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News Selection and Household Inflation Expectations*

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Abstract

We examine the impact of systematic media reporting on household inflation expectations, focusing on how selective news coverage influences household responses to inflation news. In a model where monitoring all economic developments is costly, households will account for news selection when forming inflation expectations. The model implies an asymmetry: news about high inflation influences inflation expectations more than news about low inflation. Using micro panel data, we find support for this hypothesis. Exposure to news about higher prices increases household inflation expectations by approximately 0.4 percentage point, whereas exposure to news about lower prices has no discernible effect.

JEL classification: E3, D84

Keywords: Inflation Expectations, News Media, Selection

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1 Introduction

Inflation expectations are central to modern theories of inflation dynamics (Woodford, 2003). Empirical evidence shows that household inflation expectations, in particular, are a key driver of overall inflation (Coibion and Gorodnichenko, 2015), and as a result are closely monitored by policymakers, particularly central banks. Household expectations also tend to be both higher and more volatile than either professional forecasts or market-based measures of expectations.

This study aims to provide new insight into how households form their inflation expectations by focusing on the role of the news media in shaping these expectations. The existing literature identifies several drivers of household inflation expectations. For instance, households tend to overweight prices of salient, frequently purchased products such as food and energy (Trehan et al., 2011 and D'Acunto et al., 2021). Additionally, personal experiences, including participation in the housing market (Kuchler and Zafar, 2019) and living through high-inflation (Malmendier and Nagel, 2016), have been shown to impact households' expectations. While some prior research has considered the role of the media (e.g., Carroll (2003) and Larsen et al. (2021)), these studies generally rely on aggregate time-series data.[1]

A key concern in studying the effect of the media on expectations is the potential for reverse causality: the media may report more on inflation precisely when inflation or inflation expectations are elevated. Nimark and Pitschner (2019) characterize such systematic responses of media reporting choices to economic conditions with the notion of a "news selection function." When what is covered depends on the state of the world, the topics reported in the news are informative to households independently of the stories themselves.

To assess the impact of news selection on inflation expectations, we develop a model in which households learn about inflation through media coverage. We assume that news outlets report more frequently on inflation when it is elevated, a pattern supported by the data.[2] In this framework, rational agents encounter news stories drawn randomly from a distribution, in which some stories focus on inflation and others do not. As inflation rises, the probability that a randomly encountered story will be about inflation increases. Consequently, the fact that the story addresses inflation conveys information beyond its specific content: hearing about inflation itself signals to agents that inflation may be higher than previously thought. In addition to this inflation-*topic* signal, households also update their expectations based on the *content* of the story. The agent's inflation expectations decline if the story reports

[1] Ehrmann et al. (2017) also use household level data, but do not include household or time fixed effects.

[2] Nimark (2014), Nimark and Pitschner (2019), and Chahrour et al. (2021) all focus on contexts where unusual events - whether high or low - are more likely to be reported.

favorable conditions (that is, lower prices); expectations rise if the story reports unfavorable conditions (that is, higher prices).[3]

Our model generates a distinctive prediction: the effects of favorable and unfavorable inflation news on household inflation expectations are asymmetric. When households read about rising prices, both the topic of the story and its content signal high inflation, leading to a substantial increase in expectations. By contrast, when households read about lower prices, they receive conflicting signals: the story's focus on inflation suggests that inflation is a concern, but the content indicates low inflation. This leads to a more muted reduction—or no change at all—in inflation expectations.

Guided by this theoretical prediction, we empirically estimate the effects of favorable and unfavorable inflation news on household inflation expectations using microdata from the Michigan Surveys of Consumers. The survey asks households whether they have heard news about business conditions and, if so, what they have heard. Households are free to respond that they have heard news about higher (i.e., unfavorable) or lower (i.e., favorable) prices, the focus of our study. The panel structure of the data, in which households are surveyed twice six months apart, allows us to include both time and household fixed effects. These fixed effects help isolate the causal impact of the response to the survey question on inflation expectations. Time fixed effects control for the possibility that households tend to have high expectations when inflation is high, regardless of any exposure to news coverage. Household fixed effects account for time-invariant household heterogeneity, such as demographic factors.

Any remaining endogeneity concerns would be household-time specific. We use a novel instrumental variable approach to address this potential bias. Endogeneity can arise if households, who are surveyed twice, are more likely to seek out and hear inflation news in the second period if their inflation expectations have already changed for other reasons. That is, households whose expectations have changed by more may be more likely to select into the treatment group, the group that switched from not hearing to hearing inflation news.

To address this concern, we use an instrumental variable specification based on the design of the Michigan survey. Specifically, households in a given survey round are asked the question about economics news twice. The instrument is the household's *second* response to the question about economic news. The identifying assumption is that since "inflation" was not their primary response when asked about economic news, it is more likely that the household happened to hear about inflation news by chance, and was not actively seeking inflation news between survey periods.

The question ordering in the Michigan survey effectively addresses another potential

[3]As we show below, respondents nearly always view news about lower prices as favorable and news about higher prices as unfavorable.

endogeneity concern, priming effects. The survey asks households about economic news *before* asking about their expectations. This reduces the risk of priming respondents to answer the economics news question in a way that rationalizes the expectations they have reported earlier in the survey.

Our analysis shows that households' one-year inflation expectations rise by about 0.4 percentage point after hearing news about higher prices. News related to lower prices is found to be negatively associated with expectations using OLS, but is found to have a near-zero effect when we implement the IV approach. These results are robust to including time-varying household response controls (e.g., responses about personal finances) and allowing demographic effects to vary by time-period (e.g., age effects may vary by time period). They are also robust to controlling for households' individual perceived financial conditions. A simple back-of-the-envelope calculation suggests that media coverage of inflation could explain between 5 and 21% of the COVID-era increase in household inflation expectations.

Previous research has assessed whether and how news influences households' inflation expectations. In particular, Carroll (2003) finds evidence that the gap between household (Michigan) and professional (SPF) inflation expectations shrinks when news coverage of inflation is higher. He argues that inflation news informs households about professional forecasts, leading households to revise their expectations towards professionals. More recently, Larsen et al. (2021) shows that news media coverage of certain topics (such as technology and health care) are positively correlated with inflation expectations and negatively correlated with households' inflation forecast errors, suggesting that aggregate news may provide information that improves households' expectations. However, these studies rely on aggregate time-series, which makes establishing a causal relationship difficult.

2 Data and Motivating Facts

Our main data source is the University of Michigan's (UM) Surveys of Consumers. In addition to the commonly used question regarding inflation expectations, this survey includes a question about overall business conditions. Specifically, the survey asks: "During the last few months, have you heard of any favorable or unfavorable changes in business conditions?" The household can respond "Yes" or "No; Haven't Heard." If the respondent says "Yes," they are then asked a follow-up question regarding the type of news: "What did you hear? (Have you heard of any other favorable or unfavorable changes in business conditions?)."[4] The interviewer then codifies the responses by favorability (i.e., "favorable" or "unfavorable")

[4]The Appendix contains an image of the survey questionnaire.

Table 1: Summary Statistics: Household Survey

	Full Sample		Heard Higher prices		Heard Lower prices	
	mean	sd	mean	sd	mean	sd
Expected Inflation, 1-year	4.62	3.99	5.86	4.54	3.56	3.42
Heard any news?	.653	.476				
(1st response)	.653	.476				
(2nd response)	.405	.491				
Heard higher prices	.056	.23				
(1st response)	.0329	.178				
(2nd response)	.023	.15				
Heard lower prices	.0145	.12				
(1st response)	.00832	.0908				
(2nd response)	.00623	.0787				
Male	.527	.499	.594	.491	.705	.456
Age	48	16.9	50.3	15.9	46.1	15.7
College Grad	.471	.499	.586	.493	.667	.471
HS Grad	.254	.435	.253	.435	.211	.408
Have Kids	.356	.479	.336	.472	.378	.485
Married	.632	.482	.665	.472	.677	.468
Income	66436	69150	91548	88662	77406	81451
Observations	138786		7768		2019	

and topic (e.g., government, employment, or inflation). The second part of the follow-up question, "Have you heard of any other...", allows the respondent to list up to two additional topics. We isolate those households who responded with news about inflation, which UM codes as "Unfavorable news: Higher prices" and "Favorable news: Lower prices."[5]

Table 1 shows summary statistics from the UM survey. Our analysis focuses on the panel nature of the survey and therefore isolates those households that are sampled at least twice, which amounts to 138,786 observations covering January 1980 to January 2024.[6] Approximately two-thirds (65.3%) of observations report hearing news about business conditions, of which a subset report hearing inflation news. Specifically, 7,768 observations (5.6%) report hearing higher prices (unfavorable inflation news) and 2,019 observations (1.5%) report hearing news of lower prices (favorable inflation news). Those households reporting unfavorable inflation news have higher-than-average one-year ahead inflation expectations, 5.9%, while those reporting favorable inflation news have lower-than-average inflation expectations, 3.6%. One-year ahead inflation expectations average 4.6% over the entire sample. Those reporting unfavorable news tend to be demographically similar to the average, while those reporting favorable news are more likely to be male and college graduates.

We also report the order in which inflation was reported by the respondent. Overall, 41% of observations include a second topic. Of the 5.6% of observations with unfavorable news a bit over half, 3.3 percentage points (pp), were reported as the first response. Similarly, for favorable news, a little over half were reported as the first response. As we will describe in the next section, the ordering of the response will be used to aid in identification through instrumental variables.

As shown in Figure 1, the fraction reporting inflation news varies over time, with unfavorable news tending to rise with inflation and favorable news declining, however to a lesser extent. Specifically, the correlation between the share of unfavorable news and year-over-year headline CPI inflation is 0.5, while the correlation with favorable news is -0.05. The share of unfavorable news peaked in May 2022, at 43%. It also spiked, rising above 30%, in the summer of 2008 as inflation briefly climbed above 5%.

Table 2 provides a time-series overview of the factors associated with fluctuations in the news-heard variables. Column (1) shows that the share of households that report hearing news of higher prices is positively associated with 3-month CPI inflation, separated into

[5]We removed the very few observations where the individual reported hearing "Unfavorable news: lower prices" or "Favorable news: higher prices." No results changed when these observations were included. See appendix figure A3 for an image of the survey codebook.

[6]We removed outliers: the top and bottom 1 percent of households based on their inflation expectations level and the change in expectations over the panel period.

Table 2: Aggregate variation in hearing inflation news

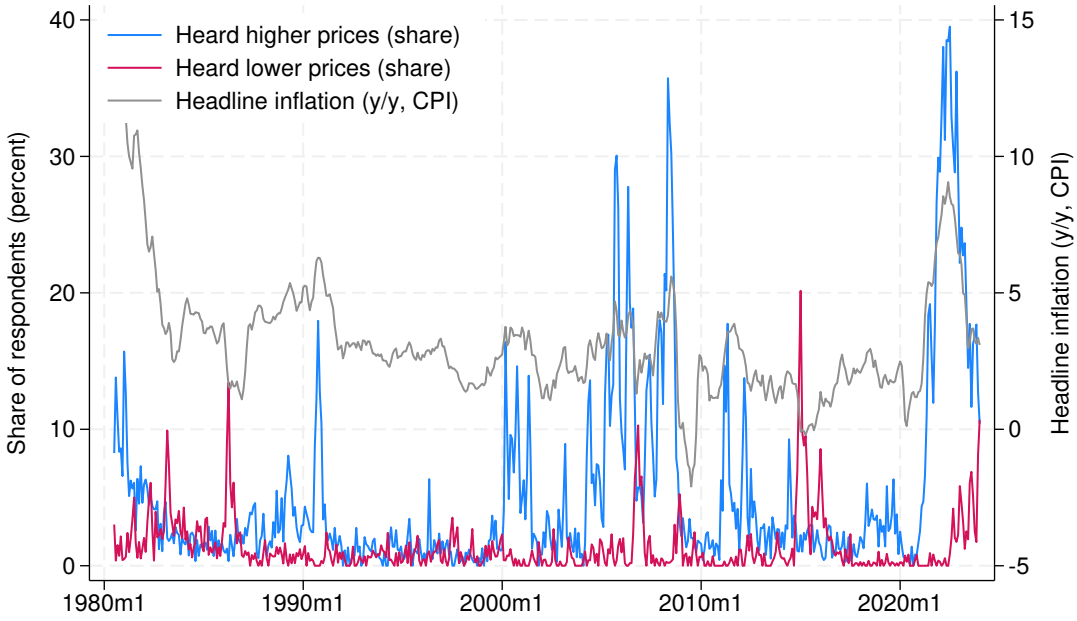
	(1) Share Higher prices	(2) Share Higher prices	(3) Share Lower prices	(4) Share Lower prices
Core inflation (3-month, CPI)	0.484***	0.117	0.0650*	-0.0487
	(0.106)	(0.124)	(0.0373)	(0.0427)
Food inflation (3-month, CPI)	0.945***	0.733***	-0.0371	-0.0937***
	(0.103)	(0.0945)	(0.0276)	(0.0289)
Energy inflation (3-month, CPI)	0.0708***	0.0802***	-0.0393***	-0.0357***
	(0.0150)	(0.0143)	(0.00718)	(0.00705)
Unleaded gasoline price (per gallon)	3.907***	3.632***	0.186**	0.0223
	(0.299)	(0.270)	(0.0849)	(0.0725)
News coverage mentioning inflation (share)		1.520***		0.451***
		(0.293)		(0.0792)
N	523	516	523	516
R^2	0.580	0.608	0.152	0.193
Adjusted R^2	0.576	0.604	0.146	0.185

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable is the share of households reporting heard news of higher prices (columns 1 and 2) and lower prices (columns 3 and 4), by month.

Figure 1: Aggregate variation in hearing inflation news



the core, food, and energy categories. The regression also includes the level of gas prices, as previous studies have shown that the inflation expectations are sensitive to this variable (Coibion and Gorodnichenko, 2015). Column (2) adds a variable measuring inflation news penetration taken from a corpus of 26 major newspapers across the United States (see Shapiro et al. (2022) for a description of the news media data). Specifically, this variable represents the fraction of mentions of the term "inflation" across articles. The coefficient on this variable is positive and significant, and incorporating it leads to an insignificant coefficient on core inflation. This pattern suggests that households maybe be hearing about core inflation through the media. Inflation of "salient" items like food and energy, on the other hand, continues to be positively associated with the share hearing news about higher prices, consistent with the idea that prices of these items are salient to consumers and hence they do not need the news media to learn about them.

Columns (3) and (4) report the same regressions but with the dependent variable being the share of households hearing lower prices. The first coefficient in Column (3) shows that hearing lower-prices news *rises* with core inflation, indicating that households are more likely to report hearing news about *lower* prices when inflation is high. This result might appear counter-intuitive, but we show in the following section that it aligns with our model of news selection. Column (4) shows that, as with case of hearing about unfavorable news,

news media coverage soaks up the positive covariation between core inflation and hearing favorable inflation news. These results indicate that core inflation does not have an effect on people's reporting of hearing lower-prices news independent of the news media channel. Overall, columns (1) and (3) show that households are more likely to report hearing any news about inflation when inflation is high, while columns (2) and (4) show that this association can be accounted for by news media coverage.

3 A Model of News Selection and Inflation Expectations

The time series evidence summarized above suggests that the intensity of newspaper coverage of inflation varies over time, rising in periods when inflation itself is above average. In this section, we provide a simple model of this time variation in inflation coverage, and explore how fluctuations in the intensity of inflation coverage impact the inferences people draw from the news. The key ingredient of the model is a "news selection function" in which media are more likely to report on inflation when inflation is high. Because agents understand that the media select the topics they report based on the state of the world, the topic of a story they see provides information beyond that which is explicitly contained in the story itself.

3.1 Model Environment

For simplicity, we model inflation as an i.i.d. random variable.[7] Agents are asked to forecast inflation's realization at the end of the period. The variable to be forecast is π_{t+1}, and agent i's expectation is given by

$$\hat{\pi}^i_{t+1} \equiv E[\pi_{t+1}|\Omega_{it}]. \tag{1}$$

The information set of agent i is denoted Ω_{it}, which we define momentarily. The probability distribution function $f(\pi_{t+1})$ governs the aggregate realization of inflation. We assume the unconditional mean of inflation is given by

$$E[\pi_{t+1}] = \bar{\pi}. \tag{2}$$

Each period, the media generate a continuum of news stories. Some stories are about inflation while others concern different topics, and agents randomly read one of these stories. We equate each story with an agent indexed i who reads it, so that i indexes both agents and

[7] Given the static nature of our model, we use the notions of "inflation" and "higher prices" interchangeably.

the news stories they read. The set of agents i who read a story about inflation is denoted by $\mathcal{S}_t$.

We assume that the topic of media reporting is determined by a "news selection function" (Nimark and Pitschner, 2019). In particular, the probability of a story i being about inflation is given by

$$Pr[i \in \mathcal{S}_t | \pi_{t+1}] = \Phi(\pi_{t+1}), \tag{3}$$

where $\Phi(\pi_{t+1}) \in [0, 1]$ is a strictly increasing function of inflation. The news selection function $\Phi(\cdot)$ describes how higher inflation increases the likelihood that a given media story is about inflation.[8] The systematic response of reporting to economic conditions means that people learn from the *topic* of news being reported, above and beyond the *content* of the story, and this is the essential ingredient in our model.

Every report on the topic of inflation contains an unbiased signal about inflation over the period. When agents observe a news story, they learn whether the story is about inflation or not, i.e. whether $i \in S_t$. If it is, then they also see the signal s_{it}. The information about inflation contained in an inflation story, and therefore seen by agent $i \in \mathcal{S}_t$, is given by

$$s_{it} = \pi_{t+1} + \eta_{it}, \tag{4}$$

where the noise $\eta_{it} \sim N(0, \sigma_s^2)$ is independent across agents. We assume that stories that are not about inflation contain no economic information at all, so that an agent $i \notin S_t$ bases their expectation on only their prior information about inflation and the fact their signal was not about inflation.

To map the model to the data, we need to define "favorable news" and "unfavorable news" about inflation. We assume that a signal constitutes "favorable news" if it suggests inflation will be below average

$$s_{it} < \bar{\pi}$$

and a signal is "unfavorable news" if it suggests inflation will be above average

$$s_{it} \geq \bar{\pi}.$$

These assumptions are supported by the fact that there are almost no observations in the Michigan survey data of households reporting hearing "Unfavorable news: lower prices" or "Favorable news: higher prices." This is also consistent with Afrouzi, et al.'s (2024) survey results finding that households preferred inflation rate is near zero (0.2%), implying lower

[8] We model the topic of a particular report as a probabilistic, and not a *deterministic*, function of inflation because it is assumed that other newsworthy events (i.e., events unrelated to inflation) occur randomly, as discussed in Nimark and Pitschner (2019).

(higher) prices are always favorable (unfavorable) so long as inflation is positive, which is true throughout our sample period. This observation about households contrasts with the practice of most monetary policymakers, who tend to have a U-shaped loss function around a positive inflation target (Shapiro and Wilson, 2022).

3.2 Model Implications

To understand the implications of this information structure for expected inflation, it is useful to compare the expectations of a person who observes a non-inflation story to one who sees a story about inflation but prior to seeing the detailed signal s_{it} contained inside that story. Proposition 1 describes what agents learn *just from knowing the topic of their news story.*

Proposition 1. *An agent who observes a non-inflation story expects inflation to be below average, while an agent who observes an inflation story expects inflation to be above average. That is,*

$$E[\hat{\pi}^i_{t+1}|i \in S_t] > \bar{\pi} > E[\hat{\pi}^i_{t+1}|i \notin S_t]. \tag{5}$$

The Proposition, proved in the Appendix, says that, prior to seeing the realization of the signal, the agent who sees that the topic of their story is inflation should raise their inflation expectations above the prior (average) level of inflation, while the agent who sees an unrelated story should lower their expectations below the average. Intuitively, the increasing $\frac{Pr(i \in S_t|\pi_{t+1})}{Pr(i \in S_t)}$ in equation (9) implies that the conditional distribution $f(\pi_{t+1}|i \in S_t)$ always puts strictly more weight on higher values of π_{t+1}, compared to the unconditional $f(\pi_{t+1})$. Conversely, $\frac{Pr(i \notin S_t|\pi_{t+1})}{Pr(i \notin S_t)}$ is decreasing, and shifts weight to lower values of inflation. Because this difference only depends on the topic of the story seen by by the agent, this gap occurs regardless of the particular realization of the signal s_{it} or even the current level of inflation.[9]

To fully evaluate the rational expectations of an agent who sees an inflation story, we must combine their pessimistic "prior" based on Proposition 1 with the information contained in the story, s_{it}, itself. Because our data provide only a qualitative classification of news as "favorable" or "unfavorable", we focus on computing the average expectations depending on whether the signal is below or above average inflation. The difference of favorable news or unfavorable news agents, relative to the "no news" agents, will be one of the key outcomes in our empirical exercises. Proposition 2 provides an general characterization of the effects of seeing good or unfavorable news.

[9] A similar result appears as Proposition 5 in Chahrour et al. (2021).

Proposition 2. *Relative to a "no news" agent, an agent hearing "unfavorable news" increases their inflation expectation by more than an agent hearing "favorable news" decreases theirs. That is,*

$$|E[\hat{\pi}^i_{t+1}|s_{it} \geq \bar{\pi}, i \in S_t] - E[\hat{\pi}^i_{t+1}|i \notin S_t]| > |E[\hat{\pi}^i_{t+1}|s_{it} < \bar{\pi}, i \in S_t] - E[\hat{\pi}^i_{t+1}|i \notin S_t]| \quad (6)$$

Proposition 2 is proved in the Appendix. Intuitively, if the agent sees "favorable news", then the content of the signal counteracts the impact of learning that the story concerns inflation: the fact that story is about inflation increases their expectation of expectation of inflation, while the direct effect of the signal they observe is to lower the expectation.

By contrast, the agent seeing "unfavorable news" experiences two forces that both increase inflation expectations: the fact that the news is about inflation, and the fact that signal itself indicates higher inflation. The contrast, between opposing forces in the first case, and reinforcing forces in the second, leads to the asymmetry in the response of agents to seeing good versus bad inflation news.

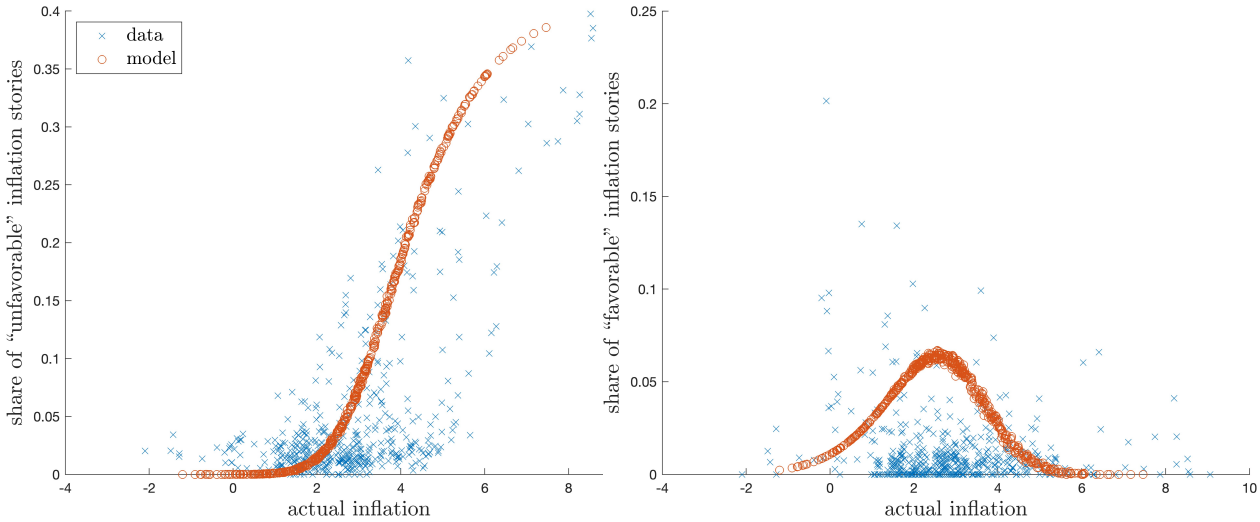
3.3 A Numerical Example

To make the connections between our theory and our empirical findings more concrete, we report some implications from a numerical example of our model. Because of our model's simplicity, our implementation contains very few degrees of freedom and we do not attempt a full quantitative estimation of the model. We assume that $\pi_{t+1} \sim N(\mu_\pi, \sigma_p^2 i)$, with a mean $\mu_\pi = 2.85$ and standard deviation $\sigma_\pi = 1.60$ that are equal to those of realized CPI inflation. The signal noise variance in s_{it} is $\sigma_s^2 = 1$, and that the news selection function $\Phi(\pi_{t+1})$ is 0.4 times the normal CDF with mean parameter of 1 and standard deviation of 1.60. This parameterization for the news selection function approximately aligns the model and data relationships between inflation and the household shares who have heard unfavorable inflation news.

We solve the model numerically under these assumptions by simulating a sample of 300 periods of inflation, and a large panel of 1000 agents/stories in each period. The nonlinear nature of the inference problem faced by agents makes closed-form solutions for expectations difficult to compute. For this reason, we all compute conditional expectations using conditional means in the (large, but finite) simulated sample.

This simple model of the news selection function replicates the key time series facts established in Section 2 above. In particular, the shares of "favorable news" and "unfavorable news" heard by agents in the economy comove with inflation in the simulated data in the same way that they comove with inflation in the actual data. Panel (a) of Figure 2 plots

Figure 2: News selection in the model versus data



(a) Unfavorable news about inflation.

(b) Favorable news about inflation.

Notes: The actual data are monthly from January 1983 to January 2024 and inflation is measured using year-over-year headline CPI inflation. The model data are based on solving the model numerically under the assumptions given in the text by simulating time series of 300 periods of inflation, and a large panel of 1000 agents/stories in each period.

the share of "unfavorable news" against current inflation in both the actual data (blue x's) and in the simulated data (red circles). The actual data are monthly from January 1983 to January 2024 and inflation is measured using year-over-year headline CPI inflation.[10] While the relationship in the data is not perfect, both series reflect a very strong positive slope: higher inflation increases the reporting of unfavorable news about inflation. The figure emphasizes that the real-world data are consistent with a very strong news selection function based on current inflation conditions.

Panel (b) of Figure 2 plots the relationship between the share of "favorable news" in the economy, against the current level of inflation. In contrast to Panel (a), for the arrival of favorable news, the data do not suggest a monotonic relationship: the share of favorable news is low both when inflation is high and when inflation in low, but higher for intermediate values. Though people report hearing few stories about inflation when it is low and when it is high, the reasons are different. When inflation is low, the media give relatively little attention to inflation: few inflation stories appear, but those that do appear tend to be

[10]We focus on the post-Great Inflation period when inflation expectations stabilized.

about lower inflation. When inflation is high, the media give greater attention to inflation, but very few of those stories signal lower inflation. At intermediate values of inflation, news coverage of inflation is also intermediate in quantity, and roughly half of those stores signal lower inflation. The result of these offsetting forces is the hump-shaped relation depicted in the Panel.

The model also replicates, albeit somewhat mechanically, the positive relationship between the share of news coverage that is about inflation and the likelihood that individuals have heard "unfavorable" news about inflation, as depicted in Table 2. This happens because, under the news selection function $\Phi(\cdot)$, higher inflation leads to higher overall inflation coverage as well as higher signals of inflation on average, among those hearing news about inflation.

In addition to these time-series patterns, Proposition 2 describes a clear cross-sectional implications of having an upward sloping news selection function: the expectational impact of the *random observation of an inflation story* should be larger when that story suggests rising inflation. In the next sections, we test this implication using the micro data from the Michigan Survey of Consumer Expectations.

4 Empirical Specification

To identify the causal effects of news, we turn to household-level panel data that includes information on both households' inflation expectations and whether they report hearing inflation news. Specifically, we construct a household panel data set using the micro-data from the University of Michigan's Survey of Consumer Expectations (MSC). A panel is obtainable because a large number of households are sampled twice, six months apart.

We consider variants of the following regression specification:

$$\pi^e_{it} = \beta U_{it} + \gamma F_{it} + \alpha_i + \alpha_t + \delta X_i \cdot t + \zeta Y_{i,t} + \epsilon_{it}, \tag{7}$$

where π^e_{it} is household i's one-year ahead inflation forecast as of month t. U_{it} is an indicator variable equal to 1 if the household reports having heard news of higher prices (that is, unfavorable inflation news) and 0 otherwise. F_{it} is an analogous variable for news of lower prices (that is, hearing favorable inflation news). The sets of parameters α_i and α_t denote individual and time fixed effects, respectively. X_i is a vector of demographic variables. Although household fixed effects, α_i, control for demographics, we allow for the possibility that the effects of demographics on inflation expectations may vary over the six months separating households survey responses by including an interaction between each demographic variable

and time, $X_i \cdot t$. Lastly, in some specifications, we include time-varying household-level variables, $Y_{i,t}$.

To increase efficiency, we estimate this specification in first-differenced form:

$$\Delta\pi^e_{it} = \beta\Delta U_{it} + \gamma\Delta F_{it} + \tilde{\alpha}_t + \delta X_i + \zeta\Delta Y_{i,t} + \varepsilon_{it}, \tag{8}$$

where $\tilde{\alpha}_t = \Delta\alpha_t$. The difference operator, Δ, in equation (8) refers to a six-month difference because households in the Michigan survey are surveyed six months apart (if they are surveyed more than once at all).

The use of household-level panel data offers three key identification advantages over either time-series data or purely cross-sectional data. First, it allows us to absorb time fixed effects. These time fixed effects capture the influence of aggregate inflation and aggregate inflation expectations on inflation-related news coverage.[11] Second, we can utilize the individual-level measures of news described above that are available in the Michigan survey. Third, the micro panel data allows us to deal with a potential household specific bias concern. Specifically, individuals that tend to have high (low) levels of inflation expectations may also tend to seek out inflation news more (less) so than others and, in turn, be more likely to report hearing news of higher prices (and less likely to report hearing news of lower prices). To the extent that this factor is fixed over time, at least over the six months households are in the sample, it will be captured by individual fixed effects and removed by first-differencing.

However, it is possible that this factor is household-*time* specific. That is, households whose inflation expectations have changed over the six months may be more likely to seek out inflation news during that interval and report hearing inflation news.[12] We use an instrumental variables (IV) approach to address this concern. Our IV strategy exploits the fact that households are asked multiple questions about the news. Specifically, households that report having heard any news about business conditions are next asked "what did you hear?" The person conducting the survey classifies the response as one of several topics, including inflation, and as being as favorable or unfavorable. The household is then asked a *second* question, whether they have "heard of any *other* favorable or unfavorable changes in business conditions," the response to which is similarly classified by topic and by favorable vs. unfavorable. For our IV regressions, we instrument for ΔU_{it} with an indicator of whether "higher prices"(that is, unfavorable) was the household's secondary/other response to the questions about economic news. Similarly, we instrument for ΔF_{it} with an indicator of

[11]Figure A1 documents this correlation.

[12]We would expect a positive bias for hearing unfavorable news – households with increasing expectations seek out and find unfavorable news – and a negative bias for hearing favorable news – household with decreasing expectation seek out and find favorable news.

whether "lower prices" (that is, favorable) was the household's secondary response. The identifying assumption is that individuals who answered inflation second were not seeking out inflation news, but rather discovered it by chance.

5 Empirical Results

5.1 Effects of News on Inflation Expectations

The results of estimating equation (8) are shown in Table 3. Column (1) corresponds to the simplest version of the regression, where demographic controls (X_i) and time fixed effects are omitted and it is estimated using Ordinary Least Squares (OLS). Hearing news related to higher prices (that is, unfavorable inflation news) is associated with higher inflation expectations, with an estimated coefficient of 0.57. This coefficient implies that hearing higher inflation news raises inflation expectations by about 0.6 percentage points (relative to a sample mean of around 3%). By contrast, the estimated coefficient on hearing lower (i.e., favorable) inflation news is negative, at -0.41. The coefficients on both lower-prices and higher-prices news are statistically significant at below the 1 percent level.

In columns (2) through (7) we estimate the specification using IV. We first establish that the instruments are relevant. The first stage estimates are provided in Appendix Table A2 and show that the instruments are highly statistically significant, of the expected sign, and yield Cragg-Donald F-statistics far above standard critical values for weak-instrument bias.

As shown in column (2), using IV has little effect on the estimated coefficient on hearing higher-prices news, but it reduces the estimated coefficient on hearing lower-prices news considerably. In both cases, the increase in the standard error is minor. The reduction in the estimated effect of hearing lower-prices news implies a negative OLS bias, consistent with the idea that some households whose inflation expectations fell over their six-month survey window were more likely to seek out and find lower-prices news. Using IV to alleviate such reverse-causality results in an estimated coefficient on lower-prices news that is statistically indistinguishable from zero.

Controlling for inflation (column (3)) yields similar results, though the point estimates on both news variables become slightly closer to zero. In column (4), we replace headline inflation with its major components, core, food, and energy inflation. The results are virtually unchanged. Controlling for all types of inflation as well as all other aggregate factors via time fixed effects pushes both estimates closer to zero, as shown in column (5). The effect of hearing news of higher prices shrinks to 0.4 but remains highly statistically significant, while the effect on hearing news of lower prices shrinks to -0.03, remaining statistically insignif-

Table 3: Baseline Estimates: expected inflation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Heard higher prices	0.573***	0.629***	0.501***	0.489***	0.410***	0.427***	0.414***
	(0.0755)	(0.111)	(0.110)	(0.110)	(0.109)	(0.113)	(0.112)
Heard lower prices	-0.406***	-0.198	-0.116	-0.122	-0.0346	-0.0728	-0.0819
	(0.100)	(0.134)	(0.133)	(0.134)	(0.135)	(0.136)	(0.136)
Headline inflation (y/y)			0.268***				
			(0.0281)				
Core Inflation (y/y)				0.109**			
				(0.0450)			
Food inflation (y/y)				0.115***			
				(0.0228)			
Energy inflation (y/y)				0.0243***			
				(0.00342)			
Pers. Fin. better than last yr							-0.0439
							(0.0338)
Pers. Fin. worse than last yr							0.369***
							(0.0502)
Pers. Fin. better next yr							0.00193
							(0.0389)
Pers. Fin. worse next yr							0.186***
							(0.0400)
Observations	67818	67818	67818	67818	67818	65650	65650
Adjusted R^2	0.002	0.002	0.009	0.010	0.000	0.001	0.003
|higher| = |lower|, p-val	0.185	0.0129	0.0259	0.0348	0.0317	0.0446	0.0581
Time Fixed Effects	No	No	No	No	Yes	Yes	Yes
Demographic Controls	No	No	No	No	No	Yes	Yes
IV	No	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the 6-month change in the household's 1-year ahead inflation expectations. All independent variables are in first-differences (i.e., 6-month changes over the household's survey response) as in equation (8). Two-way clustered standard errors (by household and time) are in parenthesis. * p<0.1, ** p <0.05, *** p < 0.01

icant. In column (6) and (7), we add the demographic controls and time-varying personal finance controls. These additions have little effect on the results. Including the household's 1-year ahead expectation of gas price growth has a negligible effect on the estimates, as shown in Appendix Table A1.[13] The third row at the bottom of the table reports p-values testing the null hypothesis of symmetric news effects – i.e., that the size of the coefficient on heard higher prices is equal to the negative value of the size of the coefficient on heard lower prices. For all of the IV regressions, the very low p-values indicate that one can reject the null hypothesis of symmetry, providing strong evidence of the asymmetric effects of favorable and unfavorable news implied by the theoretical model.

5.2 Comparison with Model

We now ask whether our simple model, loosely calibrated to match the unconditional properties in inflation news heard, gives qualitatively reasonable effects regarding the exposure to news. To do this, we perform the regression specified in equation (7) on model simulated data. Since news arrival is exogenous by assumption in our model, no IV strategy is required to identify the causal effect of exposure to news in our simulated data.[14]

We find that the coefficient $\hat{\beta}^{model} = 1.7$, implying that exposure to news containing information about higher prices increases the model agent's inflation expectations by 1.7 percentage points. On the other hand, we find that $\hat{\gamma}^{model} = -0.1$, implying that exposure to news stories about lower inflation has a very small negative effect on inflation expectations.

Qualitatively, these patterns are a good match to the empirical estimates in our preferred specifications (e.g. Column 6) of Table 3. Like the empirical estimates, our model reveals almost no decrease in inflation expectations when agents read stories about lower inflation. On the other hand, the increase in inflation expectations when reading about high inflation is substantially larger in the model than in the data. Of course the model is stylized in many dimensions, but one likely source of this difference is that fact that real-world inflation is substantially persistent, since variable persistence generally implies smaller updates in response to the same signals.

[13] This survey question is not available for the full sample period—it began in May 2006. Columns (1) and (2) of of table A1 show that the sample decreases from 65,650 observations to 38,730.

[14] Since the model-generated data are also i.i.d., it also makes no difference whether we run the regression in levels or first-differences.

5.3 A Back-of-the Envelope Calculation Over the Pandemic Period

Household inflation expectations reached a peak of 5.4% in March 2022, having increased 3.2 pp from the onset of the pandemic in March 2020. Over the same period, the share of households hearing unfavorable inflation news increased by 40 pp. Although a comprehensive assessment of the role of media coverage in explaining the increase in expectations would require a structural analysis, we can use our estimated coefficients to conduct a back-of-the-envelope calculation, providing a rough estimate of its potential impact based on our findings.

If there were no reverse causality in reports of hearing higher-prices news (consistent with our finding of little to no OLS bias for that variable), applying the causal effect from our preferred specification would imply that, at its peak, news coverage of inflation increased inflation expectations by $0.43 \times 0.4 \approx 0.172$ percentage points per month. This corresponds to roughly 5% of the cumulative increase in inflation expectations during the period. While it is not obvious how to accumulate these effects over time, one natural approach is to assume that they decay at the same rate as individual inflation expectation do on average in our sample.[15] Accumulating in this way, COVID-era media coverage of inflation could explain an increase of 0.67 of a percentage point in inflation expectations, or 21% of the total increase during that period. Hence, this exercise suggests that news media could account for somewhere between 5 and 21% of the increase in aggregate inflation expectations over this period.

6 Conclusion

This study points to an important role of news media in shaping households' inflation expectations. The model we develop shows that news selection leads to an asymmetry: high-inflation news will have a larger impact on expectations than low-inflation news. We estimate the effect of news on expectations using micro panel data, which allows for the inclusion of time and household fixed effects, as well as an IV approach, to address endogeneity issues. We find that hearing news related to higher prices causes expectations to increase by 0.4 pp. In line with the model, hearing news of lower prices has a near-zero effect. A back-of-the-envelope calculation shows that the media can play a substantial role in explaining inflation expectations.

[15] We estimate a AR(1) model coefficient of expectations in the panel of 0.40 over six months, which corresponds to a monthly autocorrelation coefficient of $0.40^{\frac{1}{6}} = 0.86$.

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Online Appendix

A Proofs of propositions

Lemma 1. *Assume that*

1. *$f(x)$ is a distribution;*
2. *$\tilde{f}(x) \equiv g(x)f(x)$ is also distribution; and*
3. *$g(x)$ is a strictly increasing function, with $E_f[g(x)] = 1$.*

Then, $E_{\tilde{f}}[x] > E_f[x]$.

Proof of Lemma 1. Compute

$$\begin{aligned} E_{\tilde{f}}[x] - E_f[x] &= \int xg(x)f(x)dx - \int xf(x)dx \\ &= \int x(g(x)-1)f(x)dx \\ &= E_f[x(g(x)-1)] \\ &> E_f[g(x)-1]E_f[x] \\ &= 0. \end{aligned}$$

The inequality above comes from Jensen's inequality, since both $h(x) = x$ and $m(x) = g(x) - 1$ are strictly increasing in x. □

Proof of Proposition 1. For the purpose of proofs, we drop the $t+1$ subscripts on π_{t+1}. The first inequality in equation (5) follows from applying Bayes theorem,

$$f(\pi|i \in S_t) = \frac{Pr(i \in S_t|\pi)f(\pi)}{Pr(i \notin S_t)}. \tag{9}$$

The ratio $\frac{Pr(i\in S_t|\pi)}{Pr(i\in S_t)} = \frac{\Phi(\pi)}{Pr(i\notin S_t)}$ is strictly increasing since $\Phi(\cdot)$ is strictly increasing. Applying Lemma 1 gives the result. An analogous argument establishes the second inequality. □

Proof of Proposition 2. Using the law of iterated expectations, equation (6) is equivalent to

$$|E[\pi|s_{it} \geq \bar{\pi}, i \in S_t] - E[\pi|i \notin S_t]| > |E[\pi|s_{it} < \bar{\pi}, i \in S_t] - E[\pi|i \notin S_t]| \tag{10}$$

Using the same argument as for Proposition 1, it is immediate that $E[\pi|s_{it} \geq \bar{\pi}, i \in S_t] > E[\pi|s_{it} < \bar{\pi}, i \in S_t]$, so that (10) can be rewritten

$$E[\pi|s_{it} \geq \bar{\pi}, i \in S_t] - E[\pi|s_{it} < \bar{\pi}, i \in S_t] > 2E[\pi|i \notin S_t].$$

Since $E[\pi|i \notin S_t] < \bar{\pi}$, it is sufficient to show

$$E[\pi|s_{it} \geq \bar{\pi}, i \in S_t] - E[\pi|s_{it} < \bar{\pi}, i \in S_t] > 2\bar{\pi}, \tag{11}$$

which is what we now prove.

Using Bayes law, compute

$$f(\pi|s_{it} < \bar{\pi}, i \in S_t) = \frac{Pr(s_{it} < \bar{\pi}|\pi, i \in S_t)Pr(i \in S_t|\pi)f(\pi)}{Pr(s_{it} < \bar{\pi}|i \in S_t)Pr(i \in S_t)}$$

$$f(\pi|s_{it} \geq \bar{\pi}, i \in S_t) = \frac{Pr(s_{it} \geq \bar{\pi}|\pi, i \in S_t)Pr(i \in S_t|\pi)f(\pi)}{Pr(s_{it} \geq \bar{\pi}|i \in S_t)Pr(i \in S_t)}.$$

Using the above expressions, explicitly compute the sum-of-expectations on the left-hand-side of (11), to get

$$E[\pi|s_{it} \geq \bar{\pi}, i \in S_t] - E[\pi|i \in S_t, s_{it} < \bar{\pi}, i \in S_t] = \int \pi g(\pi)h(\pi)f(\pi)d\pi \tag{12}$$

where $g(\pi) \equiv \left(\frac{1-ncdf(\pi-\bar{\pi})}{Pr(s \geq \bar{\pi}|i \in S_t)} + \frac{ncdf(\pi-\bar{\pi})}{Pr(s<\bar{\pi}|i \in S_t)}\right)$, $ncdf(\cdot)$ is the normal cumulative distribution function for variance σ_s^2, and $h(\pi) \equiv \frac{Pr(i \in S_t|\pi)}{Pr(i \in S_t}$. The function $g(\pi)$ is strictly increasing because $Pr(s < \bar{\pi}|i \in S_t) < Pr(s \geq \bar{\pi}|i \in S_t)$, while $h(\pi)$ is increasing by the assumption about the news selection function. Using Jensen's inequality, we have

$$E[\pi|i \in S_t, s_{it} \geq \bar{\pi}] - E[\pi|i \in S_t, s_{it} < \bar{\pi}] > \bar{\pi}E[g(\pi)]E[h(\pi)] = 2\bar{\pi} \tag{13}$$

since $E[g(\pi)] = 2$ and $E[h(\pi)] = 1$ by their definitions. □

B Additional Materials

Figure A1: Inflation expectations versus newspaper coverage of inflation

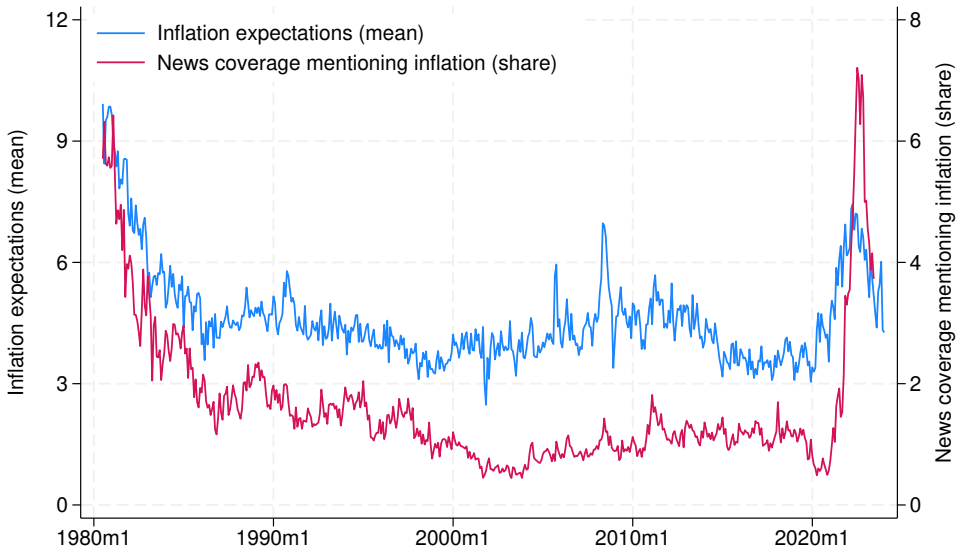
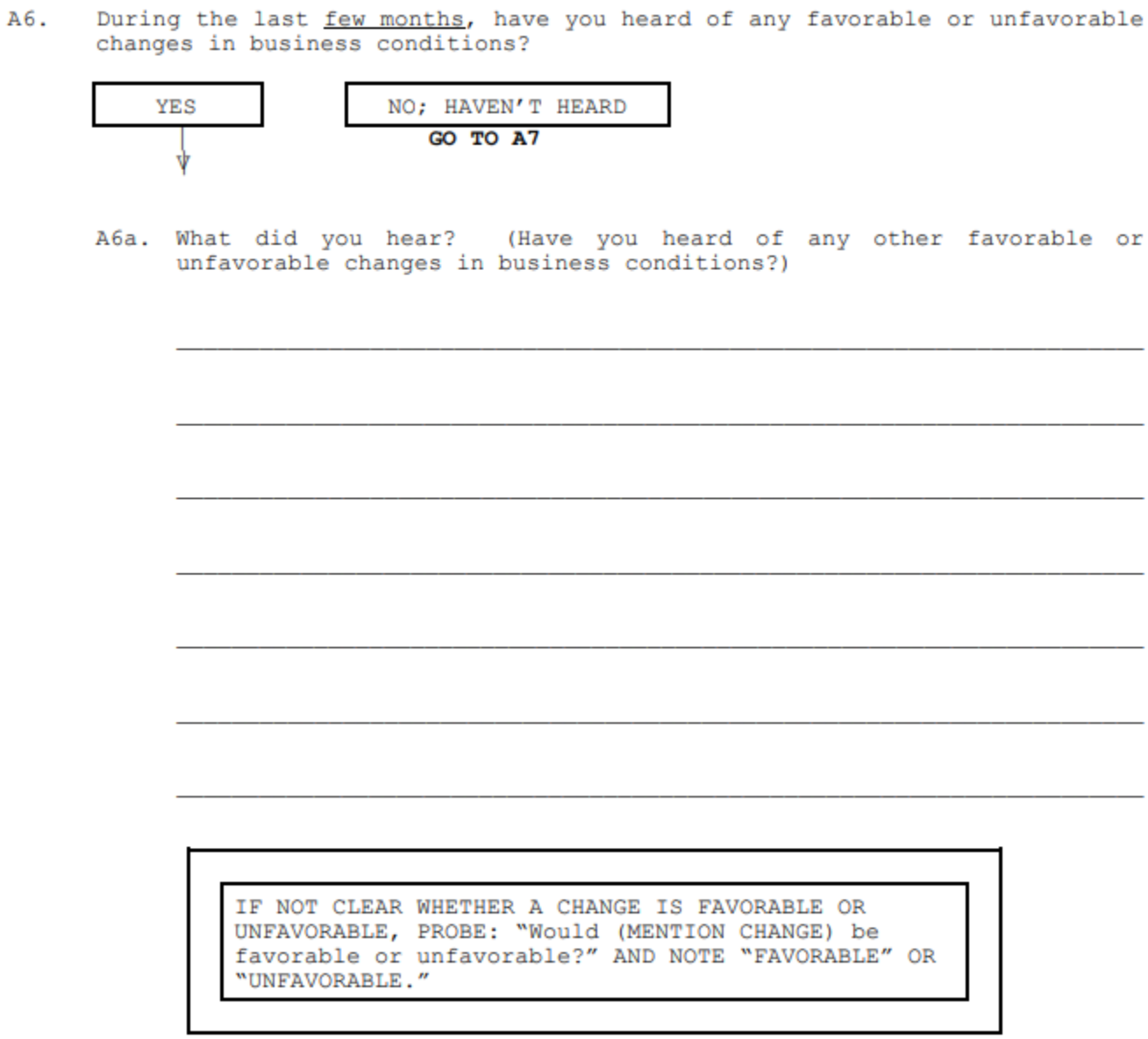


Figure A2: University of Michigan survey question regarding "heard news"



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

YES

NO; HAVEN'T HEARD

GO TO A7

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

IF NOT CLEAR WHETHER A CHANGE IS FAVORABLE OR UNFAVORABLE, PROBE: "Would (MENTION CHANGE) be favorable or unfavorable?" AND NOTE "FAVORABLE" OR "UNFAVORABLE."

Figure A3: University of Michigan survey codebook

NEWS	"During the last few months, have you heard of any favorable or unfavorable changes in business conditions?"	
	NEWS_F	Favorable news
	NEWS_U	Unfavorable news
	NEWS_N	No news
	NEWS_R	FAVORABLE - UNFAVORABLE + 100
NEWSRN	"What did you hear?"	
	NEWSRN_F_GOVT	Favorable news: Government; elections
	NEWSRN_F_EMP	Favorable news: Employment
	NEWSRN_F_DEM	Favorable news: High consumer demand
	NEWSRN_F_PRI	Favorable news: Lower prices
	NEWSRN_F_CRED	Favorable news: Easier credit
	NEWSRN_F_STK	Favorable news: Stock Market
	NEWSRN_F_TRD	Favorable news: Trade deficit
	NEWSRN_U_GOVT	Unfavorable news: Government; Elections
	NEWSRN_U_EMP	Unfavorable news: Unemployment
	NEWSRN_U_DEM	Unfavorable news: Lower consumer demand
	NEWSRN_U_PRI	Unfavorable news: Higher prices
	NEWSRN_U_CRED	Unfavorable news: Tighter credit
	NEWSRN_U_ENG	Unfavorable news: Energy crisis
	NEWSRN_U_STK	Unfavorable news: Stock Market
	NEWSRN_U_TRD	Unfavorable news: Trade deficit
	NEWSRN_NP	NEWSRN_F_PRI - NEWSRN_U_PRI
	NEWSRN_NE	NEWSRN_F_EMP - NEWSRN_U_EMP
	NEWSRN_NG	NEWSRN_F_GOVT - NEWSRN_U_GOVT

Table A1: Baseline Estimates: expected inflation, including gas price survey control

	(1)	(2)	(3)	(4)
Heard higher prices	0.427***	0.390***	0.376***	0.360***
	(0.113)	(0.134)	(0.132)	(0.132)
Heard lower prices	-0.0728	0.0719	0.0706	0.0578
	(0.136)	(0.180)	(0.180)	(0.180)
% Gas Prices up next yr			0.00846***	0.00827***
			(0.000923)	(0.000919)
Pers. Fin. better than last yr				-0.0588
				(0.0474)
Pers. Fin. worse than last yr				0.374***
				(0.0626)
Pers. Fin. better next yr				-0.0748
				(0.0523)
Pers. Fin. worse next yr				0.156***
				(0.0532)
Observations	65650	38730	38730	38730
Adjusted R^2	0.001	0.002	0.006	0.008
|higher| = |lower|, p-val	0.0446	0.0402	0.0471	0.0620
Time Fixed Effects	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes
IV	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable is the 6-month change in the household's 1-year ahead inflation expectations. All independent variables are in first-differences (i.e., 6-month changes over the household's survey response) as in equation (8). Two-way clustered standard errors (by household and time) are in parenthesis. * p<0.1, ** p <0.05, *** p < 0.01

Table A2: First Stage Estimates

	Higher	Lower	Higher	Lower	Higher	Lower
Higher (2nd response)	0.871***	-0.00539*	0.854***	-0.00325	0.851***	-0.00345
	(0.0120)	(0.00275)	(0.0122)	(0.00270)	(0.0124)	(0.00268)
Lower (2nd response)	-0.0311***	0.950***	-0.0222**	0.938***	-0.0224**	0.938***
	(0.0115)	(0.00867)	(0.0107)	(0.00864)	(0.0109)	(0.00874)
Observations	67818	67818	67818	67818	65650	65650
Time Fixed Effects	No	No	Yes	Yes	Yes	Yes
Demographic Controls	No	No	No	No	Yes	Yes
Personal Finance Controls	No	No	No	No	Yes	Yes
Cragg-Donald F-stat	19235	19235	18900	18900	18159	18159

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable is the first-difference (6-month changes) of hearing news of higher prices (columns 1, 3, 5) and lower prices (columns 2, 4, 6) in either the first or second response. Independent variables are also in first-differences (i.e., 6-month changes over the household's survey response) as in equation (8). Two-way clustered standard errors (by household and time) are in parenthesis. * p<0.1, ** p <0.05, *** p < 0.01