Attention allocation, macroeconomic expectations, and consumption behavior*

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Abstract

This paper empirically investigates household attention allocation and its economic implications regarding expectation formation and consumption attitudes. We use micro level data from the Michigan Survey of Consumers and create a measure of attention allocation based on news that survey participants could recall. We find that individuals' socioeconomic status and recent experience of a recession play important roles in determining what information to pay attention to. We also document to what degree expectations matter for the pass-through of news attention to consumption attitudes towards durable goods, cars, and homes.

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"We cannot deny that an object once attended to will remain in the memory, while one inattentively allowed to pass will leave no traces behind." (James, W: The Principles of Psychology. Dover Publications; 1980)

1 Introduction

The importance of limited attention of households, which ultimately leads to a choice of attention allocation, is well-documented in the macroeconomic literature.[1] But we know little about what determines households' attention allocation when they face a vast amount of information or how attention allocation affects expectations and consumption choices empirically. Answering such questions is difficult because this would require measuring attention allocated to different economic dimensions at an individual level. Nevertheless, given their potential relevance for policy-making, this paper aims at providing answers to these questions by using data from the Michigan Survey of Consumers (MSC).

The main contributions of our paper are threefold. First, we study determinants of individuals' attention allocation behavior by using a measure of (in)attention from micro level survey data. Second, we explore the effects of attention allocation on macroeconomic expectations and consumption decisions. Last, we compute to what degree expectations matter for the pass-trough of news attention to consumption attitudes via a mediation analysis. To explore households' attention and consumption behavior, we make use of the MSC, which has four advantages: (i) it includes information about which economic news individuals paid attention to, their macroeconomic expectations on unemployment rates, inflation rates and interest rates, and their consumption spending attitudes towards durable goods, homes and cars; (ii) its rotating panel structure allows us to mitigate an omitted variable bias due to unobservable fixed personal characteristics; (iii) samples are heterogeneous across many dimensions such as income, education, etc., (iv) it has been conducted since 1978, providing us with a long time series featuring large variations in

[1] Empirical studies, such as Coibion and Gorodnichenko (2012, 2015) and Roth and Wohlfart (2020), use limited attention to explain professional forecasters' and households' expectation updating behaviors. Theoretical studies use limited attention and attention allocation to provide important policy implications: Gabaix (2020) shows that the ZLB is less costly and forward guidance is less powerful if rationally inattentive firms and households allocate limited attention to related shocks; Maćkowiak and Wiederholt (2015) also show that a model with rationally inattentive firms and households can match the empirical impulse responses to monetary policy shocks and aggregate technology shocks; Gaballo (2016) presents the important role of forward guidance communication in affecting social welfare with rationally inattentive consumers.

news attention, expectations, and consumption attitudes.

To be more specific, we measure attention using news heard data from the MSC: In the survey, respondents were asked to report what news regarding business conditions they heard recently and we use their answers to infer what economic dimensions they paid attention to. For our analysis, we divide news into seven dimensions comprising unemployment, fiscal policy, interest rate, inflation, demand, stock market, and miscellaneous.[2] Such a split represents a complete decomposition of possible answers to the news heard question. We measure attention to each news dimension by a dummy variable, which takes on the value '1' if the survey participant answered recalling that specific news item and the value '0' if not.[3] In addition, the MSC also collects individuals' expectations regarding unemployment rates, inflation rates, interest rates and their responses concerning their attitudes towards purchasing durable goods. Therefore, this dataset allows us not only to study individuals' attention choice but also how macroeconomic expectations and consumption behavior are affected by both attention allocation and expectations.

Main findings. We first investigate how attention allocation is determined by households' socioeconomic status (SES, including income and education level), stock market participation, recession status, etc.. Regression results suggest that an increase in income is positively correlated with the likelihood of paying attention to news regarding employment, fiscal policies, interest rates, inflation, stock market, and demand. Higher levels of education are also associated with more attention to all news. One potential explanation is that people with higher income and education level have more economic and financial literacy, which leads to smaller information-processing cost. During recessions, individuals are on average more likely to pay attention to news relating to government actions, unemployment news and stock markets. However, we find that households are less likely to pay attention to interest rates and prices when the economy is in a slump.

We then turn to studying the link between attention allocation and macroeconomic expectations, where we focus on key macroeconomic variables, including unemployment, inflation, and interest rates. We find that individuals who heard news regarding high unemployment rates, high prices, and high interest rates are more likely to report expectations about high unemployment rates, high prices, and high interest rates respectively. These results suggest that individuals make use of their acquired information when forming expectations about macroeconomic variables.

[2]The miscellaneous group includes news regarding exchange rate, agriculture, social stability, etc.

[3]Survey participants are asked to provide two distinct news items they can recall. As long as the participants mentioned the news item once, the dummy variable will take on the value '1'.

Next, we study how consumption choices are affected by macroeconomic expectations and attention allocation. Here we follow the theoretical framework of Gabaix (2020), where current consumption depends on the present value of future discounted income evaluated using behavioral expectations. In that case households' consumption choices depend on current and expected income, current and expected interest rates and amounts of attention to present and future states. We show that i) attention affects current consumption attitudes directly and ii) attention affects current consumption attitudes indirectly via expectations. We also conduct a mediation analysis to investigate the magnitudes of the direct and indirect effects. We find that the direct effect of attention to macroeconomic variables on consumption attitudes is relatively more important than the indirect effect through expectations. Among all three macroeconomic variables, expectations on future unemployment rates have a larger effect on consumption attitudes than expectations on future inflation rates and interest rates. Taken together these results have important policy implications: when central bankers want to manage expectations in order to stimulate the economy, communicating targets for unemployment rates might be more effective than communication targets for inflation rates or interest rates.

To deal with unobservable fixed personal characteristics that may lead to omitted variable bias, we create a sub-sample of rotating panel dataset, in which respondents were re-interviewed after six months. In results of first-difference regressions, we can still find that changes in attention devoted to unemployment news, government policies, inflation, and interest rates are positively correlated with changes in income. Using this rotating panel dataset, we also obtain similar relationship between attention and expectations, and similar results on the direct and indirect effects of attention on consumption as those in our baseline estimations.

Related literature. Our paper is related to studies that use news heard as a measure of attention. Numerous studies already made use of the news heard question in the MSC. For example Binder (2018) uses news heard about interest rates to explain consumers decision-making. Ehrmann, Pfajfar, and Santoro (2017) use news heard by consumers in the MSC and show a tight link between respondents stating that they have heard news about prices and gasoline price inflation in the United States. Pfajfar and Santoro (2013) use MSC news regarding prices to study the connection of news and expectations. However, the authors find a disconnect between news on inflation, consumers' frequency of expectation updating, and the accuracy of their expectations. Dräger and Lamla (2017) use MSC news heard data to measure attention to inflation in order to study consumers'

inflation belief updating behavior. The news heard question is not exclusive to the MSC. For example, Coibion, Georgarakos, Gorodnichenko, and Van Rooij (2019) use survey data of Dutch households in which random subsets of respondents receive information about inflation and find that there is a sharp negative effect on durable spending. Dräger and Nghiem (2021) use German survey data and analyze how news on inflation and interest rates affect spending decisions.[4] Dräger, Lamla, and Pfajfar (2016) show that news on monetary policy helps households in understanding how monetary policy affects the economy. Overall, the literature focuses on either one specific aspect of the news heard variable, such as inflation, interest rates, or it focuses on whether households paid attention to any news at all. However, instead of a single news category, we split the news heard into seven categories covering different economic aspects. This allows us to investigate what determines individuals' attention allocation. A recent study by Born, Enders, Menkhoff, Müller, and Niemann (2022) find that different types of news (macro news vs micro news) matter for how firms update expectations about their production: firms underreact to the former but overreact to the latter.

Additionally, this paper is also close to a large group of studies that use survey data to investigate how households' macroeconomic expectations affect their decisions, such as Andre, Pizzinelli, Roth, and Wohlfart (2022), Bailey, Dávila, Kuchler, and Stroebel (2019), D'Acunto, Hoang, and Weber (2022), Das, Kuhnen, and Nagel (2020), Dräger and Nghiem (2021), Goldfayn-Frank and Wohlfart (2020), and Kuchler and Zafar (2019). Especially, Bachmann, Berg, and Sims (2015) examine the relationship between expected inflation and spending attitudes using micro data from the MSC. The authors show a small and insignificant impact of higher inflation expectations on the reported readiness to spend on durables outside the zero lower bound but a significantly negative effect inside the zero lower bound. Similarly, Candia, Coibion, and Gorodnichenko (2020) document how changes in macroeconomic expectations, particularly inflation expectations, affect households' and firms' actions. But they also find that the provision of information about inflation to households may reduce current consumption depending whether consumers interpret high inflation as bad news or good news for the economy. Different to these studies, we follow Das, Kuhnen, and Nagel (2020) and conduct a mediation analysis to investigate the direct effect of news attention on consumption decision as well as its indirect effect through expectations.

[4] Dräger and Nghiem (2021) find higher inflation expectations have positive effects on the readiness to spend on non-durable goods but negative effects on the readiness to spend on durable goods.

Our paper relates to recent papers that study how information acquisition affects expectations or perceptions of inflation rates (Armantier, de Bruin, Topa, van der Klaauw, and Zafar (2015), Armantier, Nelson, Topa, van der Klaauw, and Zafar (2016), Binder (2020), Binder (2021), Carroll (2003), Cavallo, Cruces, and Perez-Truglia (2017), Coibion, Gorodnichenko, and Kumar (2018), Coibion, Gorodnichenko, Knotek II, and Schoenle (2020), Lewis, Makridis, and Mertens (2019), Lamla and Lein (2014), Lamla and Vinogradov (2019), Coibion, Georgarakos, Gorodnichenko, and Weber (2020), and Coibion, Gorodnichenko, and Weber (2022)), the unemployment rates (Roth, Settele, and Wohlfart (2022)), GDP growth rates (Roth and Wohlfart (2020)), house prices (Armona, Fuster, and Zafar (2019) and Fuster, Perez-Truglia, Wiederholt, and Zafar (2018)), stock returns (Hanspal, Weber, and Wohlfart (2020)), and consumer sentiment (Doms and Morin (2004)). Dräger and Lamla (2012) find evidence in the rotating panel of the MSC that households adjust their expectations towards inflation regularly. These studies suggest that information provision leads to macroeconomic expectations updating and to changes in economic decision-making. In the present paper, the MSC allows us to study a more detailed link between information and expectation formation. As we know what types of information individuals paid attention to (price up/down, unemployment up/down) and their corresponding expectations, we are able to test whether specific types of information are associated with an updating of expectation towards the direction implied by the acquired information.

Finally, our paper is associated with the previous literature that studies RI. Entropy-based RI theory in Sims (2003) and sparsity-based RI theory in Gabaix (2014) have been popularly applied in macroeconomics. The key idea is that due to limited attention, decision-makers optimally choose what information to pay attention to and what to neglect when facing vast amount of information. In addition to its success in explaining economic puzzles mentioned above, recent empirical works by Coibion and Gorodnichenko (2012, 2015) show that models of information rigidities (see Mankiw and Reis (2002)) and models of RI are more successful in fitting survey expectations than alternative models. Our empirical analysis is based on Gabaix (2020), where decision-makers pay limited attention to current and future shocks, such that their consumption decisions depend on their nowcast and forecasts of fundamental shocks.

The remainder of this paper is organized as follows. Section 2 introduces our news-recall based measure of (in)attention, describes the dataset and key variables. Section 3 presents the estimation specifications. Section 4 discusses main results including char-

acteristics that determine individuals' attention allocation behavior, how attention allocation affects macroeconomic expectations and consumption spending decisions, and the degree to which expectations mediate attention to consumption decision. Section 5 presents robustness checks. Section 6 concludes.

2 Data

The MSC is conducted monthly starting in January 1978. But in order to include information regarding individuals' stock market participation, we concentrate on MSC data from January 1990 to January 2020. In each month, about 400 households in the US are interviewed about their beliefs about future values of several macroeconomic variables. In addition, from July 1980, in each survey a fraction of randomly chosen individuals is re-interviewed after six months. In our analysis, we weight observations with the household sample weights provided by the MSC.[5]

2.1 Reported news and attention allocation

To analyze households' attention behavior we employ a question in the MSC:

> A6. 'During the last few months, have you heard of any favorable or unfavorable changes in business conditions?'

If the question is answered with 'yes', an open question is then asked to which the respondent can give at most two answers.

> A6a. 'What did you hear? (Have you heard of any other favorable or unfavorable changes in business conditions?)'

Answers to the open question A6a are coded using several news categories.[6] As mentioned, some respondents may provide two news items (e.g. one about stock market, one about the presidential election).[7] Our aim is to test what determines individuals' atten-

[5]These sample weights adjust, among other things, for differential non-response by demographic characteristics.

[6]Details can be found in https://data.sca.isr.umich.edu/sda-public/sca/Doc/sca.htm or our Online Appendix A.

[7]It follows that our measure of attention necessarily underestimates how much attention is payed to a specific news item. For example, if households would report, in that order, that they recall news regarding inflation, unemployment, and interest rates, we would infer, that they do not pay attention to interest rates, as the answers in the MSC only provide two responses.

tion allocation between differing news categories. For this purpose, we divide all news items, exhaustively, into seven groups by the following themes: unemployment, fiscal policy, interest rates, inflation, demand, stock market, and miscellaneous.[8] We now measure attention to a specific news group by a dummy variable which takes on the value '1' if the respondent reported news in this group, and '0' otherwise. For example, we will say that respondents who reported hearing news about the stock market pay more attention to stock markets than respondents who did not report such news. Table 1 presents summary statistics for all seven attention categories. In this case the average is especially informative, as it reflects the ratio of households that could recall hearing news about that category. According to our measure, we would say that 25% of households in the sample paid attention to news about unemployment. We can conclude that, most households paid attention to unemployment news, fiscal policy news, and news on interest rates. Only 8% of households paid attention to news about prices and news about the stock market was paid attention to by 7% of households.

Before we continue, we want to provide three reasons why using news-recall in the MSC measures attention. First, many neurological and psychological studies provide evidence on the relationship between attention and memory. For example, Chun and Turk-Browne (2007) use lab experiment and show that attending to a fact or event will increase the likelihood of later memory recall. Following this logic, if a respondent recalls something from memory, she was more likely to pay more attention to this fact before. Second, we focus on endogenous information acquisition regarding a large number of economic dimensions. In reality, when making economic decisions the agent is interested in a vector of state variables, such as personal income, inflation, interest rates etc.. The availability of multiple possible answers to the question A6a enables us to study individuals' attention allocation among different economic dimensions. Third, as shown next, our attention proxy closely reflects changes in current economic conditions. Therefore, making it unlikely that the attention proxy's variation is dominated by changes in news reporting orthogonal to economic conditions.

To show that participants in the MSC reported hearing about specific news items in a way that is consistent with changes in macroeconomic data, we compute net shares of the direction of responses for unemployment, inflation, and interest rates news. For example considering unemployment, out of all survey participants in one survey round, we count how many report hearing news about increasing unemployment and subtract

[8]The final group includes news regarding agriculture, exchange rate, social stability.

how many report hearing news about decreasing unemployment. The resulting net share of unemployment news is positive if more households reported news about increasing unemployment than decreasing unemployment, and vice versa. We conjecture that such a measure is positively correlated with actual unemployment data. Figure 1 shows the net share for unemployment news compared to U.S. unemployment, Figure 2 shows net shares for inflation news compared to CPI inflation, and Figure 3 shows net shares for interest rates news compare to the three-month treasury bill (T-bill). For all variables, we can observe that news attention is correlated with the respective economic measures. This is especially pronounced for unemployment during initial increases of unemployment at the onset of recessions. Taken together, these results imply that news heard responses co-move strongly with macroeconomic news, qualifying these survey responses as a potential measure of households' attention to the macroeconomic environment.

Using news heard responses in the MSC to construct a proxy for households' attention allocation behavior has limitations. For example, changes in news heard responses might not be exclusively driven by changes in households' attention preferences, i.e. changes in information demand by households. In principle, there is a clear channel of information supply going from macroeconomic data releases or events reflecting changes in economic conditions, i.e. banking collapses, firm closures etc., to news agencies which pre-select information and report about it to households. While controlling for actual changes in economic conditions is not difficult given real-time data at the time of surveys, accounting for changes in news reporting is more difficult. Over time, news agencies may change their own preferences concerning topics to report news, which might create unwanted variation in the news heard responses in the MSC and represent a change of the information supply but not demand. To the extend that these variations in information supply via news agencies change over time, and as long as they are uncorrelated with observable household characteristics, we control for these in our econometric setup using time dummies. However, changes in reporting by news agencies could affect household characteristics, such as stock market participation. To deal with this problem, we also compute results using a sub-panel in which respondents got re-interviewed after six months. As we find it unlikely that changes in news reporting affect characteristics within a six month time period and our results are robust using the sub-panel, we believe this channel to be of minor importance.

2.2 SES, macro beliefs, and consumption decisions

In this paper, we follow Das, Kuhnen, and Nagel (2020) and measure SES by computing the level of real income (in 2019 dollars) and the level of education.[9] And a more important reason that we use income and education to measure SES is because they are closely linked to financial literacy (see e.g. Lusardi and Mitchell (2014)) and thus affect information-acquisition behavior. The macroeconomic belief variables we use are UNEMP, PX1Q1 and RATEX.[10] UNEMP measures respondents' subjective beliefs about the national unemployment rate in the next 12 months. PX1Q1 is respondents' expectations on the qualitative change of price in 12 month compared to the price level during the survey period. RATEX indicates respondents' expectations on future borrowing interest rates in the next 12 months. In terms of buying attitudes, respondents were asked to report whether it is a good or bad time to buy a house, cars, or other major household items.[11]

We also control for several demographic variables, such as gender, number of children, age, and marital status.[12] Especially, we control for a stock market participation dummy, i.e. whether respondent held any stock shares. We believe this to be an important control variables, as we conjecture that households with higher income and education level are more likely to invest in the stock market, and that households that hold stock shares are more likely to pay attention to news about the macroeconomic and microeconomic environment than those who do not participate in the stock market. Meanwhile, households that invest into stock markets may be more likely to have more optimistic expectations on macroeconomics and more optimistic attitudes toward purchasing durable goods. Another important explanatory variable is a NBER recession index. We control for the NBER recession index because investors' attention allocation strategies are different during recession periods and non-recession periods, as shown in Kacperczyk, Van Nieuwerburgh, and Veldkamp (2016). We also control for individuals' personal financial experience, i.e. if they are better off financially than they were a year ago.[13]

[9] Education indicates the level of education, and the MSC allows for six levels of education, which can be translated into years of schooling. In the paper, we also check the robustness of using real wealth instead of real income to measure SES. To compute real wealth, we add real investment (in 2019 dollars) to real income.

[10] Detailed survey questions can be found in https://sda.umsurvey.org/sca/Doc/sca.htm.

[11] Detailed questions about macro belief and purchasing attitudes can be found in Online Appendix B.

[12] To exclude outliers, we exclude respondents who have real annual income below 1000 dollars (in 2014 dollars) and whose age is below 20 or over 80.

[13] Table 2 documents summary statistics for the key variables taken from the MSC.

3 Econometric specification.

We motivate our econometric specification using insights from sparsity RI theory by Gabaix (2014, 2020). First, the agent's attention choice is endogenous, and might very well be determined by the state of the world, either individually or in the aggregate. It is not difficult to see that the optimal attention devoted to variable x is negatively correlated with information cost and other personal characteristics, but positively correlated with its prior variance that is related to the economic environment such as a recession. Information cost is usually related to financial literacy as more financially literate consumers more likely to read and comprehend news about economic and financial conditions. Following Lusardi and Mitchell (2014), we use consumers' socioeconomic status (income and education) to measure financial literacy. Therefore, we construct the following estimation specification:

$$\text{Attention}^*_{x_{j,t}} = \alpha_0 + \alpha_1 \log(y_{j,t}) + \alpha_2 \text{Education}_{j,t} + \alpha_3 \text{Recession}_t + \mathbf{\Gamma}_1 \mathbf{X}'_{\mathbf{j,t}} + \epsilon_{j,t}, \quad (1)$$

where $\text{Attention}^*_{x_{j,t}}$ is a measure of attention to be explained below, $\log(y_{j,t})$ is individual j's logarithm of income (in 2014 dollars), $\text{Education}_{j,t}$ indicates individual j's education level. $\text{Recession}_{j,t}$ indicates whether individual j has experienced recessions in past three months standing at t. $\mathbf{X}'_{\mathbf{j,t}}$ is an additional set of control variables including demographic characteristics (age, gender, etc.), region and year-month time dummies. $\epsilon_{j,t}$ is the error term. In the MSC, we will only be able to observe if a household pays attention to specific news categories or not, meaning the true level of attention ($\text{Attention}^*_{x_{j,t}}$) is unknown.

The survey responses $\text{Attention}_{x_{j,t}}$ for individual j at time t are coded as: '0' indicating that news regarding a variable is heard; '1' meaning that news regarding this variable is not heard. However, the observed quantity in the MSC, i.e. if news on some topic was payed attention to, can be mapped to an amount of attention using a latent variable model of the form

$$\text{Attention}_{x_{j,t}} = \begin{cases} 0 & \text{if} \quad \text{Attention}^*_{x_{j,t}} \leq \bar{m}, \\ 1 & \text{if} \quad \text{Attention}^*_{x_{j,t}} > \bar{m}, \end{cases} \quad (2)$$

where $\bar{m}$ is the threshold value. Using observations $\text{Attention}_{x_{j,t}}$, we run probit regressions and estimate partial effects of increasing income (in percent), education (in level) and being in recession on attention allocation (α_1, α_2, α_3) via maximum likelihood.

Second, individuals' expectations are affected by "perceived" knowledge about the

present state of the world. Simple Bayesian updating implies $E[x|S] = \text{Attention}^*_x S$, where the agent receives a signal S regarding the state x.[14] In RI models such as Gabaix (2014), attention parameter takes on values between zero and one.[15] Therefore, the agent's expectations about x after observing a signal S will be the signal S discounted by the level of attention[16]. Since we assume attention to always be positive, if the agent receives a non-zero signal, expectations will be updated in the direction of the sign of the signal. Because we do not only attempt to understand if news attention affects expectations and consumption attitudes, but also the direction of the effect, we require information about the sign of the signal that agents receive. To that end, some answers to the news heard question in the MSC can provide us with information about the direction of the signal, i.e. if unemployment goes up or if it does down. This enables us to create a direction-adjusted measure of attention given by

$$\text{Attention}_{d,x_{j,t}} = \begin{cases} 1 & \text{if} \quad \text{Heard news about } x \text{ going in direction } d \\ 0 & \text{if} \quad \text{Heard news about } x \text{ going opposite to direction } d \text{ or heard no news} \end{cases} \tag{3}$$

Suppose, for example, the agent receives a signal about rising unemployment, so the signal on unemployment is positive, i.e. $d = "+"$, the direction-adjusted attention measure will be given the value '1'. If there is either no news on unemployment or if there is news about falling unemployment the measure attains the value '0'. This specification allows us to check in which direction news about raising/falling unemployment affects expectations and consumption attitudes. The following estimation specification follows:

$$\text{Expectations}_{x_{j,t}} = \beta_0 + \beta_1 \text{Attention}_{d,x_{j,t}} + \mathbf{\Gamma_2 Y'_{j,t}} + u_{j,t}, \tag{4}$$

where $\mathbf{Y'_{j,t}}$ includes a set of control variables; $u_{j,t}$ is the error term. β_1 measures the partial effect of paying attention to a specific news category, $\text{Attention}_{d,x_{j,t}}$, on expectation. For example, the effect of paying attention to news regarding high (low) unemployment, prices and interest rates on the likelihood of reporting high (low) expectations on unemployment rates, prices and interest rates. It is worth noticing the following issue.

[14] For ease of exposition, we assume that $\bar{x}$, the unconditional mean of x, is equal to zero.

[15] Similarly, in Sims (2003) the perceived mean is a linear combination of a noisy signal and the unconditional mean, with a weight (between zero and one) that is determined by the amount of attention devoted to this variable.

[16] For a more detailed derivation of behavioral expectation formation and how it relates to attention, see Online Appendix C.

The latent variable $\text{Expectations}^*_{x_{j,t}}$ is not observable, but the discrete survey responses $\text{Expectations}_{x_{j,t}}$ are. We code these responses as: '1' indicating that comparing to now unemployment (prices, interest rates) will go up in 12 months, '-1' meaning that comparing to now unemployment (prices, interest rates) will go down in 12 months, and '0' saying that unemployment (prices, interest rates) will stay the same in 12 months. We model the relationship between $\text{Expectations}^*_{x_{j,t}}$ and $\text{Expectations}_{x_{j,t}}$ as:

$$\text{Expectations}_{x_{j,t}} = \begin{cases} -1 & \text{if} \quad \text{Expectations}^*_{x_{j,t}} \leq \tau_1 \\ 0 & \text{if} \quad \tau_1 < \text{Expectations}^*_{x_{j,t}} \leq \tau_2 \\ 1 & \text{if} \quad \text{Expectations}^*_{x_{j,t}} > \tau_2 \end{cases} \tag{5}$$

with the threshold values τ_1 and τ_2. Using the observations $\text{Expectations}_{x_{j,t}}$ we estimate β_1 in this ordered probit model via maximum likelihood.

Third, agent's consumption decisions are affected by her attention and macroeconomic expectations. This can be motivated by a behavioral version of the present value of discounted lifetime income similar to Gabaix (2020) given by

$$\begin{aligned} \hat{c}_t &= \mathbb{E}_t \left[\sum_{\tau \geq t} \beta^{\tau - t} \bar{m}^{\tau - t} \left(\alpha_i m_i \hat{i}_\tau + \alpha_\pi m_\pi \hat{\pi}_\tau + \alpha_Y m_Y \hat{y}_\tau \right) \right] \\ &= \alpha_i \mathbb{E}_t^{BR} \hat{i}_t^{BR} + \alpha_\pi \mathbb{E}_t^{BR} \hat{\pi}_t^{BR} + \alpha_Y \mathbb{E}_t^{BR} \hat{y}_t^{BR} + \sum_{\tau \geq t+1} \frac{1}{R^{\tau - t}} \left(\alpha_i \mathbb{E}_t^{BR} \hat{i}_\tau^{BR} + \alpha_\pi \mathbb{E}_t^{BR} \hat{\pi}_\tau^{BR} + \alpha_Y \mathbb{E}_t^{BR} \hat{y}_\tau^{BR} \right) \\ &\approx \alpha_i \mathbb{E}_t^{BR} \hat{i}_t^{BR} + \alpha_\pi \mathbb{E}_t^{BR} \hat{\pi}_t^{BR} + \alpha_Y \mathbb{E}_t^{BR} \hat{y}_t^{BR} + b_i \mathbb{E}_t^{BR} \hat{i}_{t+1}^{BR} + b_\pi \mathbb{E}_t^{BR} \hat{\pi}_{t+1}^{BR} + b_Y \mathbb{E}_t^{BR} \hat{y}_{t+1}^{BR}, \end{aligned} \tag{6}$$

where we cutoff the time horizon at $\tau = t + 1$. α_i, α_π, α_Y, and b_i, b_π, b_Y are coefficients that depend on household preferences and the steady state value. $\bar{m}$, m_i, m_π, and m_Y are attention parameters discounting present and future realizations of nominal interest rate i, inflation π, and income y. $\mathbb{E}_t^{BR}(\cdot)$ is the behavioral expectations operator.[17] The equation above imply that household consumption within a behavioral expectations context

[17] For more details on the derivation of the behavioral version of the present value of discounted lifetime income see Online Appendix C. For this empirical application, we substitute the real rate of interest r_t in the Online Appendix using the Fisher Equation. Further we assume separate attention coefficients for nominal interest rates and inflation. Behavioral expectations for a variable x are linked to the objective expectations operator $\mathbb{E}$ via

$$\mathbb{E}_t^{BR} \left[x_{t+k}^{BR} \right] = \bar{m}^k m_x \mathbb{E}_t \left[x_{t+k} \right]. \tag{7}$$

depends on perceived present values of income, nominal interest rate, and inflation rate and on the subsequent behavioral expectations of these variables. As we do not observe perceived present values of all three variables, we make use of news heard categories w.r.t. interest rates, inflation, and unemployment to generate direction-adjusted attention variables as in definition (3) as proxies.

Consequently, we state the corresponding regressions specifications as follows:

$$\begin{aligned} c_{j,t} = \theta_0 + \theta_1 \text{Attention}_{d,i_{j,t}} + \theta_2 \mathbb{E}^{BR}_{j,t} i^{BR}_{j,t+1} + \theta_3 \text{Attention}_{d,\pi_{j,t}} + \theta_4 \mathbb{E}^{BR}_{j,t} \pi^{BR}_{j,t+1} + \dots \\ \theta_5 \text{Attention}_{d,y_{j,t}} + \theta_6 \mathbb{E}^{BR}_{j,t} y^{BR}_{j,t+1} + \Gamma_4 \mathbf{Z}'_{j,t} + v_{j,t}, \end{aligned} \tag{8}$$

where $\mathbf{Z}'_{j,t}$ represents additional control variables and $v_{j,t}$ is the error term. $\text{Attention}_{d,i_{j,t}}$, $\text{Attention}_{d,\pi_{j,t}}$ and $\text{Attention}_{d,y_{j,t}}$ tracks news heard about interest rates, inflation and unemployment going either up ($d =$ "+") or down ($d =$ "-"). Both cases will be estimated separately. $\mathbb{E}^{BR}_{j,t} i^{BR}_{j,t+1}$, $\mathbb{E}^{BR}_{j,t} \pi^{BR}_{j,t+1}$ and $\mathbb{E}^{BR}_{j,t} y^{BR}_{j,t+1}$ are individuals' forecasts of the interest rates, inflation rates and unemployment rates respectively.

The latent variable $c^*_{j,t}$ is not observable, but the discrete survey responses $c_{j,t}$ are. We code these responses as: '1' indicating that now is a good time to buy household consumer durables, '-1' meaning that now is bad time to buy, and '0' saying that now is neither a good nor a bad time to buy. We model the relationship between $c^*_{j,t}$ and $c_{j,t}$ as:

$$c_{j,t} = \begin{cases} -1 & \text{if} \quad c^*_{j,t} \leq \xi_1 \\ 0 & \text{if} \quad \xi_1 < c^*_{j,t} \leq \xi_2 \\ 1 & \text{if} \quad c^*_{j,t} > \xi_2 \end{cases} \tag{9}$$

with the threshold values ξ_1 and ξ_2. We estimate this model as an ordered probit, using the observations $c_{j,t}$ to estimate (θ_1, θ_2, θ_3, θ_4, θ_5, θ_6) via maximum likelihood.

4 Attention, expectations, and consumption

In this section we use the main dataset of the MSC to investigate factors that affect individuals attention allocation, how attention allocation affects macroeconomic expectations, consumption behavior, and how expectations mediate the pass-through from attention to consumption decisions.

4.1 Factors of attention allocation behavior

In this subsection we use regression specification (2) to study what determines individuals' attention allocation decisions. Table 3 shows regression results for the probability of paying attention to seven groups of news.[18] More precisely, in each column, the dependent variable is a dummy variable which takes the value one if respondents paid attention to that specific economic dimension. The main explanatory variables again include individuals income (in log-term), education level, and the NBER recession index. First, let us start the discussion of the effect of income on attention allocation, as shown in the first row of Table 3. We can see that individuals with more income are more likely to pay attention to news about economic conditions. For example, increasing income by 1% increases the likelihood of paying attention to news regarding unemployment (labor markets), to news about fiscal policies by about 1.2 percentage points, and to news about interest rates and stock market by about 1.4 percentage points. However, the marginal effects of income on the likelihood of paying attention to inflation, demand, and others are about 0.5 percentage points.

Second, the results show that the level of education is positively correlated to the likelihood of paying attention to any news items. Similar to other empirical RI studies such as Fuster, Perez-Truglia, Wiederholt, and Zafar (2018) and Yin (2021), one possible explanation is that more educated individuals face smaller costs when acquiring information, and as a result they pay more attention compared to less educated individuals. However we also notice that the magnitudes of these effects are different. Education has larger effects on the likelihood of paying attention to unemployment and stock market news than on other topics. These results in the first two rows imply that more financially literate households (higher income and education level) have smaller cognitive costs of processing information regarding economic conditions and therefore they are more likely to pay attention to all of these economic aspects.

Third, we analyze the effect of recessions on attention allocation. We use the adjusted NBER recession index that tracks if the US is either experiencing a recession currently or has experienced a recession in the past three months. We find that individuals who have recent experiences of a recession are more likely to pay attention to news regarding unemployment, fiscal policies, demand, and the stock market. More specifically, recent

[18] In our later discussion on expectation and consumption, we only use attention to unemployment rates, inflation rates and interest rates. However, here we are interested in understanding what factors affect individuals' attention to different economic dimensions and therefore, we include all news groups in Table 3.

experience of a recession increases the probability of paying attention to unemployment by 16 percentage points, to fiscal policies by 8 percentage points, to news regarding consumers' demand by 2.1 percentage points, and to stock market news by 2 percentage points.[19] On the other hand, we can observe that experiencing recessions is negatively correlated with the likelihood of paying attention to prices and interest rates. The largest effect size can be found for attention to unemployment and government policies. This is intuitive as during recessions, people face more uncertainty in their employment status and might count on the government to take actions and as a result households reallocate their attention to news regarding labor markets and government policies. These results support theories of RI, that due to the cost of acquiring information, individuals optimally decide what information to pay attention to and what information to ignore. In this case, individuals usually pay more attention to the information that matters more to their present and future decision making.[20]

4.2 Attention and macroeconomic expectations

What is the role of information in economic decision-making? Usually we think of information acquisition affecting economic behavior through changes in agents' information sets. For example, it is common thinking in (New) Keynesian economics that changes in expectations of nominal interest rates and the inflation rate will affect agent's current consumption behavior. But if the agent pays no attention to these changes, her information set and expectations do not adjust and as a result her consumption behavior will not react to these changes. Therefore, in this section we want to study whether paying attention to specific types of news is associated with adjustment in corresponding expectations.[21] For example, as shown below, consumers who heard news about higher unemployment are more likely to adjust their unemployment expectations upwards.

[19] This result is different from the findings in Sicherman, Loewnstein, Seppi, and Utkus (2016). By using online account data, the authors find that when stock market goes down, investors pay less attention to their asset holdings ("ostrich behavior"). However, we find that during recession periods, investors pay more attention to news regarding stock prices as in these periods stock prices are relatively volatile.

[20] We observe that the z-statistics of the recession index are very large. This is due to our clustering method (standard errors are clustered in year-month level), which has been used in many previous studies that use MSC data. If we use robust standard errors instead, marginal effects remain significant, but z-statistics are much lower. In addition, as shown in Table A1 and A2 of Online Appendix D.1, we also use different measures of recession indicators, such as capacity utilization and economic macro uncertainty, and obtain very similar results as the recession index but with relatively smaller z-statistics.

[21] Dräger and Lamla (2017) investigate the role of information acquisition/attention by analyzing its effects on forecasting biases. We also conduct such an exercise in Table A12 of Online Appendix E.1.

To achieve this, we apply estimation specification (4) and define more specific types of news to measure the combination of attention and signal. First, for news regarding price, we construct a dummy variable "newsprices_high", which equals '0' if the respondent reported no news on price or reported news on either 'falling prices/deflation' or 'lower, stable prices/less inflation', and one if the respondent reported news on heard on either 'high prices/inflation' or 'higher prices/inflation'. Second, for news about unemployment, we construct a dummy variable "newsunempolyment_high", which equals '1' if the respondent reported no news on unemployment, or heard news on either 'Opening of plants, factories, stores' or 'Employ is high, plenty of jobs', or 'Rise in employ', and '0' if the respondent reported news heard on either 'Unemp has risen', 'Closing of plants, factories, stores' or 'Drop in employ, less overtime'. Finally, for the news regarding interest rates, we create a dummy variable "newsinterestrate_high", which equals '0' if the respondent reported no news on interest ratse or heard news on either 'Easier money, credit easy to get, low int rates', and '1' if the respondent reported news on either 'Tight money, int rates high'.[22]

In Table 4, we indeed observe positive marginal effects that imply that individuals who acquire information regarding higher unemployment, higher prices and higher interest rates are more likely to adjust their expectations on unemployment, prices and interest rates upwards. More precisely, the marginal effect of paying attention to higher unemployment news equals 0.165. Therefore, paying attention to news on higher unemployment is positively correlated to an increase in the probability of higher unemployment expectations by about 16 percentage points. Similarly, paying attention to information about higher prices is positively associated with an increase in the probability of higher price expectations by about 6 percentage points. When paying attention to information about higher interest rates, the probability of higher interest expectation increases by about 9 percentage points. These results suggest that information acquisition may play an important role in individuals' macroeconomic expectation updating. When households pay attention to certain types of news, this information is incorporated in their macroeconomic expectations.

[22]Here we only focus on the discuss with higher economic news and higher macroeconomic expectations. In Table A3- Table A9 of Online Appendix D.2, we check the robustness with lower economic news and lower macroeconomic expectations.

4.3 Attention, macroeconomic expectations, and consumption

In this subsection, we study the impact of information acquisition, especially through its influence on expectations, on households' consumption behavior. More precisely, we employ individuals' attitudes toward purchasing durable goods as the dependent variable.[23] Purchasing attitudes equal to '1' if individuals reported that they thought it is a good time to conduct purchases, and '-1' if they thought it is a bad time to buy and '0' if they provided a neutral answer. Consumption choices depend on the agent's behavioral income, inflation expectations, interest rate expectations, and additional controls. Therefore, the main explanatory variables in our exercises are macroeconomic expectations about changes in unemployment rates, inflation rates and interest rates in 12 months.

Here we follow Bachmann, Berg, and Sims (2015) and run ordered probit regressions of consumption attitudes toward purchasing durable goods, homes and cars on news concerning macroeconomic variables and macroeconomic expectations. From Column 1 of Table 5, we see that individuals have more pessimistic attitudes regarding buying durable goods if they have more pessimistic expectations concerning employment. We also account for the specific role of attention in shaping individuals' consumption behavior. In Column 1, we also observe a negative and significant coefficient for attention to higher unemployment news. This implies that paying more attention to news regarding higher unemployment is associated with more pessimistic durable goods purchasing attitudes.

From Column 2, we first observe that paying attention to news regarding higher prices or inflation is associated with more pessimistic durable goods purchasing attitude.[24] When consumers acquire information that prices are higher or that inflation is positive, they have the motivation to cut spending. In addition, we also find that individuals who had larger inflation expectations (higher prices) would like to consume less durable goods today. This finding is in line with findings in Bachmann, Berg, and Sims (2015). One potential reason is provided in Van Zandweghe and Braxton (2013), who argue that in recent times the real interest rate sensitivity of durable purchases has declined. This implies that any channel which lowers durables consumption if inflation

[23]The survey only asks about spending conditions for durables, not about non-durables and services. However, as argued in Bachmann, Berg, and Sims (2015), although durables are usually a relatively small part of the current spending budget of households, they are also the most sensitive to both idiosyncratic and aggregate economic conditions. Therefore, we do not think the 'limited' data availability in the survey as a problem.

[24]In our baseline estimation we use qualitative expectations on inflation rates

expectations go up is now more likely to dominate the overall effect, as the real interest rate channel is weakened.

Column 3 shows that paying attention to news about higher interest rates and a higher expected interest rates have negative but insignificant effects on the likelihood of optimistic attitude towards purchasing durable goods. One potential explanation for this negative coefficient is that when consumers observe a higher interest rates or expect a higher interest rates in the future, they want to save their money instead of spending.

We also use purchasing attitudes of homes and cars as dependent variables. In columns 4 - 9 of Table 5, we conduct similar exercises with the same explanatory and control variables by using different dependent variables. Here we find similar results that paying attention to news regarding higher unemployment, higher prices and higher interest rates leads to more pessimistic attitude toward purchasing home and cars. However in the case of purchasing attitudes towards homes, news regarding higher interest rates and higher interest rate expectations are now significant. For cars only interest rate expectations, not interest rate news, appear to matter. Consumers who expect higher unemployment rates, prices and interest rates in the future are also more likely to report a pessimistic attitude toward purchasing homes and cars.[25]

4.4 Mediation analysis: Inspecting the mechanism

In this section we discuss direct and indirect effects regarding consumption attitudes for unemployment, price, and interest rate news and possible explanations for their apparent differences. First, to conduct a mediation analysis, we follow Das, Kuhnen, and Nagel (2020) and run OLS regressions of consumption attitudes towards purchasing durable goods, homes, and car on news towards macroeconomic variables and macroeconomic expectations.[26] In Table 6, we conduct a mediation analysis by combining results in Table 7 with results in Table 8. It shows the direct effect of paying attention to negative economic news (higher unemployment rates, higher prices, and higher interest rates) on consumption attitudes and the indirect effect of attention on consumption attitudes

[25] In Table A13 of Online Appendix E.2, we also check the consistency of paying attention to news and the reasons of reporting purchasing attitudes. In the MSC, after asking respondents' purchasing attitudes, the participants are also asked why they do have such attitudes. We find that those who heard news regarding prices and interest rates are indeed more likely to use these news as a reason for having certain purchasing attitudes.

[26] Here we use a linear probability model instead of an ordered probit model because direct and indirect effects in non-linear regression with an ordered dependent variable are difficult to compute in an unique fashion.

through macroeconomic expectations.[27] Next, we will discuss direct and indirect effects and their policy implications.

Unemployment. Indirect effects of unemployment news on consumption attitudes are comparatively large. For high unemployment news, these stand at 31% for durable goods, 43% for cars, and 59% for homes. Two observations stand out. First, as the average value of consumption items increases, unemployment rate expectations matter more for the pass-through of unemployment news to consumption attitudes. Since the financing of large value items is mainly driven by credit, unemployment rate expectations matter increasingly more for items, where refinancing might be necessary. For example, if the probability of future unemployment is high, it might be difficult to refinance a house purchase. This could ultimately lead to the decision not to acquire a house. Second, indirect effects are large compared to indirect effects for price or interest rate news. In Tables 8 we can see one potential explanation for this observation: unemployment news affects unemployment rate expectations much more strongly than price news affect inflation rate expectations and interest rate news affect interest rate expectations.

Prices. The indirect effects of high price news on purchasing attitudes towards durable goods, homes and cars are 3% and 5% and 4.6% respectively. These indirect effects on purchasing attitudes are small compared to unemployment. This might be explained by the time period the analyses is based on. We use data in the MSC covering the years 1990 to 2019. First, over this time period inflation has been relatively low compared to historic averages. Second, household inflation rate expectations have been anchored for the most part. Anchored inflation rate expectations should be relatively insensitive to inflation news, which might explain the low or even insignificant indirect effects.[28]

Interest Rates. Indirect effects of high interest news on consumption attitudes are only significant for houses and cars (7.3% and 18%, respectively). Since buying cars and houses is usually financed by credit, households might not want to buy cars and houses when they think that interest rates stay high for some time, as these purchases have to be refinanced and high interest rate expectations point to large refinancing costs.

Implications for monetary policy-makers. Almost half of the variation in consumption attitudes that is due to information acquisition of unemployment news works through

[27] In Section 5.3, we verify that results are robust to the case where households pay attention to lower unemployment, prices, and interest rates.

[28] In MSC, respondents were also asked about their quantitative expectations on inflation rates: "By about what percent do you expect prices to go (up/down) on the average, during the next 12 months?" In Table A10 and A11 of Online Appendix D.2, we show our main results are robust by using these quantitative expectations.

the expectation channel. However, this is not the case for inflation or interest rates news acquisition. It stands to reason, if this finding can guide communication policies by policy-makers. More specifically, the question is what kind of state variable should be targeted when communicating policy goals. For example, should central bankers exclusively talk about targets for their policy instrument, i.e. interest rates, or should they talk about outcome-based targets such as GDP and unemployment. Angeletos and Sastry (2021) ask this question using a stylized model. It turns out that the preference of instrument-based communication over outcome-base communication depends on the strength of general equilibrium effects in the economy. If general equilibrium feedback effects are not strong enough, communication should be outcome-based. In the same vain Angeletos and Sastry (2021), argue that output commitments might be favored over inflation commitment, as the general equilibrium effects of inflation targets may not by understood by the general public.

Our empirical findings suggest that news provision on outcomes, such as unemployment, might be far more successful in managing expectations which affect consumption attitudes than news provision about instruments. This also echoes results in Candia, Coibion, and Gorodnichenko (2020), which suggest that central bankers should rather talk about unemployment or income, instead of interest rates or inflation. Concerning our results, while communication about inflation might be in principle similarly important as unemployment, the indirect effects in our empirical exercise are probably muted, since inflation expectations have been strongly anchored over the time period under consideration.

5 Robustness checks

5.1 Robustness checks: first-difference regression with rotating panel data

So far we have investigated the relationship between the level of SES and information acquisition as well effects of paying attention to specific economic news on consumption behavior. However, the uncovered relationships could also be explained by alternative channels. For example, some unobservable fixed personal characteristics such as preference to news about stock markets or news agencies' coverage preferences might cause both the acquisition of stock market information via news and a high SES. To address

the unobserved personal fixed effect and news agencies' preference effect, we follow Das, Kuhnen, and Nagel (2020) and use the panel sub-sample of the MSC, with which we can use this panel structure to difference out unobserved fixed effects by looking at the relationship between changes in beliefs and changes in SES.[29]

5.1.1 Attention allocation

First, we use the rotating panel dataset and run first-difference regressions of attention to economic news on explanatory variables differenced over the six-month window between the initial interview and the re-interview. As shown in Table 9 of Appendix B, with the change in attention allocation as dependent variable, we still obtain positive effect of changes in the amount of real income on the change of likelihood of paying attention to economic news regarding unemployment, fiscal policy, interest rates and prices. These results are in line with the baseline estimations.

These results from first-difference regressions may also address a potential reverse causality story for our findings. Paying more attention to economic news itself could lead to more beneficial economic choices by households which ultimately affect the SES (income and education) that we use as main explanatory variables. However, given the first-difference regression results, this type of story appears to be a highly implausible explanation. The short time period of six months in between interview does not offer enough time for the majority of people to substantially change the amount of income due to attention allocation. Therefore, this story is unlikely an explanation for the contemporaneous correlation of changes in attention and changes in SES that we find in Appendix B Table 9.

It might the case that the positive association of having recently experienced a recession and the likelihood of paying attention to labor market news could be mainly driven by people who became unemployed during recessions. In order to check for robustness, we use a sub-sample panel dataset excluding those who experienced a reduction in income.[30] From Appendix B Table 10, we find that all our results remain robust, except for the coefficient of recession index in the regression of change in government news. One possible explanation is that during recession periods, people mainly pay attention to government rescue policies that aim to reduce unemployment. However, for those who did

[29] To construct the panel dataset, we restrict our sample to households where the same person answered both interviews.

[30] In the MSC, we are not able to obtain information regarding respondents' employment status. Therefore, we use the change in income to proxy whether they recently experienced unemployment.

not experience a reduction in income, they were less likely to pay attention to government fiscal policy news.

5.1.2 Consumption attitudes

Similar to exercises above, we also use the sub-sample panel dataset to study the direct effect of the change of attention to economic news on the change of macroeconomic expectations and purchasing attitudes. As shown in Table 11 of Appendix B, paying attention to high news about unemployment, prices and interest rates is positively correlated to upward adjustment of expectations on unemployment rates, inflation rates and interest rates respectively. These results are consistent with our baseline estimations. Then, in Table 12 we find that paying more attention to higher unemployment news and price news has negative direct effects on purchasing attitudes toward durable goods, homes and cars. It also has a significant indirect negative effect on purchasing attitudes through unemployment and inflation expectations except for durable goods purchasing attitude that has a positive but insignificant indirect effect. When it comes to the effects of paying attention to higher interest rate news on purchasing attitudes, either the direct or the indirect effect is not significant in regressions of durable goods and home purchasing attitudes. But we still find significant negative direct and indirect effects of paying attention to higher interest rate news on purchasing cars.

5.2 Robustness checks: more controls

In this section, we provide several extra robustness checks for our baseline estimations in Section 4. First, we use real wealth instead of real income to measure SES. Wealth is measured by the sum of financial asset holding and current income. From Appendix B Table 13, we can still show that individuals with more wealth, on average, are more likely to pay attention to news regarding unemployment, interest rates, fiscal policies, and prices. However, it is worth noting that using cash-on-hand as the explanatory variable may cause reverse causality problem. One can argue that paying attention to specific news items might also affect cash-on-hand. For example, if individuals pay more attention to stock market news and adjust their portfolio accordingly, they might gain more capital income from a superior portfolio strategy.

Second, as we mentioned before, a share of respondents in each survey since July 1981 got re-interviewed after six months. This implies that the full MSC sample includes

repeated observations for time-fixed variables such as education level, age, gender etc. Therefore, in order to avoid any issues arising from the effect of repeated observations on estimation significance, we delete observations created during a second interview.[31] From Appendix B Table 14, we can see that significance levels of estimations are very similar to those in baseline estimations.

Next we check the robustness of results for the relationship between attention allocation and macroeconomic expectations. As shown in Dräger and Lamla (2017), an increase in the volatility of professionals' inflation forecasts significantly increases the probability of individuals updating their inflation expectations. We follow their idea and add the sum of squared changes of professional forecasts on real GDP, unemployment, inflation, and interest rates in the SPF over the last two quarters as control variables to regressions presented in Section 4.2 and 4.3. We notice from Appendix B Table 15 that in these exercises, paying attention to news of high unemployment, prices, and interest rates still lead to a higher likelihood of reporting higher expectations regarding these variables.

Finally, we check the robustness of the baseline results of consumption behavior following Bachmann, Berg, and Sims (2015) and control for a zero-lower bound dummy, which takes the value one from December 2008 to November 2015, and zero otherwise. We also run ordered probit regressions, since spending is a categorical variable in the MSC. From Appendix B Table 16 we observe that results from ordered probit regressions are very similar to those from OLS in Table 7 and the introduction of ZLB does not change our main results regarding effects of economic news on purchasing attitudes. We still find, for example, that unemployment expectations are negatively correlated with purchasing attitudes. Although interest rate expectations have positive effects on durable goods consumption, which seem puzzling, during ZLB periods the total marginal effects of interest rate expectations becomes negatively correlated with the willingness to purchasing durable goods. Similar to the findings in Bachmann, Berg, and Sims (2015), the coefficient on inflation expectations is not significant, but the interaction term of inflation expectations and the ZLB is negative and statistically significant. This implies that during ZLB periods, the adverse effect of inflation expectation on willingness to spend is larger. This results can be potentially explained by the declining real interest rate sensitivity of durable goods consumption as shown in Van Zandweghe and Braxton (2013). If we exclude the control variable of stock market participation, we can extend our sample

[31] Another argument is that people who have participated in the Michigan survey of consumers a second time might have some extra information than those who participate the first time.

to the year 1978. As shown in Appendix B Table 17, when we include longer time series, we obtain positive and significant effects of inflation expectations on durable goods consumption. But surprisingly, inflation expectations are then negatively correlated with purchasing attitudes toward car as shown in both tables.

Additionally we try to compare the effects of being in ZLB on consumption attitudes by using two different samples. We first use a similar set of control variables as in Bachmann, Berg, and Sims (2015). The coefficient on the ZLB dummy is also positive and significant, and the marginal effects shown in Appendix B Table 17 suggests that households were about 11 percentage points more likely to have a favorable attitude about buying durables.[32] One potential interpretation of this positive coefficient, as argued by Bachmann, Berg, and Sims (2015), is that non-standard policy actions led households to have more optimistic buying attitudes than otherwise would have been warranted given observed economic conditions. However, in Appendix B Table 16, we find that being at the ZLB is negatively correlated with the willingness to purchase durable goods if including stock market participation as a control variable. In addition, we can show that individuals who hold stocks are more likely to report optimistic durable purchasing attitude, and during ZLB periods people are more likely to participate into stock markets. This implies that without controlling for stock market participation, the estimated effects of being in ZLB is upward biased.

5.3 Robustness checks: mediation analysis

In this subsection, we conduct two sets of robustness checks for the mediation analysis: 1) add all macroeconomic expectations into the regressions; 2) use paying attention to low economic news and lower macroeconomic expectations as explanatory variables. We reestimate the mediation regressions by adding the full set of macroeconomic expectations to avoid an omitted variable bias. For example, when studying the direct and indirect effects of paying attention to unemployment news on durable goods expenditure, it is possible that high inflation rate and interest rate expectations affect the expectations on unemployment rates following a Phillips curve and Taylor rule logic. As shown in Appendix B Table 18, 20, and 19, our baseline estimations in the mediation analyses are robust to these additions. One possible explanation is that correlations among these

[32] Our result is different from the finding of a marginal effect of 4 percentage points in Bachmann, Berg, and Sims (2015) who use data from 2008 to 2012. One reason is that we use a larger sample of data from Jan. 1990 to Jan. 2020.

macroeconomic expectations are relatively low within the MSC.

6 Conclusion

To summarize, this paper makes use of monthly data from the MSC to answer three questions: First, what are the determining factors of households' attention allocation behavior? Second, to what degree do consumers use their acquired information in updating expectations? Finally, what roles do attention and expectations play in households' spending decisions? Our first empirical exercise shows that socioeconomic status (income and education level) and recent experiences of a recession play important roles in individuals' attention allocated to different economic news. Especially, we find that during recession periods, on average households pay more attention to news regarding unemployment news, fiscal policy, demand, and stock market, but pay less attention to other news. In our view, this constitutes evidence for re-allocation of attention following a macroeconomic shock. The second exercise shows that comparing households that do pay attention to news of higher/lower unemployment rates (inflation rates, interest rates) are more likely to report higher/lower expected unemployment rates (inflation rates, interest rates). This might imply that individuals indeed use their acquired information when forming expectations of interested variables. Finally we inspect the mechanisms through which attention to economic news affects consumption attitudes. By conducting a mediation analyses, we find that paying attention to news of higher unemployment (prices, interest rates) is associated with pessimistic attitudes towards purchasing durable goods (home, cars) through either an direct effect of news attention on consumption attitudes or an indirect effect where paying attention to news of higher unemployment (prices, interest rates) is associated with more pessimistic attitude and more pessimistic expectations about future unemployment rate (inflation rates, interest rates). The indirect effect is strongest for unemployment news and expectations.

Our empirical analyses also brings forth several policy implications.[33] First, in the attention allocation exercise we find that recent experiences of a recession leads to smaller likelihood of paying attention to inflation and interest rates, but a larger likelihood of paying attention to unemployment. It follows that during recessions, expectations management by policy-makers might be more successful when attempting to anchor the public's expectations on unemployment rates, as compared to inflation and interest rate expecta-

[33] More discussions can be found from results in Table A14 - Table A17 of Online Appendix E.3.

tions. This is consistent with the discussion of a recent paper by Angeletos and Sastry (2021) where outcome-based communication policies (anchoring public's expectations on unemployment rates) are preferred if general equilibrium effects are not sufficiently understand by the public. Second, our empirical findings regarding determinants of attention allocation suggest that higher income and more educated households are more likely to pay attention to economic news, implying that for low income and less educated households communication policies might be less effective. To be maximally inclusive, policy makers should therefore attempt to make their communications as transparent and understandable as possible.

Finally we want to mention several potential extensions of this paper. First, currently we use whether households recall specific news as a measure of attention to different economic states. In the literature, some studies attempt to use self-designed survey questions to extract information on the degree to which individuals update their prior beliefs if they are provided with extra information (see Roth and Wohlfart (2020). In future research projects, designing surveys and asking respondents directly, if they would derive any consumption decisions from the news they heard could be helpful in understanding how household use information for consumption decisions. Second, we use purchasing attitudes regarding durable goods and homes as proxy variables for consumption. This could be problematic when studying consumers' spending behavior. This problem can be solved by collecting respondents realized spending behavior and their corresponding expectations (see Dräger and Nghiem (2021)). Third, in the MSC when respondents answered questions regarding news they could recall, they also reported whether they thought these were favorable or unfavorable news. In our view, this reported distinction deserves more consideration and will be part of our future research agenda. For example, in Table A18 Online Appendix E.4, we show that if using a sub-sample of individuals who reported inflation as favorable news and deflation as unfavorable news, inflation rate expectations are now positively correlated with the readiness of purchasing durable goods. However, in the sample we find that a majority of consumers think that deflation is favorable and inflation is unfavorable. This can explain why in Section 4.3 we find a negative correlation when using the whole sample.

	(1)		
	No. of Observation	Mean	SD
Unemployment news	174003	0.25	0.43
Fiscal policy news	174003	0.13	0.34
Interest rate news	174003	0.05	0.22
Inflation news	174003	0.08	0.27
Demand news	174003	0.06	0.25
Stock market news	174003	0.07	0.26
Miscellaneous news	174003	0.22	0.42

Table 1: Summary table of attention to different news categories for January 1990 to January 2020

	(1)					
	No. of Obs.	Mean	SD	Minimum	Maximum	Type
Real Income	162720	90746.18	81230.90	1282.74	990127.81	continuous
Real Investment	113817	189751.38	633182.08	0.00	15938341.65	continuous
Education	173105	4.18	1.23	1.00	6.00	discrete
Age	174003	48.81	15.68	20.00	80.00	discrete
Marital Status	173597	2.13	1.56	1.00	5.00	discrete
Number of Children	173876	0.66	1.06	0.00	5.00	discrete
Stock Market Participation	128659	0.63	0.48	0.00	1.00	discrete
Business Conditions Expectations	170491	0.08	0.70	-1.00	1.00	discrete
Unemployment Expectations	172335	0.15	0.70	-1.00	1.00	discrete
Inflation Expectations	172677	0.79	0.48	-1.00	1.00	discrete
Interest Rate Expectations	171075	0.43	0.71	-1.00	1.00	discrete
Purchasing Attitude - Durable Goods	165674	0.53	0.82	-1.00	1.00	discrete
Purchasing Attitude - Homes	170803	0.54	0.83	-1.00	1.00	discrete

Table 2: Summary table of key variables taken from the MSC for January 1990 to January 2020

	(1) Unemployment	(2) Fiscal policy	(3) Interest rate	(4) Inflation	(5) Demand	(6) Stock market	(7) Miscellaneous
log of income	0.0118***	0.0117***	0.0138***	0.00540***	0.00508***	0.0126***	0.00507***
	(5.12)	(6.45)	(12.84)	(3.96)	(4.10)	(8.91)	(4.86)
Education	0.0295***	0.0194***	0.0126***	0.0145***	0.00305***	0.0227***	0.0111***
	(19.40)	(15.76)	(18.81)	(15.07)	(4.04)	(27.01)	(16.06)
Recession index	0.1599***	0.0824***	-0.0311***	-0.0839***	0.0207***	0.0191***	-0.0529***
	(89.73)	(66.26)	(-39.18)	(-89.82)	(24.02)	(17.63)	(-76.22)
Stock participation	0.0269***	0.0177***	0.0153***	0.0107***	0.00738***	0.0366***	0.00878***
	(7.42)	(6.79)	(9.44)	(4.70)	(3.73)	(15.92)	(5.39)
Pseudo R^2	0.0531	0.1408	0.1027	0.0918	0.0262	0.0814	0.0996
N	118063	118063	118063	118063	118063	118063	118063

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: The table presents marginal effects from probit regressions: relationships among income, education, recession and attention to different economic news. Dependent variables are attention that is measured by dummy variables that indicate whether reported news about unemployment, fiscal policies, interest rates, inflation, demand, stock markets, and others. Main explanatory variables are log of income, education, and NBER recession index. For each specification, we control for age, gender, marital status, number of kids, stock market participation status, one-year change in personal financial situation, the year-month dummy and residence location dummy. Standard errors are clustered in year-month level.

	(1)	(2)	(3)
	Unemp. expectation	Infl. expectation	Interest expectation
High unemployment news	0.165***		
	(30.10)		
High price news		0.0612***	
		(7.51)	
High interest rate news			0.0942***
			(7.62)
Adjusted R^2	0.0442	0.0451	0.0591
N	107130	107216	106704

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: The table presents results from ordered probit regressions: relationship between macroeconomic expectations and attention to specific economic news. Marginal effects measure the effect of a particular variable on the probability that individuals have high expectations on unemployment rates, inflation rates and interest rates in percentage points with the remaining variables set at their respective conditional means. Dependent variables are expectations on unemployment rates, inflation rates and interest rates. Main explanatory variables are dummy variables indicating attention to economic news regarding high unemployment rates, high prices, and high interest rates. We also control for log of income, stock market participation status, NBER recession index, age, gender, education, marital status, number of kids, one-year change in personal financial situation, the year-month dummy and residence location dummy. Standard errors are clustered in year-month level.

	(1) Durable	(2) Durable	(3) Durable	(4) Home	(5) Home	(6) Home	(7) Car	(8) Car	(9) Car
High unemployment news	-0.0438***			-0.0181***			-0.0325***		
	(-10.90)			(-4.41)			(-7.53)		
Unemployment expectation	-0.0755***			-0.0854***			-0.0895***		
	(-31.16)			(-32.17)			(-33.13)		
High price news		-0.0435***			-0.0309***			-0.0567***	
		(-6.94)			(-4.68)			(-8.11)	
Inflation expectation		-0.0265***			-0.0282***			-0.0506***	
		(-7.28)			(-7.60)			(-13.76)	
High interest rate news			-0.00114			-0.0367***			-0.0119
			(-0.12)			(-4.11)			(-1.30)
Interest rate expectation			-0.00283			-0.0219***			-0.0227***
			(-1.16)			(-9.36)			(-9.28)
Adjusted R^2	0.0564	0.0436	0.0426	0.0707	0.055	0.0556	0.0443	0.0322	0.0308
N	107130	107216	106704	107130	107216	106704	107130	107216	106704

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: The table presents results from ordered probit regressions: relationship between consumption attitude (toward durable goods, home and car) and macroeconomic expectations and the amount of attention to relevant economic news. Marginal effects measure the effect of a particular variable on the probability that individuals find buying conditions favorable in percentage points with the remaining variables set at their respective conditional means. Dependent variables are consumption attitudes. Main explanatory variables are expectations on unemployment rates, inflation rates and interest rates and attention to economic news regarding high unemployment, high price, and high interest rates. We also control for log of income, stock market participation status, NBER recession index, age, gender, education, marital status, number of kids, one-year change in personal financial situation, the year-month dummy and residence location dummy. Standard errors are clustered in year-month level.

A: Durable goods	High unemployment news	High price news	High interest rate news
Direct	-0.094	-0.089	
Indirect	-0.0415	-0.003	Not significant
Total	-0.1355	-0.092	
Indirect/Total (%)	31%	3%	
B: Home	High unemployment news	High price news	High interest rate news
Direct	-0.0329	-0.0609	-0.0676
Indirect	-0.0474	-0.0032	-0.0053
Total	-0.0803	-0.0641	-0.073
Indirect/Total (%)	59%	5%	7.3%
C: Car	High unemployment news	High price news	High interest rate news
Direct	-0.0656	-0.117	-0.0244
Indirect	-0.05	-0.0056	-0.0053
Total	-0.1157	-0.123	-0.0296
Indirect/Total (%)	43%	4.6%	18%

Table 6: Direct effects of attention to macroeconomic news on consumption behavior and indirect effects through macroeconomic expectations. Direct effects are obtained from Table 7, and indirect effects can be computed by using results in Table 7 and Table 8. For example, the indirect effect of paying attention to high unemployment news on durable good purchasing attitude through unemployment rate expectation is the product of the coefficient of unemployment rate expectation (Column 1, Row 2 of Table 7) and the coefficient of paying attention to high unemployment news (Column 1, Row 1 of Table 8).

	(1) Durable	(2) Durable	(3) Durable	(4) Home	(5) Home	(6) Home	(7) car	(8) car	(9) car
High unemployment news	-0.0941***			-0.0329***			-0.0656***		
	(-10.54)			(-3.84)			(-7.22)		
Unemployment expectation	-0.146***			-0.167***			-0.177***		
	(-28.76)			(-28.94)			(-31.01)		
High price news		-0.0890***			-0.0609***			-0.117***	
		(-6.75)			(-4.12)			(-7.81)	
Inflation expectation		-0.0523***			-0.0551***			-0.0965***	
		(-7.32)			(-7.65)			(-13.86)	
High interest rate news			-0.00881			-0.0676***			-0.0244
			(-0.55)			(-3.62)			(-1.37)
Interest rate expectation			-0.00662			-0.0476***			-0.0469***
			(-1.36)			(-9.86)			(-9.62)
Adjusted R^2	0.0800	0.0635	0.0620	0.0836	0.0659	0.0670	0.0624	0.0465	0.0446
N	107130	107216	106704	107130	107216	106704	107130	107216	106704

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: The table presents results from OLS regressions: relationship between consumption attitude (toward durable goods, home and car) and macroeconomic expectations and the amount of attention to relevant economic news. Dependent variables are consumption attitudes. Main explanatory variables are expectations on unemployment rates, inflation rates and interest rates and attention to economic news regarding high unemployment rates, high prices, and high interest rates. We also control for log of income, stock market participation status, NBER recession index, age, gender, education, marital status, number of kids, one-year change in personal financial situation, the year-month dummy and residence location dummy. Standard errors are clustered in year-month level.

	(1) Unemp. expectation	(2) Infl. expectation	(3) Interest expectation
High unemployment news	0.284***		
	(27.73)		
High price news		0.0581***	
		(8.04)	
High interest rate news			0.112***
			(7.96)
Adjusted R^2	0.0866	0.0577	0.109
N	107130	107216	106704

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: The table presents results from OLS regressions: relationship between macroeconomic expectations and attention to specific economic news. Dependent variables are differences of expectations on unemployment rates, inflation rates and interest rates. Main explanatory variables are dummy variables indicating attention to economic news regarding high unemployment rates, high prices, and high interest rates. We also control for log of income, stock market participation status, NBER recession index, age, gender, education, marital status, number of kids, one-year change in personal financial situation, the year-month dummy and residence location dummy. Standard errors are clustered in year-month level.

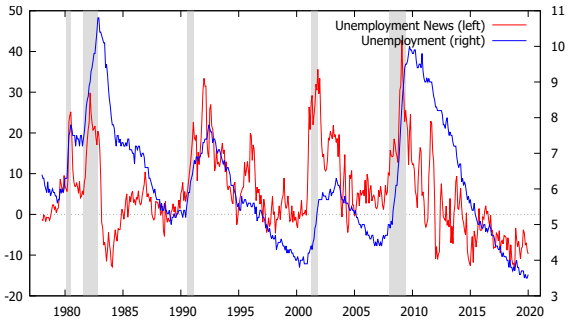

Figure 1: Attention to Unemployment News (red, left axis) computed using the net share of households that have reported hearing news on rising unemployment during the respective month and U.S. Unemployment rate in percent (blue, left axis) from January 1978 to January 2020. Gray shaded area indicates U.S. recessions as dated by the NBER. Given a rise of the unemployment rate, the ratio of households that report hearing about a rise of unemployment differs depending on the time period in which the increase was observed.

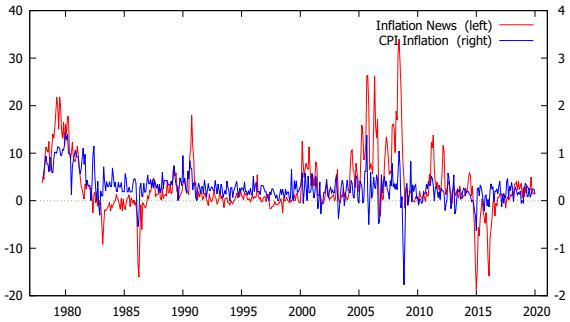

Figure 2: Attention to Inflation News (red, left axis) computed using the net share of households that have reported hearing news on rising prices during the respective month and U.S. CPI inflation rate in percent (blue, left axis) from January 1978 to January 2020.

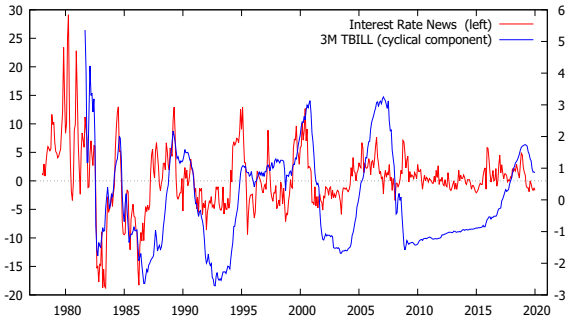

Figure 3: Net share of attention to interest rate news (red, left axis) computed using the share of households that have reported hearing news on interest rates during the respective month and the three-month T-Bill rate in percent (blue, left axis) from September 1981 to January 2020. To compare net shares for interest rate news with the three-month T-bill, we de-trended the T-bill rate using a second order polynomial.

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Appendix A: Selected News Groups

In our paper, we divide news into different groups according to which economic dimension it belongs to.

The group “fiscal policy" includes respondents’ answers regarding elections, military spending, government spending, taxes, government budget, and other news regarding government.

The group “unemployment" includes news regarding opening or closing of plants, factories, stores, and employment is high or low, firms increase/reduce investment and production.

The group “demand" contains news regarding consumers’ purchasing power, such as consumer demand high or low, purchasing power is high or low.

The group “interest rate" refers to news regarding the monetary policy including interest rates high or low, credit is easy or difficult to get.

The group “inflation" includes news high or low prices, less or more inflation, and other news regarding prices.

The group “stock market" simply refers to news regarding high or low stock prices.

The group “miscellaneous" includes the remaining news items such as balance of payments, farm situation, more or less crime and other news that cannot fit in any of groups above.

Appendix B: Robustness checks

	(1) Δ unemp.	(2) Δ fiscal	(3) Δ interest	(4) Δ infl.	(5) Δ stock market	(6) Δ demand	(7) Δ Miscellaneous
Δreal income	0.0304	0.0794**	0.0512*	0.00943	0.0165	-0.0231	0.119***
	(0.72)	(2.33)	(1.87)	(0.45)	(0.51)	(-0.98)	(2.67)
Δrecession index	0.155***	0.0189***	-0.110***	-0.0737***	0.0452***	-0.0834***	0.171***
	(127.59)	(22.41)	(-472.34)	(-104.31)	(77.13)	(-314.08)	(293.79)
Adjusted R^2	0.430	0.450	0.389	0.480	0.419	0.473	0.461
N	76844	76844	76844	76844	76844	76844	76844

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Relationship between amount of real income, recession index and attention in first differences based on the panel sub-sample, where survey respondents got interviewed twice over a time period of six months. The table presents results from first-difference regressions. Dependent variables differences of amounts of attention that is measured by dummy variables that indicate whether reported news about unemployment, fiscal policies, interest rates, and inflation. Main explanatory variables are changes in real income and recession status. The regression includes dummies for year-month and residence location. Standard errors are clustered in year-month level.

	(1) Δ unemp.	(2) Δ fiscal	(3) Δ interest	(4) Δ infl.	(5) Δ stock market	(6) Δ demand	(7) Δ Miscellaneous
Δreal income	0.126*	0.217***	0.238***	-0.0191	0.210***	-0.00345	0.202***
	(1.93)	(3.72)	(5.09)	(-0.56)	(4.21)	(-0.10)	(2.75)
Δrecession index	0.173***	-0.0218***	-0.142***	-0.0654***	0.0592***	-0.0136***	0.220***
	(83.19)	(-17.05)	(-139.28)	(-59.81)	(63.04)	(-15.76)	(228.29)
Adjusted R^2	0.431	0.453	0.401	0.481	0.418	0.475	0.467
N	33098	33098	33098	33098	33098	33098	33098

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Relationship between amount of real income, recession index and attention in first differences based on the panel sub-sample, where survey respondents got interviewed twice over a time period of six months and those who did not experience a reduction in income. The table presents results from first-difference regressions. Dependent variables differences of amounts of attention that is measured by dummy variables that indicate whether reported news about unemployment, fiscal policies, interest rates, and inflation. Main explanatory variables are changes in real income and recession status. The regression includes dummies for year-month and residence location. Standard errors are clustered in year-month level.

	(1)	(2)	(3)
	Δ unemp. expectation	Δ infl. expectation	Δ interest expectation
Δ high unemployment news	0.125***		
	(17.41)		
Δ high price news		0.0772***	
		(4.98)	
Δ high interest rate news			0.0904***
			(6.36)
Adjusted R^2	0.0420	0.0430	0.0761
N	75789	75951	74863

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Relationship between changes of attention to economic news and changes of expectations based on first-difference regression results by using a rotating panel dataset. Dependent variables are changes of expectations on unemployment rates, inflation rates and interest rates. Explanatory variables are differences of amounts of attention to news regarding high unemployment rates, high prices and high interest rates between two interviews. The regression includes dummies for year-month and residence location. Standard errors are clustered in year-month level.

	(1) Δ durable	(2) Δ durable	(3) Δ durable	(4) Δ home	(5) Δ home	(6) Δ home	(7) Δ car	(8) Δ car	(9) Δ car
Δ high unemployment news	-0.0479***			-0.0164**			-0.0168*		
	(-5.06)			(-2.15)			(-1.79)		
Δ unemployment expectation	-0.0535***			-0.0505***			-0.0576***		
	(-10.30)			(-10.22)			(-9.60)		
Δ high price news		-0.0528***			-0.0456***			-0.0419**	
		(-3.31)			(-3.20)			(-2.46)	
Δ inflation expectation		0.00319			-0.0123***			-0.0273***	
		(0.84)			(-3.19)			(-5.95)	
Δ high interest rate news			-0.0168			-0.0816***			-0.0737***
			(-0.99)			(-5.49)			(-4.08)
Δ interest rate expectation			0.0162***			-0.00417			-0.0127**
			(3.37)			(-0.83)			(-2.32)
Adjusted R^2	0.0264	0.0239	0.0242	0.0375	0.0359	0.0357	0.0224	0.0214	0.0207
N	69888	70017	69162	73735	73877	72937	70057	70193	69401

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Relationship between changes of consumption attitude (toward durable goods, home and car) and changes of macroeconomic expectations and the amount of attention to relevant economic news. The table presents results from first-difference regressions. Dependent variables are changes of consumption attitudes. Main explanatory variables are changes of expectations on unemployment rates, inflation rates and interest rates and changes of attention to economic news regarding high unemployment rates, high prices and high interest rates between two interviews. The regression includes dummies for year-month and residence location. Standard errors are clustered in year-month level.

	(1) Unemp.	(2) Fiscal	(3) Interest	(4) Inflation	(5) Demand	(6) Stock market	(7) Miscellaneous
log of COH	0.00925***	0.00936***	0.00824***	0.00474***	0.00355***	0.0106***	0.00577***
	(5.22)	(6.80)	(11.44)	(4.51)	(3.77)	(10.16)	(3.48)
Education	0.0270***	0.0191***	0.0127***	0.0147***	0.00296***	0.0220***	0.0164***
	(17.39)	(15.68)	(18.87)	(15.52)	(3.80)	(24.94)	(11.12)
Recession index	0.182***	0.112***	-0.0246***	-0.0804***	0.0160***	0.0370***	0.0511***
	(102.32)	(87.14)	(-32.37)	(-87.38)	(17.52)	(33.54)	(31.77)
Stock participation	0.0142***	0.0112***	0.0115***	0.00652**	0.00554**	0.0277***	0.0242***
	(3.37)	(3.70)	(6.25)	(2.55)	(2.33)	(10.52)	(7.04)
Pseudo R^2	0.0532	0.1403	0.1009	0.0923	0.0268	0.085	0.0187
N	106332	106332	106332	106332	106332	106332	106332

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: The table presents marginal effects from probit regressions: relationships among income, education, recession and attention to different economic news. Dependent variables are attention that is measured by dummy variables that indicate whether reported news about unemployment, fiscal policies, interest rates, inflation, demand, stock markets and others. Main explanatory variables are log of cash on hand (COH, the sum of income and investment), education, and NBER recession index. For each specification, we control for age, gender, marital status, number of kids, one-year change in personal financial situation, the year-month dummy and residence location dummy. Standard errors are clustered in year-month level.

	(1) Unemp.	(2) Fiscal	(3) Interest	(4) Inflation	(5) Demand	(6) Stock market	(7) Miscellaneous
log of income	0.00853***	0.0133***	0.0134***	0.00480***	0.00540***	0.0143***	0.0130***
	(3.13)	(5.86)	(9.70)	(2.74)	(3.46)	(8.23)	(4.81)
Education	0.0262***	0.0208***	0.0121***	0.0141***	0.00266***	0.0204***	0.0149***
	(14.52)	(13.20)	(15.95)	(13.11)	(2.70)	(20.61)	(8.93)
Recession index	0.239***	0.0891***	-0.0208***	-0.0871***	0.0311***	0.0133***	0.0216***
	(118.44)	(60.86)	(-23.96)	(-80.68)	(29.13)	(10.09)	(12.64)
Stock participation	0.0222***	0.0210***	0.0138***	0.00751***	0.00797***	0.0349***	0.0271***
	(5.47)	(6.04)	(7.20)	(2.80)	(3.19)	(13.35)	(7.65)
Pseudo R^2	0.0538	0.1356	0.1038	0.0895	0.0289	0.086	0.0186
N	70976	70751	70976	70976	70976	70976	70976

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14: The table presents marginal effects from probit regressions: relationships among income, education, recession and attention to different economic news. Respondents' second observations are excluded. Dependent variables are attention that is measured by dummy variables that indicate whether reported news about unemployment, fiscal policies, interest rates, inflation, demand, stock markets and others. Main explanatory variables are log of income, education, and NBER recession index. For each specification, we control for age, gender, marital status, number of kids, one-year change in personal financial situation, the year-month dummy and residence location dummy. Standard errors are clustered in year-month level.

	(1) Unemp. expectation	(2) Infl. expectation	(3) Interest expectation
High unemployment news	0.165***		
	(30.65)		
High price news		0.0629***	
		(8.13)	
High interest rate news			0.0942***
			(8.12)
Adjusted R^2	0.0442	0.0451	0.0591
N	117289	117414	116616

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15: The table presents marginal effects from ordered probit regressions: relationship between macroeconomic expectations and attention to specific economic news. Marginal effects measure the effect of a particular variable on the probability that individuals have high expectations on unemployment, prices and interest rates in percentage points with the remaining variables set at their respective conditional means. Dependent variables are expectations on unemployment rates, inflation rates and interest rates. Main explanatory variables are attention to economic news regarding high unemployment rates, high prices and high interest rates. We control for log of income, stock market participation status, NBER recession index, age, gender, education, marital status, number of kids, one-year change in personal financial situation, the year-month dummy and residence location dummy. We also control for squared changes of unemployment rates, inflation rates and interest rates over from months $t-2$ to $t-8$. Standard errors are clustered in year-month level.

	(1) Durable	(2) Home	(3) Car	(4) Durable	(5) Home	(6) Car
High price news	-0.0201***	-0.00991*	-0.0312***			
	(-3.26)	(-1.72)	(-4.51)			
Low price news				0.0246*	0.00858	0.0307***
				(1.85)	(0.62)	(2.68)
Inflation expectation	-0.00169	0.00154	-0.0228***	-0.00176	0.00158	-0.0229***
	(-0.43)	(0.40)	(-5.12)	(-0.45)	(0.42)	(-5.13)
High unemployment news	-0.0268***	-0.00821**	-0.0178***			
	(-7.15)	(-2.20)	(-4.18)			
Low unemployment news				0.0366***	0.0414***	0.0362***
				(6.60)	(8.09)	(6.60)
Unemp. expectation	-0.0352***	-0.0407***	-0.0376***	-0.0353***	-0.0398***	-0.0373***
	(-11.12)	(-13.74)	(-12.66)	(-11.23)	(-13.51)	(-12.55)
High interest rate news	0.0118	-0.0180**	0.00302			
	(1.35)	(-2.15)	(0.34)			
Low interest rate news				0.0268***	0.0546***	0.0354***
				(2.94)	(6.00)	(3.33)
Interest rate expectation	0.00762***	-0.0148***	-0.0120***	0.00792***	-0.0147***	-0.0119***
	(2.71)	(-5.18)	(-4.23)	(2.80)	(-5.18)	(-4.19)
ZLB*unemp. expectation	-0.00817	-0.0204***	-0.0331***	-0.00682	-0.0189***	-0.0317***
	(-1.64)	(-3.87)	(-5.93)	(-1.37)	(-3.61)	(-5.70)
ZLB*inflation expectation	-0.0164**	-0.0144**	-0.000218	-0.0163**	-0.0142*	-0.0000920
	(-2.17)	(-1.97)	(-0.03)	(-2.16)	(-1.95)	(-0.01)
ZLB*interest expectation	-0.0134***	0.000723	-0.00301	-0.0134***	0.000707	-0.00298
	(-2.95)	(0.15)	(-0.64)	(-2.98)	(0.15)	(-0.64)
ZLB dummy	-0.0270***	0.0891***	0.0528***	-0.0287***	0.0872***	0.0515***
	(-4.06)	(13.91)	(8.34)	(-4.30)	(13.67)	(8.19)
Stock participation	0.0169***	0.0498***	0.0279***	0.0162***	0.0489***	0.0270***
	(4.92)	(14.39)	(7.60)	(4.69)	(14.17)	(7.36)
Adjusted R^2	0.0724	0.1355	0.0647	0.0722	0.1365	0.0650
N	109233	112041	109126	109233	112041	109126

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 16: The table present marginal effects from ordered probit regressions: effects of attention to news, expectations and ZLB on positive consumption attitudes. Dependent variables are purchase attitudes toward durable goods, home and car. Main explanatory variables are news of high/low price,high/low unemployment, high/low interest rate, expectations (on inflation rates, unemployment rates and interest rate), ZLB and its interactions with expectations. For each specification, we control for log of income, education, stock market participation, NBER recession index age, gender, marital status, number of kids, education level, one-year change in personal financial situation, the year-month dummy and residence location dummy. Standard errors are clustered in year level.

	(1) Durable	(2) Home	(3) Car	(4) Durable	(5) Home	(6) Car
High price news	-0.0129***	-0.0110**	-0.0228***			
	(-2.81)	(-2.34)	(-4.19)			
Low price news				0.0154*	0.0203**	0.0297***
				(1.81)	(2.22)	(3.56)
Inflation expectation	0.0143***	0.00885***	-0.00652**	0.0143***	0.00880***	-0.00657**
	(5.37)	(3.71)	(-2.46)	(5.40)	(3.68)	(-2.48)
High unemployment news	-0.0304***	-0.0100***	-0.0155***			
	(-10.86)	(-3.59)	(-4.85)			
Low unemployment news				0.0329***	0.0371***	0.0365***
				(7.46)	(9.07)	(8.29)
Unemp. expectation	-0.0331***	-0.0374***	-0.0367***	-0.0336***	-0.0366***	-0.0363***
	(-17.56)	(-19.28)	(-18.81)	(-18.03)	(-18.98)	(-18.57)
High interest rate news	-0.00299	-0.0184***	-0.00879			
	(-0.53)	(-3.57)	(-1.45)			
Low interest rate news				0.0345***	0.0899***	0.0557***
				(6.30)	(15.11)	(7.96)
Interest expectation	0.00915***	0.00269	-0.00979***	0.00965***	0.00337	-0.00934***
	(5.46)	(1.24)	(-5.52)	(5.76)	(1.55)	(-5.27)
ZLB*unemp. expectation	-0.0133***	-0.0280***	-0.0380***	-0.0121***	-0.0266***	-0.0364***
	(-2.95)	(-5.76)	(-7.15)	(-2.69)	(-5.55)	(-6.88)
ZLB*inflation expectation	-0.0326***	-0.0197***	-0.0166***	-0.0326***	-0.0193***	-0.0164***
	(-4.54)	(-2.82)	(-2.69)	(-4.57)	(-2.78)	(-2.65)
ZLB*interest expectation	-0.0154***	-0.0184***	-0.00624	-0.0157***	-0.0189***	-0.00655
	(-3.85)	(-4.14)	(-1.47)	(-3.93)	(-4.27)	(-1.55)
ZLB dummy	0.116***	0.157***	0.153***	0.111***	0.152***	0.149***
	(18.97)	(25.96)	(27.17)	(18.30)	(25.29)	(26.60)
Adjusted R^2	0.0719	0.1342	0.0638	0.0718	0.1353	0.0642
N	219809	226437	219918	219809	226437	219918

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 17: The table present marginal effects from ordered probit regressions: effects of attention to news, expectations and ZLB on positive consumption attitudes. The sample is from Jan. 1978 to Dec. 2019 by excluding stock market participation in the regression. Dependent variables are purchase attitudes toward durable goods, home and car. Main explanatory variables are news of high/low prices, high/low unemployment rates, high/low interest rates, expectations (on inflation rates, unemployment rates and interest rates), ZLB and its interactions with expectations. For each specification, we control for log of income, education, NBER recession index age, gender, marital status, number of kids, education level, personal financial situation. the year-month dummy and residence location dummy. Standard errors are clustered in year level.

A: Durable goods	High unemployment news	High price news	High interest rate news
Direct	-0.0938	-0.0676	
Indirect	-0.04	-0.0015	Not significant
Total	-0.135	-0.0912	
Indirect/Total (%)	29.8%	1.6%	
B: Home	High unemployment news	High price news	High interest rate news
Direct	-0.033	-0.0333	-0.0505
Indirect	-0.046	-0.001	-0.004
Total	-0.079	-0.0619	-0.0727
Indirect/Total (%)	58%	1.6%	5.6%
C: Car	High unemployment news	High price news	High interest rate news
Direct	-0.0667	-0.093	Not significant
Indirect	-0.048	-0.0028	-0.0035
Total	-0.115	-0.124	-0.0318
Indirect/Total (%)	42%	2.3%	11%

Table 18: Direct effects of attention to macroeconomic news on consumption behavior and indirect effects through macroeconomic expectations. Direct effects are obtained from Table 19, and indirect effects can be computed by using results in Table 19 and Table 20. For example, the indirect effect of paying attention to high unemployment news on durable good purchasing attitude through unemployment expectation is the product of the coefficient of unemployment expectation (Column 1, Row 2 of Table 19) and the coefficient of paying attention to high unemployment news (Column 1, Row 1 of Table 20).

	(1) Durable goods	(2) Home	(3) Car
High unemployment news	-0.0938***	-0.0332***	-0.0667***
	(-10.37)	(-3.95)	(-7.39)
Unemployment expectation	-0.143***	-0.164***	-0.170***
	(-28.17)	(-29.17)	(-29.96)
High price news	-0.0676***	-0.0333**	-0.0933***
	(-5.15)	(-2.28)	(-6.12)
Price expectation	-0.0327***	-0.0219***	-0.0628***
	(-4.68)	(-3.27)	(-9.46)
High interest rate news	0.00386	-0.0505***	-0.00654
	(0.24)	(-2.78)	(-0.38)
Interest rate expectation	0.00233	-0.0379***	-0.0324***
	(0.52)	(-8.04)	(-6.94)
Adjusted R^2	0.0801	0.0853	0.0649
N	105758	105758	105758

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 19: The table presents results from OLS regressions: relationship between consumption attitude (toward durable goods, home and car) and macroeconomic expectations and the amount of attention to relevant economic news. Dependent variables are consumption attitudes. Main explanatory variables are expectations on unemployment rates, inflation rates and interest rates and attention to economic news regarding high unemployment rates, high prices, and high interest rates. We also control for log of income, stock market participation status, NBER recession index, age, gender, education, marital status, number of kids, one-year change in personal financial situation, the year-month dummy and residence location dummy. Standard errors are clustered in year-month level.

	(1) Unemp. expectation	(2) Infl. expectation	(3) Interest expectation
Unemployment expectation		0.0607***	0.0173***
		(20.12)	(3.66)
High unemployment news	0.281***	0.00607	-0.0367***
	(28.56)	(1.23)	(-5.12)
Price expectation	0.131***		0.272***
	(16.39)		(49.72)
High price news	0.135***	0.0455***	0.00680
	(10.55)	(6.34)	(0.59)
Interest rate expectation	0.0190***	0.139***	
	(3.61)	(33.93)	
High interest rate news	0.0968***	-0.0224**	0.107***
	(5.79)	(-2.22)	(7.60)
Adjusted R^2	0.0973	0.102	0.144
N	105758	105758	105758

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 20: The table presents results from OLS regressions: relationship between macroeconomic expectations and attention to specific economic news. Dependent variables are differences of expectations on unemployment rates, inflation rates and interest rates. Main explanatory variables are dummy variables indicating attention to economic news regarding high unemployment rates, high prices, and high interest rates. We also control for log of income, stock market participation status, NBER recession index, age, gender, education, marital status, number of kids, one-year change in personal financial situation, the year-month dummy and residence location dummy. Standard errors are clustered in year-month level.