(0.020)	(0.033)	(0.011)
Ruling out mispricing	0.027	−0.025	−0.002	0.039	−0.007
	(0.031)	(0.026)	(0.019)	(0.032)	(0.011)
Constant	0.741***	0.177***	0.082***	0.693***	0.030***
	(0.022)	(0.019)	(0.014)	(0.023)	(0.009)
Observations	1,182	1,182	1,182	1,182	1,182
R^2	0.004	0.003	0.001	0.002	0.001

Notes: This table analyzes treatment effects of interventions that rule out risk-based reasoning and beliefs in mispricing. The experiment is based on the *Nike good news* scenario. The outcome is a dummy variable for expecting the stock return over the next 12 months to be higher in the good news than in the neutral scenario (Columns 1–3) or dummy variables for expressing reasoning in line with market efficiency and standard risk-based asset pricing (Column 4) or reasoning consistent with a neglect of equilibrium price adjustments (Column 5) in the open-ended question. The independent variables are dummy variables indicating whether a respondent is part of a specific treatment arm, where the control group is the omitted base category. The underlying sample consists of general population respondents. Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Respondents in the *No temporary mispricing* arm are instead presented with a message that rules out temporary mispricing:

> **[No temporary mispricing]** Please assume that the stock price of Nike has changed over the last four weeks since the announcements. The stock price responded to what the announcements revealed about Nike's future business prospects. Please assume that the current stock price fully and correctly reflects Nike's future business prospects in both scenarios.

If predictions of higher returns following stale positive earnings news are driven by perceived changes in risk exposure or beliefs in temporary over- or under-reaction of stock prices, we should observe strong shifts in households' return forecast across the three survey arms.

Results Table 2, Columns 1–3, regress dummy variables for predicting a higher return in the good news scenario, similar returns in both scenarios, or a lower return in the good news scenario on indicators for the two treatment conditions. Compared to the control group, the *No changes in risk exposure* intervention only marginally reduces the portion of respondents forecasting higher returns in response to positive earnings news from 74% to 70% ($p = 0.191$). The *No temporary mispricing* intervention leads to an insignificant increase in the fraction of respondents expecting higher returns following

favorable earnings news ($p = 0.383$). In other words, both interventions do not have a detectable effect on return predictions. These patterns underscore that households' inclination to equate future earnings with future stock returns does not result from standard asset-pricing reasoning or beliefs in temporary mispricing. Columns 4 and 5 of Table 2 highlight that the interventions also do not change respondents' tendency to invoke arguments consistent with market efficiency or the neglect of equilibrium price adjustments when they explain their forecast in the open-ended question, consistent with the muted effects on return forecasts.

All in all, our second main result can be summarized as follows:

Result 2. *Qualitative text data on reasoning, the co-movement of expectations, and an additional experimental intervention show that respondents from the general population, retail investors, and financial professionals neglect the offsetting effects of equilibrium price adjustments when forming stock return expectations. By contrast, experts' forecasts are based on a belief in market efficiency. Beliefs in temporary mispricing do not seem to play a prominent role in either group's return forecasts.*

5 Drivers of non-equilibrium reasoning

A neglect of equilibrium pricing is prevalent among our non-expert respondents. This section explores where this feature of respondents' mental model of the stock market is coming from. We focus on general population respondents and conduct two additional experiments, investigating the role of inattention to market responses and the possibility that households fundamentally fail to understand equilibrium.

5.1 Inattention to trading reactions and price changes

One potential origin of a neglect of equilibrium pricing is inattention to the fact that, over the four weeks since the news announcement, other traders reacted to the news and started to buy or sell the stock. Alternatively, households could be inattentive to the stock price changes that were triggered by these trading responses. Indeed, inattention to indirect, contingent, and downstream consequences is a common behavioral phenomenon (Bordalo et al., 2022; Eyster, 2019; Gabaix, 2019; Niederle and Vespa, 2023). Do households neglect equilibrium pricing because they fail to pay sufficient attention to how the market responded to the news? To explore this, we design experimental interventions in which we draw respondents' attention to the trading responses or price changes that happened over the past four weeks before they predict returns over the next 12 months.

Sample We run the experiment in June 2023 with Prolific and collect 1,183 complete responses. Our sample is balanced across the three included survey arms (Appendix Table B.5). Summary statistics are shown in Appendix Table B.4.

Design Our design is based on the *Nike good news* scenarios. The experimental instructions can be found in Appendix D.4. Participants in the control group complete a shortened version of our standard survey.

Respondents in the *Attention to trading reactions* survey arm respond to an additional question after having seen the two scenarios, just before they make their return forecast. Specifically, they are asked how other traders reacted over the past four weeks to the announcement in the scenarios. The response options include that the announcement (i) made other traders more eager to buy and less eager to sell Nike stock at the old stock price, (ii) did not change other traders' eagerness to buy or sell the stock, and (iii) made them less eager to buy and more eager to sell. Participants in the *Attention to price reaction* arm respond to the same question and additionally answer a question about how other traders' reactions affected Nike's stock price over the past four weeks (whether it increased, did not affect, or decreased the price).

Immediately afterward, respondents in these two arms proceed with their return forecast. The two interventions are unobtrusive and seamlessly fit into the flow of the survey. Yet, at the same time, they effectively draw respondents' attention to trading reactions and ensuing price changes and ensure that respondents think about them just before they make their return forecasts. If inattention is indeed contributing to the observed neglect of equilibrium pricing among households, we would expect these interventions to decrease the proportion of respondents predicting higher stock returns in the good news scenario.

Results 88% of respondents who receive the question on trading reactions predict a higher eagerness to buy among traders at the old stock price. Similarly, 88% of respondents who receive the question on price changes predict that prices have increased in response to other traders' reactions. Hence, participants predict that both initial trading responses to the announcement and ensuing price changes have occurred over the past four weeks.

However, as shown in Panel A of Table 3, neither intervention significantly alters the proportion of respondents expecting higher stock returns over the next 12 months in the good news scenario, nor do they reduce the fraction expressing naive reasoning in the open-ended elicitation. Thus, even when respondents are made attentive to the trading and price reactions that have occurred since the announcement, they continue to equate higher earnings with higher returns. These findings suggest that inattention

is not the primary driver of the non-equilibrium reasoning observed among households.

5.2 A gap in the mental model: Equilibrium not understood

The knowledge that the stock became more popular and its price rose over the past four weeks does not keep households from inferring higher future returns from stale good news. This pattern suggests that households interpret this information through a model without equilibrium pricing. If households fail to understand equilibrium pricing on financial markets, they may not realize that the price adjustments (which they anticipate) occur only until the higher current price exactly offsets the higher expected future dividends and that, at this point, no further surplus return can be expected. To study this possibility, we conduct an experimental intervention aimed at "fixing" respondents' mental model. Specifically, we provide respondents with an explanation for how future expected earnings are incorporated into prices in financial markets before respondents complete our standard survey module.

Sample The experiment consists of two waves and was conducted in June 2023 with Prolific. 947 respondents completed the first survey, out of which 588 completed a follow-up survey conducted one to three days later. Appendix Table B.4 provides summary statistics. Appendix Table B.6 highlights that the sample is balanced across the two included treatment arms in both waves and that participation in the follow-up study is unrelated to respondent characteristics. Participation in the follow-up also does not differ by treatment status ($p = 0.916$).

Design The design is again based on the *Nike good news* scenarios, and the instructions are provided in Appendix D.5. Before completing our standard module, respondents in the treatment group receive a comprehensive explanation detailing how earnings expectations get incorporated into stock prices. This explanation emphasizes the principle that stocks of companies with lower future earnings must be priced lower to attract investors. It further elucidates how, if this were not the case, stock prices would adjust due to arbitrage until holding stocks of firms with varying levels of earnings is equally attractive. The explanation concludes that "the expected future success of a company is not a reliable indicator of the future success of an investment in its stock." Respondents are then asked to provide a summary of this principle in their own words. Control group respondents instead receive an explanation about an unrelated topic of similar length and difficulty (the tides and what determines the tidal range). If inference from stale news originates from a fundamental misunderstanding of the concept of equilibrium, our intervention – aimed at filling this mental gap – should decrease the proportion of respondents predicting higher returns in response to stale good news.

Table 3 Attention and explaining equilibrium studies

Panel A: *Attention* experiment

	Dummy for predictions: **Good news ⇒ ...**			**Reasoning**	
	Return higher	Return similar	Return lower	Eq. neglect	Efficiency
	(1)	(2)	(3)	(4)	(5)
Traders' reaction	0.016	−0.023	0.006	0.038	0.010
	(0.031)	(0.027)	(0.019)	(0.033)	(0.009)
Traders' reaction & prices	0.003	−0.011	0.007	0.016	0.008
	(0.031)	(0.028)	(0.019)	(0.034)	(0.009)
Constant	0.732***	0.192***	0.076***	0.657***	0.013**
	(0.022)	(0.020)	(0.013)	(0.024)	(0.006)
Observations	1,183	1,183	1,183	1,183	1,183
R^2	0.000	0.001	0.000	0.001	0.001

Panel B: *Explaining equilibrium* experiment: Wave 1 (scenario *Nike good*)

	Return higher	Return similar	Return lower	Eq. neglect	Efficiency
	(1)	(2)	(3)	(4)	(5)
Explain equilibrium	−0.205***	0.196***	0.009	−0.195***	0.107***
	(0.031)	(0.029)	(0.018)	(0.032)	(0.019)
Control	0.741***	0.181***	0.077***	0.645***	0.035***
	(0.019)	(0.017)	(0.012)	(0.021)	(0.008)
Observations	947	947	947	947	947
R^2	0.046	0.048	0.000	0.038	0.037

Panel C: *Explaining equilibrium* experiment: Wave 2 (scenario *Amazon good*)

	Return higher	Return similar	Return lower	Eq. neglect	Efficiency
	(1)	(2)	(3)	(4)	(5)
Explain equilibrium	−0.181***	0.115***	0.066***	−0.187***	0.078***
	(0.040)	(0.037)	(0.025)	(0.041)	(0.022)
Control	0.703***	0.228***	0.069***	0.575***	0.034***
	(0.026)	(0.023)	(0.014)	(0.028)	(0.010)
Observations	588	588	588	588	588
R^2	0.034	0.016	0.012	0.035	0.023

Notes: This table analyzes treatment effects of interventions that draw respondents' attention to other market participants' trading reactions and the ensuing price changes (Panel A) or that explain the concept of equilibrium to respondents (Panels B and C) before they make their return forecast. The surveys are based on the *Nike good news* scenario (Panels A and B) or the *Amazon good news* scenario (Panel C). The outcome is a dummy variable for expecting the stock return over the next 12 months to be higher in the good news than in the neutral scenario (Columns 1-3) or dummy variables for expressing reasoning in line with market efficiency and standard risk-based asset pricing (Column 4) or reasoning consistent with a neglect of equilibrium price adjustments (Column 5) in the open-ended question. The independent variables are dummy variables indicating whether a respondent is part of a specific treatment arm, where the respective control group is the omitted base category. Panel C is based on the same intervention as Panel B but estimates treatment effects on forecasts and reasoning as measured among a subset of the original respondents in a follow-up survey conducted a few days after the initial survey. The underlying samples consist of general population respondents. Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Because the explanation of equilibrium pricing and the scenario forecast are integrated in the same survey, experimenter demand effects are a potential concern. For this reason, we conduct a follow-up survey one to three days later in which we present respondents with a different scenario (the *Amazon good news* case) and ask them for an additional forecast and explanation. Concerns related to experimenter demand effects should be mitigated in the follow-up survey (de Quidt et al., 2018).

Results Column 1 of Table 3, Panel B, illustrates that the intervention explaining equilibrium substantially reduces the proportion of respondents forecasting higher returns in the *Nike good news* scenario, going from 74% to 54% ($p < 0.01$). This is mirrored by an increase in the fraction of participants forecasting similar returns across the two scenarios, rising from 18% to 38% ($p < 0.01$, Column 2). The fraction predicting lower returns in the good news scenario is unaffected by the intervention (Column 3). Columns 1–3 of Panel C illustrate similar patterns in the follow-up survey: for example, the percentage of respondents expecting higher returns in response to positive news drops significantly from 70% to 52% due to the intervention (Column 1, $p < 0.01$). Columns 4 and 5 of Panel B and Panel C highlight that these forecasts are accompanied by a significant increase in the tendency to invoke market efficiency when explaining the reasoning underlying the return forecast ($p < 0.01$). Conversely, naive reasoning is significantly reduced among treated respondents ($p < 0.01$).

Taken together, when households are made familiar with the concept of equilibrium, a substantial fraction start reasoning and forecasting returns in line with market efficiency. This effect also illustrates the complementary nature of attention and mental models. If the model is misspecified and does not attribute an important role to the market response, increasing attention to the market response is futile. Instead, a correction of the mental model is required.

Our third and final main result is the following:

Result 3. *Interventions drawing attention to trading and price responses over the past month do not significantly influence households' return forecasts. However, households' forecasts are responsive to interventions that explain the concept of equilibrium. Thus, non-equilibrium reasoning seems to be primarily driven by a gap in households' mental models – they fail to understand the concept of equilibrium in financial markets.*

6 Conclusion

Financial markets are governed by return expectations, which agents must form in light of their deeper understanding of these markets. Understanding agents' mental models is thus critical to understanding how return expectations are formed. In this paper,

we combine expectation data with qualitative text measures of reasoning as well as experimental interventions to shed light on the mental models that underlie agents' return forecasts.

We document a widespread tendency among households from the general population, retail investors, and financial professionals to draw inferences from stale news regarding future company earnings to a company's prospective stock return, which is absent among academic experts. This striking difference in their return forecasts results from differences in agents' understanding of financial markets. Experts' reasoning aligns with standard asset pricing logic and a belief in efficient markets. By contrast, households and financial professionals appear to employ a naive model that directly associates higher future earnings with higher future returns, neglecting the offsetting effect of endogenous price adjustments. This non-equilibrium reasoning stems from a lack of familiarity with the concept of equilibrium rather than inattention to trading or price responses.

Our tailored empirical approach – surveys conducted with four different groups of economic agents, represented by more than 7,000 respondents, combining expectation data with rich qualitative text data from ten different scenarios and four additional experiments – highlights that it is possible to obtain detailed insights into the reasoning underlying agents' belief formation. Economic agents' mental representation of financial markets and the economy does not need to remain a black box for economists. Our findings – that mental models differ across economic agents and that they drastically differ from standard economic theories among important groups of households and financial professionals who advise and trade for these households – are likely to have significant implications.

For example, our findings can provide a new perspective on previously documented anomalies in return expectations and trading decisions. Positive news about future earnings typically trigger immediate stock price increases and will make economic agents engaging in non-equilibrium reasoning more optimistic about future stock returns. Non-equilibrium reasoning can thus provide a micro-foundation for extrapolation of past stock returns (Greenwood and Shleifer, 2014; Vissing-Jorgensen, 2003). Similarly, non-equilibrium reasoning could be underlying phenomena such as the pro-cyclicality of return expectations (Amromin and Sharpe, 2013; Beutel and Weber, 2022; Giglio et al., 2021a), a preference for active trading strategies (Haaland and Næss, 2023), a tendency to trade on stale news (Tetlock, 2011), over-trading (Barber and Odean, 2000; Odean, 1999), or investors' failure to understand that dividend payout decreases stock prices (Hartzmark and Solomon, 2019). Our results also underscore the importance of theoretical analyses that explore the interplay of agents with heterogeneous mental models and different levels of understanding of equilibrium feedback (Barberis

et al., 2015, 2018; Bastianello and Fontanier, 2023; Eyster et al., 2019; Glaeser and Nathanson, 2017). Our findings provide empirical evidence on the micro-foundations of such models and highlight promising avenues for future work.

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Appendix
Mental Models of the Stock Market

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Summary of the online appendix

Section A provides additional figures.

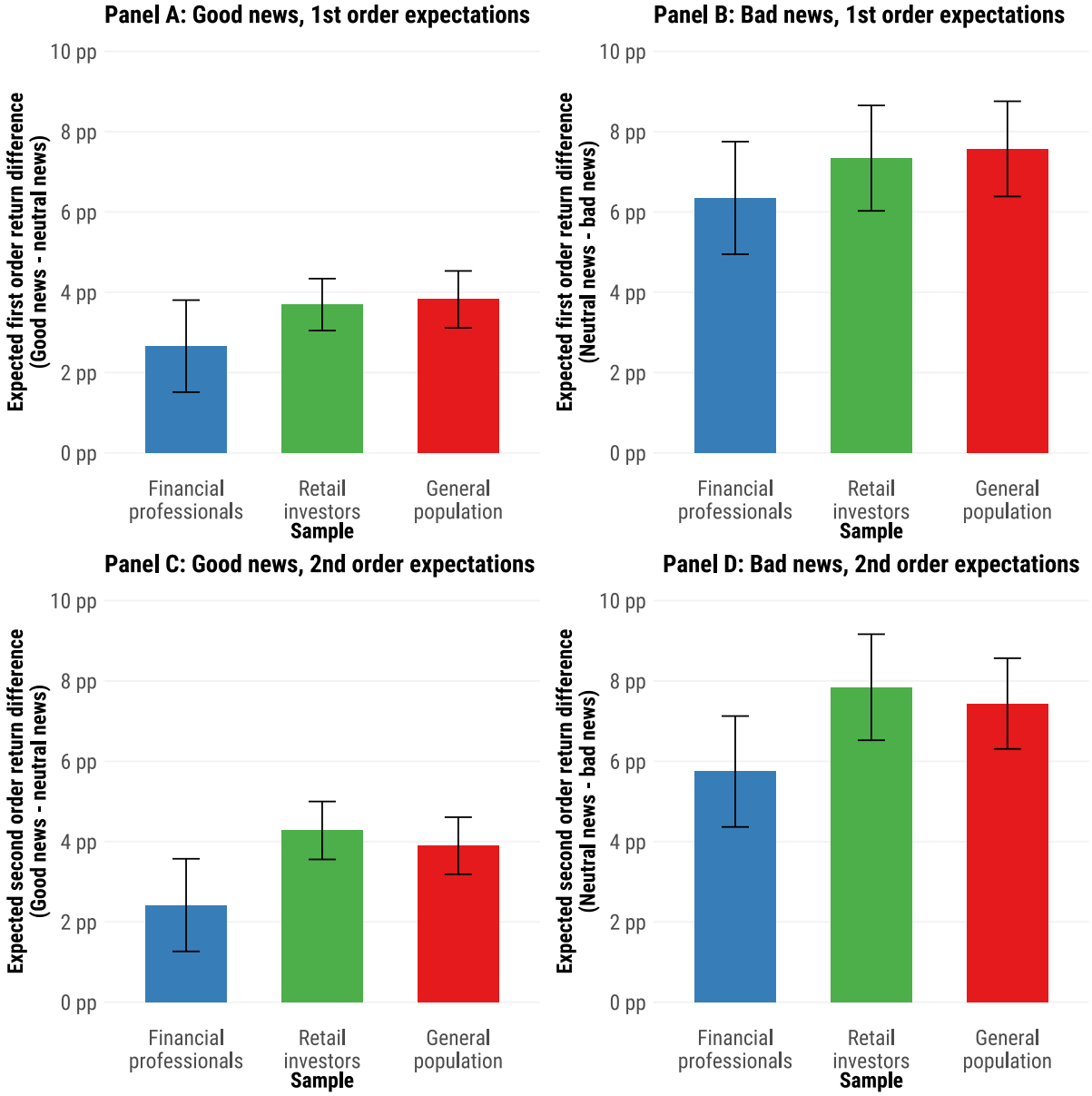
Section B provides additional tables.

Section C contains additional details on our empirical approach, including the expert survey and the hand-coding of the open-ended responses.

Section D summarizes the experimental instructions.

A Additional figures

Figure A.1 Quantitative return forecasts across samples: 1st and 2nd order



Notes: This figure shows the average predicted quantitative differences in the return over the next 12 months between the *Nike good news* and the neutral scenario (Panel A) and between the neutral and the *Nike bad news* scenario (Panel B) in our samples of financial professionals, retail investors, and respondents from the general population. Analogously, Panels C and D depict the average beliefs about the quantitative differences in other stock traders' return expectations across scenarios. Return predictions are winsorized at ± 30 pp. Error bars indicate 95% confidence intervals.

Figure A.2 Word clouds

(a) Academic experts



(b) Financial professionals



(c) Retail investors



(d) General population



Notes: The word clouds display the 30 most commonly used word stems in the qualitative text data for each sample. The text data are tokenized, stemmed, and we drop punctuation, stop words, as well as the commonly used words “Nike”, “scenario”, “stock”, and “return”.

B Additional tables

Table B.1 Overview of data collections

Population	Recruitment*	n	Study content
Main descriptive study			
General population (US), quota-targeted sampling**	Dynata	2,434	Full descriptive survey. All prediction cases (6 individual stocks, 4 aggregate cases). About 220 respondents per case, except for the two Nike cases, for which we collected 330 responses each.
Retail investors (US)	Prolific	408	Full descriptive survey. Two cases: *Nike good news*, *Nike bad news*. Case selected randomly.
Financial professionals (US)	CloudResearch	405	Full descriptive survey. Two cases: *Nike good news*, *Nike bad news*. Case selected randomly.
Academic experts (global)	Invited via email	116***	Streamlined, shorter version of survey. Two cases: *Nike good news*, *Nike bad news*. Case selected randomly with equal chance.
Real news robustness study			
General population (US)	Prolific	484	Between-subject design with real good news and real bad news for the company *Siemens Energy*. Incentivized, quantitative return prediction. Incentivized investment decision.
Ruling out risk-based reasoning and beliefs in mispricing			
General population (US)	Prolific	1,182	Experiment with three conditions. Equal chances of being in the control condition, a condition that rules out risk-based reasoning, and a condition that rules out beliefs in mispricing. Based on *Nike good news*.
Attention study			
General population (US)	Prolific	1,183	Experiment with three conditions. Equal chances of being in the control condition, a condition that draws attention to others' trading reactions, and a condition that additionally draws attention to price changes. Based on *Nike good news*.
Explaining equilibrium study			
General population (US)	Prolific	947	Experiment with two conditions. Equal chances of being in the control condition (explanation of the tidal range) and a treatment condition (explanation of equilibrium and price adjustments in financial markets). Two waves. Wave 1 includes *Nike good news*. Wave 2 based on *Amazon good news* with 588 of the initial 947 participants.

*Depending on the targeted population, we work with different recruitment strategies and survey companies.

**The sampling process targeted a sample that mirrors the general population in terms of gender, age (3 groups), region (4 groups), income (3 groups), and education (2 groups).

*** Of the 116 academic experts who provided an expected return prediction, 102 also provided predictions about uncertainty, exposure to systematic risk, and earnings.

Table B.2 Summary statistics for the general population, retail investor, and financial professional samples

Variable	ACS (2022)	General population	Retail investors	Financial professionals
Gender				
Female	50%	52%	39%	37%
Age				
18-34	29%	27%	40%	30%
35-54	32%	33%	45%	61%
55+	38%	41%	14%	9%
Household net income (in USD)				
Below 50k	34%	38%	0%	8%
50k-100k	29%	35%	8%	37%
Above 100k	37%	27%	91%	55%
Education				
Bachelor's degree or more	33%	47%	81%	73%
Region				
Northeast	17%	19%	24%	28%
Midwest	21%	21%	19%	15%
South	39%	40%	37%	36%
West	24%	20%	21%	22%
Own assets				
Median total assets (in USD)		87,500	225,000	137,500
Stockowner		58%	94%	91%
Equity share among stockowners		43%	47%	37%
Role				
Advisor				49%
Trader				42%
Analyst				70%
Among advisors				
Mean years of advising experience				10
Median number of clients				21
Among traders				
Mean years of trading experience				9
Median annual trading vol. (in USD)				500,000
Sample size	2,059,945	2,434	408	405

Notes: This table presents summary statistics for the general population, retail investor, and financial professional samples and compares them to benchmark characteristics for the US adult population based on data from the American Community Survey 2022.

Table B.3 Summary statistics for the expert sample

Variable	Academic experts
Personal characteristics	
Male	96%
Mean (median) years since PhD	18.57 (14)
Mean (median) publications in T5 Econ	1.67 (0)
Mean (median) publications in T3 Finance	4.21 (2)
Mean (median) h-index	20.98 (14)
Mean (median) citations	6,594.49 (1,626)
Location	
US-based	40%
Europe-based	48%
Sample size	116

Notes: This table displays the basic background characteristics of the participants in the expert survey. These data are externally collected (i.e., not self-reported). "Mean (median) publications in T5 Econ" is the average (median) number of publications in five highly cited general-interest economics journals (the American Economic Review, the Quarterly Journal of Economics, the Journal of Political Economy, Econometrica, and the Review of Economic Studies). "Mean (median) publications in T3 Finance" is the average (median) number of publications in three highly cited finance journals (the Journal of Finance, the Journal of Financial Economics, and the Review of Financial Studies). "Mean (median) h-index" and "Mean (median) citations" are, respectively, the average (median) h-index and the average (median) total number of citations taken from respondents' Google Scholar profiles (as of August 2023).

Table B.4 Summary statistics for the additional experiments

Variable	ACS (2022)	Real news	Rule out risk & mispricing	Attention	Explaining eq. wave 1	Explaining eq. wave 2
Gender						
Female	50%	49%	48%	49%	50%	47%
Age						
18-34	29%	43%	50%	45%	50%	47%
35-54	32%	40%	35%	36%	38%	40%
55+	38%	17%	14%	19%	13%	13%
Household net income (in USD)						
Below 50k	34%	42%	39%	39%	37%	36%
50k-100k	29%	39%	36%	35%	36%	36%
Above 100k	37%	19%	25%	26%	28%	28%
Education						
Bachelor's degree or more	33%	55%	55%	56%	57%	58%
Region						
Northeast	17%	16%	19%	15%	19%	19%
Midwest	21%	21%	20%	23%	23%	24%
South	39%	42%	38%	40%	38%	38%
West	24%	21%	22%	22%	20%	20%
Assets						
Median total assets (in USD)		37,500	37,500	37,500	37,500	37,500
Stock owner		56%	57%	58%	58%	61%
Equity share among stock owners		34%	35%	34%	34%	33%
Sample size	2,059,945	484	1,182	1,183	947	592

Notes: This table presents summary statistics for the samples of the *Real news robustness* study, the *Ruling out risk-based reasoning and beliefs in mispricing* study, the *Attention* study, and the *Explaining equilibrium* study (both waves) and compares them to benchmark characteristics for the US adult population, derived from the American Community Survey 2022.

Table B.5 Balance tests for the Real news, Ruling out, and Attention experiments

Panel A: *Real news* study

	Female	Age	Income (in 1k USD)	Bachelor's degree	Midwest	South	West	Northeast	Assets (in 1k USD)	Stock owner
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Good news	0.000	−0.433	−2.705	−0.005	0.007	−0.008	−0.043	0.044	14.233	−0.025
	(0.046)	(1.243)	(4.671)	(0.045)	(0.037)	(0.045)	(0.037)	(0.034)	(13.525)	(0.045)
Constant	0.494***	39.602***	72.438***	0.548***	0.203***	0.427***	0.228***	0.141***	93.444***	0.568***
	(0.032)	(0.883)	(3.298)	(0.032)	(0.026)	(0.032)	(0.027)	(0.022)	(9.185)	(0.032)
Joint F-test (H_0: all differences between conditions are zero).										
	p = 0.675									
Obs.	484	484	484	484	484	484	484	484	484	484
R^2	0.000	0.000	0.001	0.000	0.000	0.000	0.003	0.004	0.002	0.001

Panel B: *Ruling out risk-based reasoning and beliefs in mispricing* study

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ruling out risk	−0.000	0.274	−1.320	0.011	0.009	−0.032	0.002	0.022	−9.091	−0.027
	(0.036)	(0.988)	(3.953)	(0.035)	(0.029)	(0.035)	(0.029)	(0.029)	(10.168)	(0.035)
Ruling out mispricing	−0.004	0.962	6.629*	0.016	−0.006	−0.030	0.058*	−0.022	12.913	0.057
	(0.036)	(0.994)	(3.931)	(0.035)	(0.028)	(0.035)	(0.030)	(0.027)	(10.694)	(0.035)
Constant	0.481***	37.327***	75.156***	0.546***	0.202***	0.404***	0.202***	0.192***	102.988***	0.561***
	(0.025)	(0.670)	(2.812)	(0.025)	(0.020)	(0.025)	(0.020)	(0.020)	(7.242)	(0.025)
Joint F-test (H_0: all differences between conditions are zero).										
	p = 0.438									
Obs.	1,182	1,182	1,182	1,182	1,182	1,182	1,182	1,182	1,182	1,182
R^2	0.000	0.001	0.004	0.000	0.000	0.001	0.004	0.002	0.004	0.005

Panel C: *Attention* study

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Att. traders	−0.010	0.424	5.571	−0.004	−0.015	−0.065*	0.085***	−0.005	11.524	0.083**
	(0.036)	(1.025)	(3.877)	(0.035)	(0.029)	(0.035)	(0.030)	(0.026)	(10.927)	(0.035)
Att. traders & prices	−0.037	1.382	−0.086	−0.027	0.035	−0.039	0.042	−0.038	−0.948	0.006
	(0.036)	(1.016)	(3.725)	(0.035)	(0.030)	(0.035)	(0.029)	(0.025)	(10.739)	(0.035)
Constant	0.503***	39.245***	74.217***	0.568***	0.220***	0.432***	0.182***	0.167***	104.795***	0.553***
	(0.025)	(0.699)	(2.663)	(0.025)	(0.021)	(0.025)	(0.019)	(0.019)	(7.687)	(0.025)
Joint F-test (H_0: all differences between conditions are zero).										
	p = 0.115									
Obs.	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183
R^2	0.001	0.002	0.002	0.001	0.002	0.003	0.007	0.002	0.001	0.006

Notes: This table presents balance tests for the *Real news* study (Panel A), the *Ruling out risk-based reasoning and beliefs in mispricing* study (Panel B), and the Attention study (Panel C). It shows regressions of respondent characteristics on dummy variables indicating different treatment conditions. Robust standard errors are in parentheses. The underlying samples consist of general population respondents. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table B.6 Balance tests for the Explaining equilibrium experiment, waves 1 and 2

Panel A: *Explaining equilibrium* study, wave 1

	Female	Age	Income (in 1k USD)	Bachelor's degree	Midwest	South	West	Northeast	Assets (in 1k USD)	Stock owner
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Explain eq.	−0.015	1.023	5.854*	0.029	0.003	0.012	−0.005	−0.010	4.883	0.018
	(0.033)	(0.857)	(3.487)	(0.032)	(0.027)	(0.032)	(0.026)	(0.026)	(9.770)	(0.032)
Constant	0.502***	37.019***	75.241***	0.556***	0.226***	0.373***	0.203***	0.199***	105.426***	0.568***
	(0.022)	(0.565)	(2.349)	(0.022)	(0.018)	(0.021)	(0.018)	(0.018)	(6.580)	(0.022)
Joint F-test (H_0: all differences between conditions are zero).										
	p = 0.809									
Obs.	947	947	947	947	947	947	947	947	947	947
R^2	0.000	0.002	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000

Panel B: *Explaining equilibrium* study, wave 2

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Explain eq.	−0.026	0.401	6.696	0.035	−0.012	0.006	−0.017	0.023	11.407	−0.014
	(0.041)	(1.062)	(4.454)	(0.041)	(0.035)	(0.040)	(0.033)	(0.032)	(12.968)	(0.040)
Constant	0.481***	37.834***	75.422***	0.563***	0.247***	0.375***	0.203***	0.175***	109.163***	0.619***
	(0.028)	(0.710)	(3.025)	(0.028)	(0.024)	(0.027)	(0.023)	(0.021)	(8.618)	(0.027)
Joint F-test (H_0: all differences between conditions are zero).										
	p = 0.841									
Obs.	588	588	588	588	588	588	588	588	588	588
R^2	0.001	0.000	0.004	0.001	0.000	0.000	0.000	0.001	0.001	0.000

Panel C: *Explaining equilibrium* study, attrition from wave 1 to 2

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Wave 2	−0.026	0.534	0.580	0.009	0.014	−0.000	−0.005	−0.009	6.724	0.037
	(0.026)	(0.677)	(2.821)	(0.026)	(0.022)	(0.025)	(0.021)	(0.021)	(8.069)	(0.026)
Constant	0.495***	37.483***	77.893***	0.569***	0.227***	0.378***	0.201***	0.194***	107.638***	0.576***
	(0.016)	(0.425)	(1.738)	(0.016)	(0.014)	(0.016)	(0.013)	(0.013)	(4.863)	(0.016)
Joint F-test (H_0: all differences between conditions are zero).										
	p = 0.915									
Obs.	1,535	1,535	1,535	1,535	1,535	1,535	1,535	1,535	1,535	1,535
R^2	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001

Notes: This table presents balance tests for the first wave of the *Explaining equilibrium* study (Panel A) and the second wave (Panel B) and analyzes attrition from wave 1 to wave 2 (Panel C). It shows regressions of respondent characteristics on dummy variables indicating being in the equilibrium explanation condition (Panels A and B) or indicating whether the respondent participated in the second wave (Panel C). Robust standard errors are in parentheses. The underlying sample consists of general population respondents. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table B.7 Regressing directional return forecasts on respondents' characteristics

	Financial professionals		Retail investors		General population	
	Dummy for predictions: **Good news** ⇒ ...					
	Higher returns	Similar returns	Higher returns	Similar returns	Higher returns	Similar returns
	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.042	0.049	0.097**	−0.037	0.051	−0.016
	(0.047)	(0.036)	(0.041)	(0.033)	(0.035)	(0.031)
Age	0.003	−0.003*	0.003**	−0.002*	0.004***	−0.003***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Bachelor's degree	0.125**	0.039	0.026	0.005	−0.040	0.033
	(0.054)	(0.031)	(0.056)	(0.045)	(0.039)	(0.035)
Log income	−0.061	0.037	−0.002	0.048	−0.001	0.010
	(0.047)	(0.033)	(0.060)	(0.052)	(0.025)	(0.023)
Log assets	−0.015	0.008	−0.019	0.003	−0.005	−0.000
	(0.010)	(0.007)	(0.012)	(0.011)	(0.005)	(0.005)
Stock owner	−0.094	−0.016	−0.109	0.081	−0.003	0.016
	(0.099)	(0.075)	(0.086)	(0.073)	(0.046)	(0.041)
Financial literacy (3/3) correct	0.165***	−0.073*	0.110*	−0.075	0.145***	−0.084**
	(0.050)	(0.038)	(0.061)	(0.051)	(0.038)	(0.034)
Constant	1.313***	−0.280	0.851	−0.376	0.480*	0.256
	(0.497)	(0.360)	(0.682)	(0.584)	(0.256)	(0.230)
Observations	405	405	408	408	672	672
R^2	0.057	0.045	0.036	0.019	0.067	0.032

Notes: This table regresses respondents' directional return forecasts on a set of respondent characteristics, pooling across the *Nike good news* and the (reversely coded) *Nike bad news* survey arms. The outcomes are dummy variables for expecting the stock return over the next 12 months to be higher (lower) in the good news (bad news) scenario than in the neutral scenario (Columns 1, 3, and 5) or to be similar between the news and the neutral scenario (Columns 2, 4, and 6). The underlying samples are financial professionals (Columns 1 and 2), retail investors (Columns 3 and 4), or the general population sample (Columns 5 and 6). Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table B.8 Quantitative return forecasts and investment decisions in the real news robustness study

	Expected return (in %)	**Share invested in stock** (in %)
	(1)	(2)
Good news	6.447***	26.723***
	(0.775)	(2.810)
Constant	4.246***	40.108***
	(0.607)	(2.169)
Observations	484	484
R^2	0.126	0.158

Notes: This table regresses a respondent's return forecast and investment decision on a dummy variable taking value one if the respondent was exposed to real stale good news regarding Siemens Energy's future earnings and value zero if the respondent was exposed to real stale bad news. The outcomes are a respondent's quantitative forecast of the return of the Siemens Energy stock over the next 12 months (Column 1) and the share of a £100 investment allocated to the Siemens Energy stock instead of a savings bond paying a fixed interest rate of 2% (Column 2). As preregistered, return predictions are winsorized at ± 30 pp. The underlying sample consists of general population respondents. Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table B.9 Regressing reasoning on characteristics

	Financial professionals		Retail investors		General population	
	Dummy for reasoning (open-text data)					
	Efficiency	Eq. neglect	Efficiency	Eq. neglect	Efficiency	Eq. neglect
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.014	0.076	−0.030**	0.089*	−0.016**	0.085**
	(0.012)	(0.051)	(0.014)	(0.051)	(0.007)	(0.038)
Age	−0.000	0.003	−0.001	0.003	−0.000	0.004***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.000)	(0.001)
Bachelor's degree	0.005	0.038	−0.005	0.072	0.005	−0.028
	(0.013)	(0.057)	(0.019)	(0.065)	(0.005)	(0.043)
Log income	0.006	−0.018	0.033*	−0.025	−0.002	−0.012
	(0.009)	(0.055)	(0.019)	(0.075)	(0.007)	(0.027)
Log assets	−0.000	−0.019	0.003	0.004	0.000	0.006
	(0.002)	(0.015)	(0.003)	(0.018)	(0.000)	(0.006)
Stock owner	0.012	−0.039	0.023*	−0.107	0.003	−0.021
	(0.011)	(0.109)	(0.012)	(0.103)	(0.007)	(0.048)
Financial literacy (3/3 correct)	−0.007	0.296***	0.022***	0.075	0.020**	0.106**
	(0.014)	(0.052)	(0.008)	(0.068)	(0.010)	(0.043)
Constant	−0.045	0.637	−0.395*	0.692	0.036	0.267
	(0.108)	(0.574)	(0.223)	(0.844)	(0.079)	(0.280)
Observations	405	405	408	408	672	672
R^2	0.007	0.098	0.023	0.020	0.022	0.054

Notes: This table regresses measures of the reasoning underlying respondents' return forecasts as expressed in the open-ended text question on a set of respondent characteristics, pooling across the *Nike good news* and the *Nike bad news* survey arms. The outcomes are dummy variables for reasoning in line with market efficiency and standard risk-based asset pricing (Columns 1, 3, and 5) and for reasoning consistent with a neglect of equilibrium price adjustments (Columns 2, 4, and 6). The underlying samples are financial professionals (Columns 1 and 2), retail investors (Columns 3 and 4), or the general population sample (Columns 5 and 6). Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table B.10 Return forecasts differ by underlying reasoning

	Dummy for predictions: **Good news** ⇒ **High return** or **Bad news** ⇒ **Low return**				
	Academic experts	Financial professionals	Retail investors	General population	General population
	(1)	(2)	(3)	(4)	(5)
Efficiency	-0.356^{***}	-0.486^{***}	-0.419^{***}	-0.330^{**}	-0.450^{***}
	(0.113)	(0.038)	(0.096)	(0.155)	(0.071)
Equilibrium neglect	0.632^{***}	0.393^{***}	0.474^{***}	0.443^{***}	0.430^{***}
	(0.112)	(0.044)	(0.041)	(0.030)	(0.019)
Constant	0.368^{***}	0.486^{***}	0.510^{***}	0.497^{***}	0.521^{***}
	(0.112)	(0.038)	(0.040)	(0.027)	(0.017)
Scenario	Nike	Nike	Nike	Nike	All individual companies
Observations	111	405	408	672	1,605
R^2	0.624	0.210	0.379	0.244	0.236

Notes: This table regresses respondents' directional return forecasts on the reasoning underlying these forecasts as expressed in the open-ended question, pooling across the *Nike good news* and the *Nike bad news* survey arms (Columns 1–4) or pooling across all firm-specific survey arms (Column 5). The outcome is a dummy variable for expecting the stock return over the next 12 months to be higher (lower) in the good news (bad news) than in the neutral scenario. The independent variables are dummy variables for reasoning in line with market efficiency and standard risk-based asset pricing and for reasoning consistent with a neglect of equilibrium price adjustments. The underlying samples are academic experts (Column 1), financial professionals (Column 2), retail investors (Column 3), or the general population sample (Columns 4 and 5). Robust standard errors are in parentheses. Of the 116 experts, 111 answered the open-ended question. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table B.11 Differences in reasoning explain differences in forecasts across samples

	Dummy for predictions: **Good news** ⇒ **High return** or **Bad news** ⇒ **Low return**					
	Regressing on sample			Regressing on sample and reasoning		
	Return higher	Return similar	Return lower	Return higher	Return similar	Return lower
	(1)	(2)	(3)	(4)	(5)	(6)
Financial professionals	0.541***	−0.611***	0.071*	0.029	−0.014	−0.015
	(0.041)	(0.045)	(0.036)	(0.055)	(0.051)	(0.051)
Retail investors	0.626***	−0.600***	−0.026	0.100*	0.003	−0.103**
	(0.040)	(0.045)	(0.034)	(0.054)	(0.051)	(0.049)
General population	0.549***	−0.523***	−0.026	0.070	0.056	−0.126**
	(0.039)	(0.045)	(0.033)	(0.054)	(0.051)	(0.050)
Efficiency				−0.417***	0.632***	−0.215***
				(0.051)	(0.050)	(0.042)
Equilibrium neglect				0.441***	−0.287***	−0.154***
				(0.021)	(0.018)	(0.017)
Constant	0.153***	0.730***	0.117***	0.429***	0.280***	0.291***
	(0.034)	(0.042)	(0.031)	(0.055)	(0.051)	(0.051)
Observations	1,596	1,596	1,596	1,596	1,596	1,596
R^2	0.102	0.140	0.017	0.354	0.355	0.075

Notes: This table examines whether differences in reasoning as expressed in the open-ended question can account for differences in directional return forecasts between experts and non-experts, pooling across the *Nike good news* and the *Nike bad news* survey arms. The outcomes are dummy variables for expecting the stock return over the next 12 months to be higher (lower) in the good news (bad news) than in the neutral scenario, to be similar across scenarios, or to be lower (higher) in the good news (bad news) than in the neutral scenario. The independent variables are dummy variables indicating whether a respondent belongs to the financial professionals, retail investors, or general population sample, and dummy variables for reasoning in line with market efficiency and standard risk-based asset pricing and for reasoning consistent with a neglect of equilibrium price adjustments. The underlying sample pools academic experts, financial professionals, retail investors, and general population respondents. Of the 116 experts, 111 answered the open-ended question. Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table B.12 Differences in structured reasoning across samples

	Dummies: Reasoning according to structured question	
	Efficiency	Equilibrium neglect
	(1)	(2)
Financial professionals	−0.358***	0.204***
	(0.049)	(0.035)
Retail investors	−0.481***	0.288***
	(0.048)	(0.036)
General population	−0.413***	0.237***
	(0.046)	(0.033)
Constant	0.770***	0.080***
	(0.042)	(0.027)
Observations	1,585	1,585
R^2	0.052	0.021

Notes: This table regresses measures of the reasoning underlying respondents' return forecasts as expressed in the structured question included at the end of the survey on dummy variables indicating the different samples, where the omitted base category is the sample of academic experts, pooling across the *Nike good news* and the *Nike bad news* survey arms. The outcomes are dummy variables for reasoning in line with market efficiency and standard risk-based asset pricing (Column 1) and for reasoning consistent with a neglect of equilibrium price adjustments (Column 2). The underlying sample pools academic experts, financial professionals, retail investors, and general population respondents. Of the 116 academic experts, 100 answered the structured question. Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table B.13 Correlations between directional return expectations and other expectations: Additional specifications

Panel A: Financial professionals

	Dummy for predictions: **Good news** ⇒ **High return** or **Bad news** ⇒ **Low return**				
	Main specification	Good news only	Bad news only	All years	Respondent FE
	(1)	(2)	(3)	(4)	(5)
Earnings $\mathbb{E}$ aligned	0.417***	0.457***	0.363***	0.380***	0.259***
	(0.046)	(0.068)	(0.069)	(0.029)	(0.038)
Uncertainty $\mathbb{E}$ aligned	0.136***	0.138**	0.132**	0.199***	0.236***
	(0.041)	(0.062)	(0.057)	(0.029)	(0.038)
Risk factor $\mathbb{E}$ aligned	−0.090**	−0.122**	−0.033	−0.014	0.054
	(0.044)	(0.062)	(0.064)	(0.030)	(0.037)
Others overoptimistic†	−0.100*	−0.044	−0.156**		
	(0.052)	(0.080)	(0.070)		
Others overpessimistic†	0.031	0.101	−0.039		
	(0.046)	(0.068)	(0.062)		
Constant	0.430***	0.374***	0.509***	0.259***	−0.114***
	(0.052)	(0.070)	(0.079)	(0.021)	(0.018)
Years	1	1	1	1-5	1-5
Scenarios	Nike	Nike good news	Nike bad news	Nike	Nike
Respondent FE	–	–	–	–	✓
Observations	405	191	214	2,025	2,025
R^2	0.272	0.329	0.203	0.199	0.489

Panel B: Retail investors

	Dummy for predictions: **Good news** ⇒ **High return** or **Bad news** ⇒ **Low return**				
	Main specification	Good news only	Bad news only	All years	Respondent FE
	(1)	(2)	(3)	(4)	(5)
Earnings $\mathbb{E}$ aligned	0.388***	0.322***	0.579***	0.551***	0.507***
	(0.057)	(0.070)	(0.113)	(0.027)	(0.035)
Uncertainty $\mathbb{E}$ aligned	0.053	0.063	0.042	0.069**	0.195***
	(0.038)	(0.057)	(0.075)	(0.032)	(0.048)
Risk factor $\mathbb{E}$ aligned	0.073*	0.095*	0.036	0.123***	0.086*
	(0.038)	(0.055)	(0.052)	(0.033)	(0.050)
Others overoptimistic†	−0.007	0.039	−0.082		
	(0.050)	(0.069)	(0.071)		
Others overpessimistic†	0.143***	0.159**	0.125**		
	(0.043)	(0.065)	(0.053)		
Constant	0.388***	0.405***	0.258**	0.152***	−0.304***
	(0.060)	(0.073)	(0.115)	(0.017)	(0.021)
Years	1	1	1	1-5	1-5
Scenarios	Nike	Nike good news	Nike bad news	Nike	Nike
Respondent FE	–	–	–	–	✓
Observations	408	210	198	2,040	2,040
R^2	0.194	0.195	0.221	0.344	0.633

†Data are only available for year 1.

Table continued on next page.

Table B.13 *(continued)* Correlations between directional return expectations and other expectations: Additional specifications

Panel C: General population

	Dummy for predictions: **Good news ⇒ High return** or **Bad news ⇒ Low return**						
	Main specification	Good news only	Bad news only	All years	Respondent fixed effects	Individual company scenarios	Aggregate economy scenarios
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Earnings $\mathbb{E}$ aligned	0.416***	0.382***	0.434***	0.460***	0.313***	0.384***	0.382***
	(0.036)	(0.050)	(0.058)	(0.024)	(0.034)	(0.023)	(0.033)
Uncertainty $\mathbb{E}$ aligned	0.075**	0.154***	−0.005	0.134***	0.133***	0.070***	0.062*
	(0.033)	(0.048)	(0.046)	(0.025)	(0.035)	(0.022)	(0.034)
Risk factor $\mathbb{E}$ aligned	−0.012	−0.025	0.004	0.015	0.001	0.008	0.004
	(0.035)	(0.050)	(0.050)	(0.027)	(0.039)	(0.024)	(0.035)
Risk aversion $\mathbb{E}$ aligned‡							0.084**
							(0.034)
Interest rate $\mathbb{E}$ aligned‡							0.034
							(0.034)
Others overoptimistic†	−0.028	−0.040	−0.035			−0.001	−0.047
	(0.039)	(0.060)	(0.051)			(0.025)	(0.037)
Others overpessimistic†	0.039	0.051	0.027			0.062**	0.132***
	(0.038)	(0.056)	(0.052)			(0.025)	(0.035)
Constant	0.415***	0.392***	0.441***	0.233***	0.822***	0.427***	0.332***
	(0.036)	(0.047)	(0.058)	(0.016)	(0.017)	(0.024)	(0.032)
Years	1	1	1	1-5	1-5	1	1
Scenarios	Nike	Nike good news	Nike bad news	Nike	Nike	Individual company scenarios	Aggregate company scenarios
Respondent FE	–	–	–	–	✓	–	–
Observations	672	337	335	3,360	3,360	1,605	829
R^2	0.211	0.216	0.200	0.243	0.576	0.185	0.219

†Data are only available for year 1. ‡Data are only available for the aggregate scenarios.

Notes: This table regresses respondents' directional return forecasts on their forecasts about other variables. The outcome is a dummy variable for expecting the stock return over the next 12 months to be higher (lower) in the good news (bad news) than in the neutral scenario. Columns 1, 4, and 5 pool the *Nike good news* and the *Nike bad news* survey arms. Columns 2 and 3 focus on the *Nike good news* and the *Nike bad news* arm, respectively. Columns 6 and 7 pool all scenarios for stocks of individual firms and the aggregate stock market, respectively. The independent variables are dummy variables indicating whether a respondent expects earnings, uncertainty of the return, the exposure of the return to circumstances investors deem unfavorable, i.e., to systematic risk, market participants' risk aversion, or interest rates to be higher (lower) in the good news (bad news) than in the neutral scenario, and dummy variables indicating whether the respondent updates the quantitative second-order return expectation more or less strongly (more than 0.5pp) than the quantitative first-order expectation in response to the news ("Others overoptimistic" or "Others overpessimistic", respectively). The underlying samples are financial professionals (Panel A), retail investors (Panel B), or the general population sample (Panel C). Robust standard errors are in parentheses. Standard errors are clustered on the respondent level in Columns 4 and 5. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

C Additional details on empirical approach

C.1 Expert survey

Starting from the EconLit publication database, we manually identified the email addresses of all economists who have published at least one article with the JEL code "G: Financial Economics" in a set of leading finance journals or the "top five" economics journals in the years 2015–2019.

We consider the following journals:

- Journal of Finance
- Journal of Financial Economics
- Review of Financial Studies
- Review of Finance
- Journal of Financial and Quantitative Analysis
- Journal of Financial Intermediation
- American Economic Review
- Review of Economic Studies
- Quarterly Journal of Economics
- Journal of Political Economy
- Econometrica

We sent a link to our study to all of these economists by email. We did not send any reminders. In total, we contacted 2,876 economists. 116 economists responded to our survey, corresponding to a response rate of 4%, which is common for such expert surveys.

C.2 Hand-coding of open-ended responses

Each open-text response is assigned to a unique category depending on which line of reasoning is expressed by the respondent. Table C.1 provides a complete overview of all categories in our coding scheme together with examples. The coding scheme was devised before the main data collection and informed by both pilot interviews with households and leading asset pricing theories. Therefore, it contains standard risk-based asset pricing arguments, arguments related to temporary mispricing, and "naive" forms of equilibrium neglect. Responses that cannot clearly be assigned to one category are assigned to a residual category.

Table C.1 Overview of categories of the coding scheme

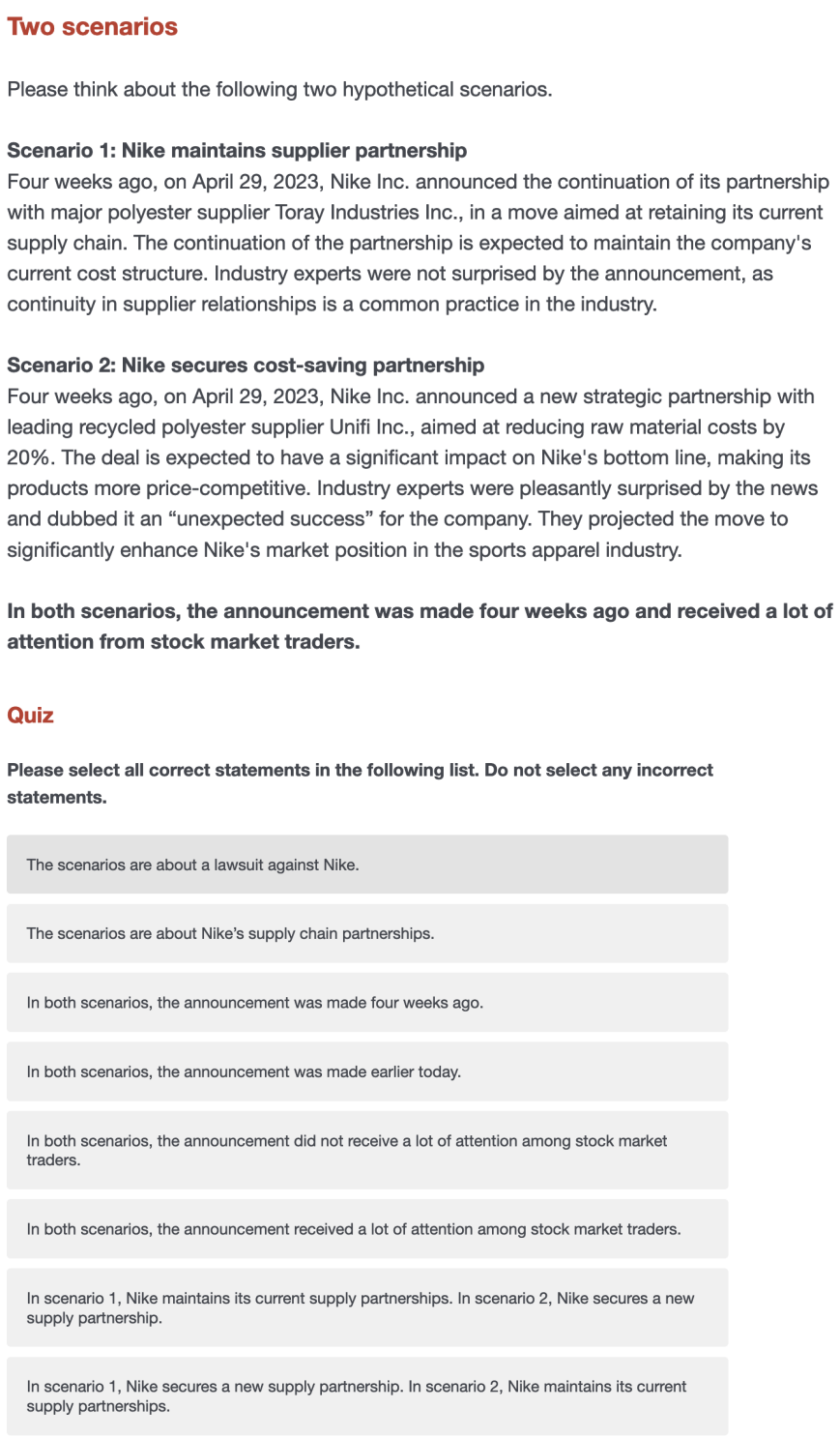
Category	Explanation	Example
Efficient markets		
Information efficiency	The expected returns are the same because the information has already been priced into the market over the past four weeks since the announcement.	"The announcement was 4 weeks ago so it is enough time to be priced in the market. It mentions that it has received a lot of attention already. [...]" (Academic expert)
Risk	The expected return is higher/lower/similar because the uncertainty of the company's future earnings is expected to be higher/lower/similar.	"I think it will be higher because of the increased risks. it will allow for more volatility and increase the return that can be gained. although this strategy is risky it could bring in more profit" (Retail investor)
Risk factor exposure	The expected return is higher/lower/similar because the risk factor exposure of the future stock return is expected to be higher/lower/similar.	"Negative news already impounded in price but Nike became riskier and the expected return is higher if you assume that the bad news is correlated is marginal utility growth. [...]" (Academic expert)
Risk aversion	The expected return is higher/lower/similar because market participants' risk aversion is expected to be higher/lower/similar.	Never assigned.
Risk-free rate	The expected return is higher/lower/similar because the interest rates are expected to be higher/lower/similar.	"If the interest rates are increased, I would figure it would increase the investment of stocks or any savings." (General population)
Temporary mispricing		
Overreaction	The expected return is higher or lower because investors initially overreact to the news, leading to a higher or lower return for some time until a correction occurs.	"I think there is a good chance that the market overreacted in the 4 weeks since the announcement. Therefore, there will be more upside to the stock in scenario two over the next 12 months." (Retail investor)
Underreaction	The expected returns are higher/lower because investors initially underreacted to the good/bad news, leading to a higher/lower return for some time until the news is fully incorporated in the price.	"In scenario 2, the surprise cost savings should lead to better bottom line. While the market probably reacted up right away during the previous 4 weeks, the upside is most likely not fully priced in." (General population)
Equilibrium neglect		
Earnings	The expected return is higher/lower/similar because the company's future earnings or performance are expected to be higher/lower/similar.	"Simply put, the second scenario would lead to a financial set-back for the company, as they are facing a 20 percent increase in production costs, cutting into the company's profits. The first scenario is more likely to get a good return for investors." (Retail investor)
Investors' reaction	The expected return is higher/lower/similar because of investors' interest in or enthusiasm about the stock is higher/lower/similar.	"Since Nike maintained its supply, chain partnership, investors would feel more confident in Nike and the stock price would rise" (Financial professional)
Residual category		
Other arguments	Any explanation that does not fit the above categories, including repetitions of the scenario text, confused responses, or responses that are too short or too ambiguous to be classified.	"There will be only modest gains in the first scenario and losses in the second." (Financial professional)

Notes: This table provides an overview of the different categories in our coding scheme, an explanation for each category, and example extracts from the open-text responses.

D Experimental instructions

This appendix contains the key instructions from our surveys and experiments. A complete overview of the survey instructions is available at https://osf.io/b83gf.

D.1 Main survey



Two scenarios

Please think about the following two hypothetical scenarios.

Scenario 1: Nike maintains supplier partnership
Four weeks ago, on April 29, 2023, Nike Inc. announced the continuation of its partnership with major polyester supplier Toray Industries Inc., in a move aimed at retaining its current supply chain. The continuation of the partnership is expected to maintain the company's current cost structure. Industry experts were not surprised by the announcement, as continuity in supplier relationships is a common practice in the industry.

Scenario 2: Nike secures cost-saving partnership
Four weeks ago, on April 29, 2023, Nike Inc. announced a new strategic partnership with leading recycled polyester supplier Unifi Inc., aimed at reducing raw material costs by 20%. The deal is expected to have a significant impact on Nike's bottom line, making its products more price-competitive. Industry experts were pleasantly surprised by the news and dubbed it an “unexpected success” for the company. They projected the move to significantly enhance Nike's market position in the sports apparel industry.

In both scenarios, the announcement was made four weeks ago and received a lot of attention from stock market traders.

Quiz

Please select all correct statements in the following list. Do not select any incorrect statements.

- The scenarios are about a lawsuit against Nike.
- The scenarios are about Nike’s supply chain partnerships.
- In both scenarios, the announcement was made four weeks ago.
- In both scenarios, the announcement was made earlier today.
- In both scenarios, the announcement did not receive a lot of attention among stock market traders.
- In both scenarios, the announcement received a lot of attention among stock market traders.
- In scenario 1, Nike maintains its current supply partnerships. In scenario 2, Nike secures a new supply partnership.
- In scenario 1, Nike secures a new supply partnership. In scenario 2, Nike maintains its current supply partnerships.

Your prediction

Review the two scenarios *(click to open detailed description)*

▸ **Scenario 1: Nike maintains supplier partnership**

▸ **Scenario 2: Nike secures cost-saving partnership**

The announcements were made four weeks ago and received a lot of attention.

Imagine that you invest $1,000 in Nike stocks today, **four weeks after the announcement was made in the two scenarios**. Imagine that you sell these stocks in twelve months from now.

What would you expect? In which scenario would the return of this investment in Nike stocks be higher?

	The expected return would be …		
	higher in scenario 1	**similar in both scenarios**	**higher in scenario 2**
Return of investment over the next twelve months Invest $1,000 in Nike stocks today, *four weeks after the announcement*. Sell these stocks one year from now.	○	○	○

"Similar in both scenarios" means that the difference in returns is smaller than or equal to 0.5 percentage points.

How confident are you in your above prediction? Please answer on a scale from 1 (Not confident at all) to 6 (Very confident).

Not confident at all **1**	**2**	**3**	**4**	**5**	Very confident **6**

Important

On the next page, you will encounter an open question in which we will ask you to explain the prediction that you made on the previous page.

From our experience, it can take about **2 minutes** to complete this question.

Your responses are very valuable for this research project. Therefore, **please take your time to respond carefully.**

[PAGE BREAK]

Your explanation

Review the two scenarios *(click to open detailed description)*

▸ **Scenario 1: Nike maintains supplier partnership**
▸ **Scenario 2: Nike secures cost-saving partnership**

The announcements were made four weeks ago and received a lot of attention.

For the following investment ...

> You invest $1,000 in Nike stocks today, **four weeks after the announcement was made in the two scenarios**.
> You sell these stocks twelve months from now.

... you responded that you expect that the **return of the investment in Nike stocks would be [repeat response]**

Please explain why you think that would be the case.

Table D.1 Overview of all scenarios

Case	Scenario 1	Scenario 2
Nike, good news: New partnership	**Nike maintains supplier partnership** Four weeks ago, on [...], Nike Inc. announced the continuation of its partnership with major polyester supplier Toray Industries Inc., in a move aimed at retaining its current supply chain. The continuation of the partnership is expected to maintain the company's current cost structure. Industry experts were not surprised by the announcement, as continuity in supplier relationships is a common practice in the industry.	**Nike secures cost-saving partnership** Four weeks ago, on [...], Nike Inc. announced a new strategic partnership with leading recycled polyester supplier Unifi Inc., aimed at reducing raw material costs by 20%. The deal is expected to have a significant impact on Nike's bottom line, making its products more price-competitive. Industry experts were pleasantly surprised by the news and dubbed it an "unexpected success" for the company. They projected the move to significantly enhance Nike's market position in the sports apparel industry.
Nike, bad news: Loss of partnership	**Nike maintains supplier partnership** Four weeks ago, on [...], Nike Inc. announced the continuation of its partnership with major polyester supplier Toray Industries Inc., in a move aimed at retaining its current supply chain. The continuation of the partnership is expected to maintain the company's current cost structure. Industry experts were not surprised by the announcement, as continuity in supplier relationships is a common practice in the industry.	**Nike faces supply chain disruption** Four weeks ago, on [...], Nike Inc. announced that it is discontinuing its long-standing partnership with major polyester supplier Toray Industries Inc., in a move that is expected to increase the company's production costs by 20%. The sudden termination disrupts Nike's supply chain, leading to higher raw material costs. Industry experts were negatively surprised by the news and dubbed it an "unexpected setback" for Nike. They projected the move to significantly weaken the company's market position in the sports apparel industry.
Amazon, good news: Expansion in Africa	**No changes to Amazon's international strategy** Four weeks ago, on [...], Amazon announced that it would move forward with its current expansion plans in the e-commerce sector. As expected, no new country expansions were announced, and none of the existing expansion plans, such as in Africa and South America, were put on hold. The news came as no surprise to e-commerce experts.	**Amazon expands in Africa** Four weeks ago, on [...], Amazon announced that it would further increase its expansion efforts in Africa, launching its e-commerce business in Nigeria, Algeria, and Morocco later this year. A spokesperson for the company said that negotiations with authorities in these countries—which are among the largest economies on the continent—were proceeding at a faster than expected pace. E-commerce experts were surprised by the good news, and called it an "unexpected success" for the company.
Amazon, bad news: Withdrawal from South America	**No changes to Amazon's international strategy** Four weeks ago, on [...], Amazon announced that it would move forward with its current expansion plans in the e-commerce sector. As expected, no new country expansions were announced, and none of the existing expansion plans, such as in Africa and South America, were put on hold. The news came as no surprise to e-commerce experts.	**Amazon withdraws from South America** Four weeks ago, on [...], Amazon announced that it would be withdrawing from the South American e-commerce market. A spokesperson of the company said the company would end its operations in Brazil in the summer of 2023 and put any expansion plans to other countries in the region on indefinite hold. This decision has raised concerns about Amazon's expansion potential. E-commerce experts were surprised by the bad news, and called it a "significant setback" for the company.
Novartis, bad news: Loss of patent	**Novartis keeps exclusive right to sell heart drug** Four weeks ago, on [...], the Food and Drug Administration (FDA) upheld Novartis' right to the exclusive sale of the heart failure drug Entresto until at least 2028, banning any competitors from producing cheaper substitutes of the drug. This decision ensures that Novartis can continue to sell its drug without contest from competitors for at least five more years. The news came as no surprise to experts of the pharmaceutical industry, who predicted the company's profits to remain stable in the next few years.	**Novartis to lose exclusive right to sell heart drug** Four weeks ago, on [...], the Food and Drug Administration (FDA) rejected Novartis' right to the exclusive sale of the heart failure drug Entresto. The US regulator will open the market for competing generic drug makers, which plan to sell equivalent drugs at lower prices, starting in September this year. The decision is a significant setback for Novartis as the Entresto drug generated the second-highest revenue among all products sold by the company in the past year. Experts of the pharmaceutical industry were surprised by the bad news, calling it an "unexpected defeat" for the company.

Notes: This table provides an overview of all scenarios of the main general population survey.

Table D.1 *(continued)* Overview of all scenarios

Case	Scenario 1	Scenario 2
BioNTech, good news: Research breakthrough	**BioNTech's cancer drug still years away, market predictions confirmed** Four weeks ago, on [...], BioNTech, a German biotechnology company, announced slow but steady progress in its cancer treatment research. A company spokesperson reported on a recently concluded large-scale trial for its bowel cancer drug. The results were promising but indicated that the program still requires years of development before commercial roll-out. The news came as no surprise to industry experts.	**BioNTech reports unexpected breakthrough in cancer research** Four weeks ago, on [...], BioNTech unexpectedly announced a breakthrough in its cancer treatment research. Results published by the company after the conclusion of a large-scale trial indicate considerably stronger effects of an mRNA-based drug in treating bowel cancer compared to earlier trials, paving the way for a commercial roll-out of the drug later this year. Industry experts were surprised by the good news, and called it an "unexpected success" for the company.
Aggregate stock market, bad news: Negative oil price shock	**Crude oil production remains unchanged** Four weeks ago, on [...], oil producing countries in the Middle East announced that they plan to keep their crude oil production unchanged. Moreover, the countries announced that no changes to these plans are expected in the foreseeable future. Thus, the globally available amount of crude oil will remain roughly at the current level for the foreseeable future. The news came as no surprise to economic experts.	**Crude oil production sharply reduced** Four weeks ago, on [...], oil producing countries in the Middle East unexpectedly announced that they will sharply cut their crude oil production in Fall 2023. As a result, the globally available amount of crude oil will be substantially lower over the next years, putting pressure on crude oil prices and further exacerbating the existing energy crisis. Economic experts were surprised by the bad news, and called it a "worst-case scenario" for economic growth in the US.
Aggregate stock market, good news: Breakthrough in solar energy technology	**Development of solar energy technology proceeding as expected** Four weeks ago, on [...], it was revealed that the development of a new solar panel technology is progressing according to plan, with no significant delays or setbacks reported. The technology holds the potential to enhance the efficiency and affordability of solar power, but it will still require years of development before commercial roll-out. The news came as no surprise to experts.	**Breakthrough in development of solar energy technology** Four weeks ago, on [...], it became known that there was a groundbreaking advancement in renewable energy technology, enabling the production of solar power at a substantially lower cost. The innovation is anticipated to drive a rapid and substantial expansion of solar power generation, leading to significant energy cost reductions for businesses and consumers across the United States already by the end of this year. Experts were positively surprised by the announcement. They projected the news to generate "significant tailwind" for the US economy, boosting overall economic growth.
Aggregate stock market, good news: Fiscal policy shock	**No new government spending programs ahead** Four weeks ago, on [...], the government announced that there would be no new stimulus package aimed at boosting economic growth. Instead, the government plans to focus on other key issues during the current legislative period. Experts were not surprised by the announcement, citing previous statements from government officials.	**New government spending program to boost economy announced** Four weeks ago, on [...], the government unexpectedly announced a new large-scale stimulus package aimed at boosting economic growth by increasing spending on infrastructure projects and providing aid to struggling US businesses. Experts were positively surprised by the news, predicting that the stimulus package would provide a "significant boost" to the US economy.
Aggregate stock market, bad news: Monetary policy shock	**Interests rates remain unchanged** Four weeks ago, on [...], the Federal Reserve announced that it would keep interest rates unchanged, in line with market expectations. Experts were not surprised by the decision, which was seen as reflecting the current state of the economy. The move is expected to maintain stability in borrowing costs for businesses and consumers.	**Fed increased interest rates unexpectedly** Four weeks ago, on [...], the Federal Reserve unexpectedly announced a major increase in interest rates. The move follows a recent shift in the composition of the Fed committee, with newly appointed members holding more hawkish views. The move is expected to slow down economic growth by making borrowing more expensive for consumers and businesses. Experts were negatively surprised by the announcement and anticipate the hike to generate "significant headwinds" for the US economy.

Notes: This table provides an overview of all scenarios of the main general population survey.

D.2 Real news robustness study

Below, we provide the instructions for the real good news and the real bad news for the company Siemens Energy. A complete overview of the survey instructions is available at https://osf.io/b83gf.

Condition: Good news

Four Months Ago: Siemens Energy Announces 7 Billion Euro Wind Power Deal

About four months ago, Siemens Energy made an announcement that received a lot of attention among stock market traders. Here is a summary of the news story.

> Siemens Energy, in partnership with Spain's Dragados Offshore, secured a multi-billion euro contract with TenneT, a prominent German-Dutch grid operator. The deal, worth nearly 7 billion euros, is aimed at enhancing the connectivity of wind farms in the North Sea to mainland Germany. This significant contract promises to increase the availability of renewable energy, as it allows for the transfer of up to 6 gigawatts of offshore wind power to the German electrical grid.
>
> The contract involves three key connectivity projects that will link wind-generated electricity from the North Sea to German cities. Siemens Energy will manufacture the main electrical components, such as switchgear, transformers, and converter technology. The projects are an extension of Siemens Energy's ongoing commitment to renewable energy, as the company recently secured similar large-scale contracts at the end of last year.

Recall: This news story broke around four months ago and received a lot of attention among stock market traders invested in or observing Siemens Energy's stock.

Condition: Bad news

Two Months Ago: Siemens Energy Retracts Forecast Amid Wind Turbine Crisis

About two months ago, Siemens Energy made an announcement that received a lot of attention among stock market traders. Here is a summary of the news story.

> Siemens Energy is grappling with a crisis due to complications in its wind turbine business. The company has retracted its annual forecast, warning of additional costs in the billions of euros. During a call with analysts, Siemens Energy CEO Christian Bruch admitted that the setback is more severe than he had anticipated. Technical checks on Siemens Energy's wind turbines have revealed "significantly increased" failure rates, with interim reports suggesting that many turbines will need to be replaced or repaired at a cost exceeding one billion euros.
>
> The challenges extend beyond technical issues; productivity improvements in the wind energy business have also fallen short of expectations. Additionally, Siemens Energy highlighted ongoing difficulties in ramping up manufacturing capacities in the offshore wind sector. As a result, Siemens Energy has retracted its profit forecast for the current fiscal year. Some experts started questioning whether Siemens Energy's wind turbine business is even capable of recovery.

Recall: This news story broke around two months ago and received a lot of attention among stock market traders invested in or observing Siemens Energy's stock.

D.3 Ruling out risk-based reasoning and beliefs in temp. mispricing

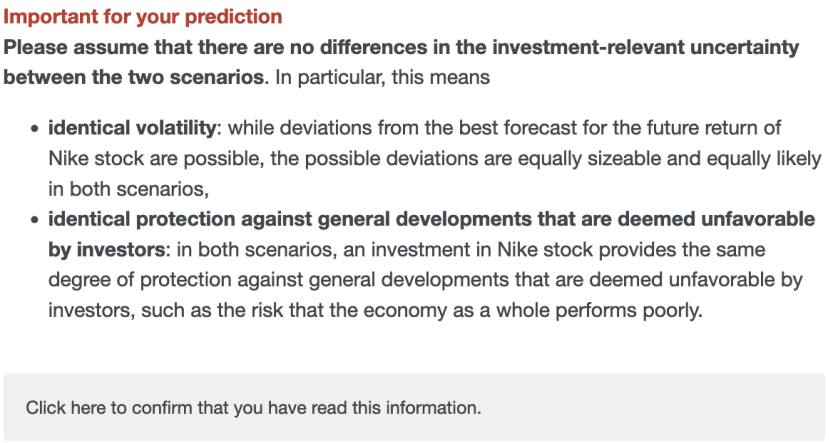
Below, we provide the key instructions for the modified prediction screens that respondents see in the experiment. A complete overview of the survey instructions is available at https://osf.io/b83gf.

Control condition

Standard prediction screen as in main survey.

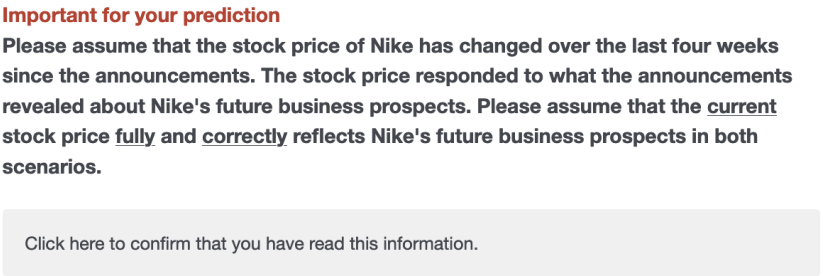
Condition: No changes in risk exposure

The prediction screen contains the following additional information directly before the forecast.



Condition: No temporary mispricing

The prediction screen contains the following additional information directly before the forecast.



D.4 Attention experiment

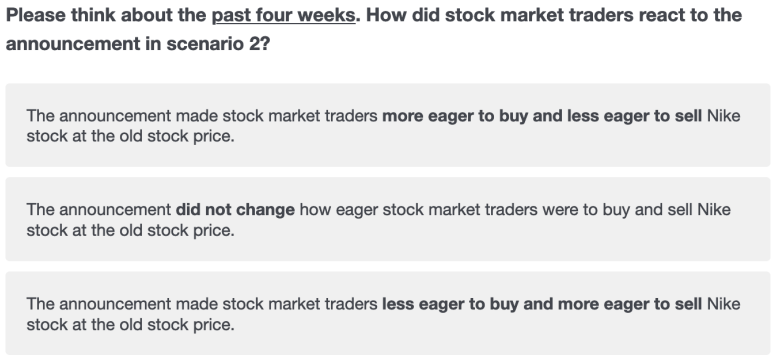
Below, we provide the key instructions for the modified prediction screens that respondents see in the experiment. A complete overview of the survey instructions is available at https://osf.io/b83gf.

Control condition

Standard prediction screen as in main survey.

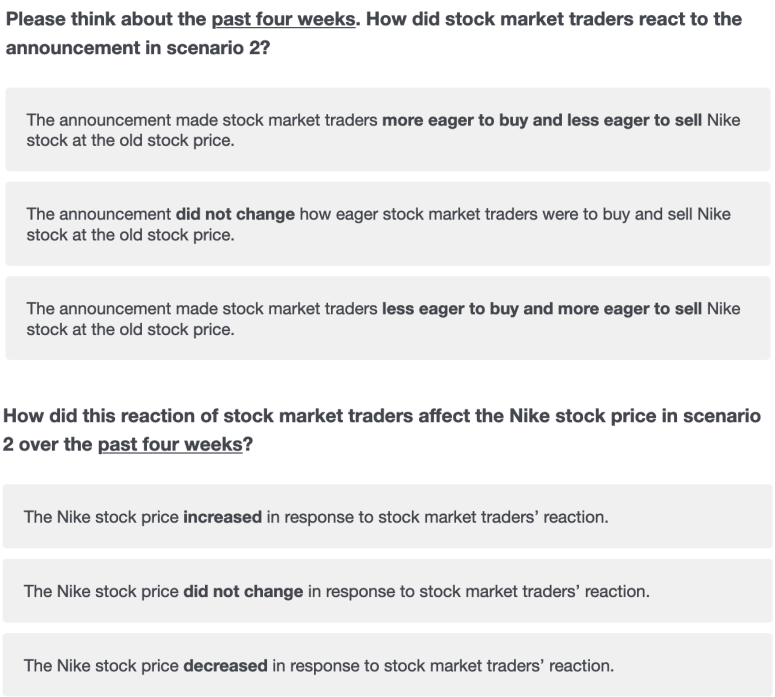
Condition: Attention to trading reactions

The prediction screen contains the following additional information directly before the forecast.



Condition: Attention to price reaction

The prediction screen contains the following additional information directly before the forecast.



D.5 Explaining equilibrium study

Respondents in the treatment condition receive the explanation below before they proceed to the standard survey module (*Nike good news* case). Respondents in the control condition receive an equivalent explanation of the determinants of the tidal range. One day after the completion of the main experiment, all respondents are invited to participate in a follow-up survey which includes the *Amazon good news* case. A complete overview of the survey instructions is available at https://osf.io/b83gf.

An important stock market principle

Companies usually differ in their expected future business prospects. Some companies are expected to generate high earnings, others are expected to generate low earnings.

What do you think? Which type of stocks are the better investment?

- Stocks of companies that are expected to generate HIGH earnings in the future.
- Stocks of companies that are expected to generate LOW earnings in the future.

The answer might surprise you. *It often does not matter.*

Why? On the next pages, we want to explain to you the following important stock market principle.

> **Stock market principle**
> Whether a company is expected to generate high or low future earnings often does not matter for the expected future return of an investment in its stock.
>
> In other words, the expected future success of a *company* is not a reliable indicator of the future success of an *investment in its stock*.
>
> **expected future success of company**
>
> $\neq$ **expected future success of investment in company stock**

[PAGE BREAK]

Why does the principle hold?

It is actually easy to see why this principle holds. First, let's repeat it once more.

> **Stock market principle** [. . .]

The principle holds because expectations for the future are already reflected in today's stock prices.

The stock of a high-earning company is particularly expensive. In fact, it is often so expensive that, from a stock investment perspective, the high expected future earnings are offset by the high stock price today.

Similarly, the stock of a low-earning company is particularly cheap. In fact, it is often so cheap that, from a stock investment perspective, the low expected future earnings are offset by the low stock price today.

[PAGE BREAK]

Why does the principle hold?

The expected future success of a company is not a reliable indicator of the future success of an investment in its stock. This also becomes clear if we think about what would happen if this principle did not hold.

Suppose that investing in high-earning companies was more lucrative than investing in low-earning companies because of their future expected earnings. This situation is unstable. Why? The answer involves four steps.

- Stock traders obviously love lucrative investments. Hence, they would want to hold more of the lucrative high-earning companies and less of the low-earning companies.
- This would trigger a change in stock prices. The demand for the stock of high-earning companies is so high that their stock prices would rise. The demand for the stock of low-earning companies is so low that their stock prices would fall.
- Investing in high-earning companies just became less lucrative because their stocks are now more expensive. Investing in low-earning companies just became more lucrative because their stocks are now cheaper.
- As long as investments in high-earning companies remain more lucrative, this process will continue. Traders will continue to trade and prices will continue to change until the expected earnings of companies do not matter for stock investments anymore.

Hence, in the end, we would be back in a situation where higher expected future earnings of a company do not come with a higher future expected return of investing into the company stock.

[PAGE BREAK]

Summary

Of course, there are other reasons why some companies might have higher expected stock returns: for example, investments in some companies' stocks are more risky or offer less protection against low economic growth. But importantly, expected future earnings themselves do not matter for stock returns.

Stock market principle [. . .]

[PAGE BREAK]

Your explanation

Now, please describe the principle you just learned about in your own words.

[Open-ended text box]

Please explain why this principle holds in the stock market.

[Open-ended text box]