Do monetary conditions news at the zero lower bound influence households' expectations and readiness to spend? ☆

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Abstract

We investigate how households update their interest rate and inflation expectations upon hearing monetary condition news, and to what extent this changes their readiness to spend. Using data from the Michigan Survey of Consumers from December 2008 to December 2015, we find 1) the likelihood of higher expected interest rates significantly increases upon hearing news of tighter monetary conditions; 2) monetary condition news is irrelevant for both short- and medium-run inflation expectations; 3) the main information content of this perceived news is most likely from forward guidance and professional forecasts; and 4) households update their readiness to spend on houses, cars and durable goods upon perceiving monetary condition news. Our evidence points toward interest rate expectations as the most likely mediator through which monetary condition news drives households' readiness to spend.

Keywords: News impact, Monetary condition news, Interest rate expectations, Inflation expectations, Readiness to spend, Purchasing intentions
JEL Classification: D83, D84

1. Introduction

How household expectations and purchase plans are formed is crucial for the effectiveness of monetary policy and macroeconomic equilibrium outcomes. It is especially important to understand this when interest rates reach their (effective, and henceforth 'zero') lower bound, as happened during and after the 2008 global financial crisis and the COVID-19 pandemic, when central banks had to resort to unconventional monetary policies such as large-scale asset purchases (LSAPs) and forward guidance to stimulate the economy. These unconventional monetary policies change the monetary conditions in the economy, and upon perceiving these changes, forward-looking households should update their expectations and

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intertemporally reallocate their expenditures.

Most central banks can have a bigger influence on economies' actual monetary conditions than on households' beliefs of such changes. The literature on central bank communications documents significant unawareness of consumers about central bank communications (for a recent survey see Binder (2017)) and even a weak desire to be informed (Van der Cruijsen et al., 2015). Given this unawareness and disinterest, studies have investigated how central banks might improve their communication strategies. For example, Lamla and Vinogradov (2019) find central bank announcement events increase the likelihood of households receiving monetary policy news, and that those better informed households tend to have lower inflation expectations and higher confidence. Further, how the central bank delivers information is important, with simple messages relatable to people's lives improving public comprehension of monetary policy (Bholat et al., 2019). The existence of significant consumer unawareness of changes in monetary policy begs the question of how they update their expectations following *actual* changes in monetary policy, as distinct from how they update their expectations upon *perceiving* news about these changes. However, how successful is monetary policy's impact on consumption depends more on the latter question.

We contribute to the literature by investigating whether and how households' expectations and readiness to spend responded to information perceived about changes in monetary conditions during the zero lower bound period between 2008 to 2015. Monetary condition news is defined as perceived news by households about changes in credit conditions and interest rates. Since the federal funds rate was already at the zero lower bound and the FED's balance sheet expanded to become relatively large in our sample, unconventional monetary policies were likely the major contributor to changes in perceived and actual monetary conditions. The self-reporting nature of monetary condition news avoids the potential contamination from directly linking actual monetary condition changes with households' expectations and readiness to spend, as many actual changes may not be perceived at all by households.

Using individual record data from the Michigan Survey of Consumers (MSC) on US households from December 2008 to December 2015, this paper finds evidence that perceived monetary conditions news had a significant impact on the likelihood of expecting higher interest rates, but there is no evidence of an impact on the likelihood of expecting lower interest rates. This result is robust to a battery of alternative specifications, and when correcting for the potential self-selection bias. We show households neither update their short-run, nor medium-run inflation expectations upon hearing monetary condition news. There is evidence to suggest that the Fed's forward guidance and professional interest rate forecasts are likely to be conveyed through the perceived monetary condition news. We find households update their readiness to spend upon the news, with tightening news reducing the likelihood of it being a good time to purchase houses and durables, and increasing the likelihood of being a bad time for purchasing houses and cars. Our results suggest the likely channel between monetary condition news and the readiness to spend is via consumers' expectations of inter-

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est rates for borrowing.

The conclusions of our paper are related to a growing literature investigating the effect of perceived news on households' expectations. Hearing business conditions news has been shown to increase the chance of households updating their inflation expectations (see Dräger and Lamla (2017) and Pfajfar and Santoro (2013)), and helps to explain the heterogeneity of inflation expectations (Wang et al. (2020)). Upon hearing inflation news, Pfajfar and Santoro (2009) find households from different socioeconomic backgrounds form inflation expectations differently, and exhibit different degrees of information stickiness when updating these expectations. Ehrmann et al. (2017) find inflation news helps to reduce the forecast bias of those households that experience financial difficulties. Our paper contributes to this literature by having a sharpened focus on the role of *monetary conditions* news.

Our paper also relates to an emerging literature documenting that the economy responds far less to forward guidance than theory would predict – the so called the 'forward guidance puzzle' (Del Negro et al., 2015). Possible reasons include incomplete markets, (Hagedorn et al., 2019), that households face uninsurable income risks that give rise to precautionary saving (McKay et al., 2016); heterogeneous interpretations of forward guidance with optimistic interpretations cancelled by pessimistic ones (Andrade et al., 2019); agents not having common knowledge of each other's plan, which introduces rational myopia at the aggregate level that moderates the impact of forward guidance in the future (Angeletos and Lian, 2018); or simply forward guidance that has a limited impact on expectations at long horizons (Campbell et al., 2019). Bilbiie (2019) proposes optimal forward guidance through which the duration of the interest rate remaining at zero becomes a policy choice variable, with a simple recommendation that a central bank "announce a duration of half of the trap's duration times the disruption" as a good approximation. Our results indicate that households' interest rate expectations responded more to forward guidance if the households perceived monetary condition news, implying that household awareness of such policies can be an important factor for the successful conduct of forward guidance policies.

The literature on the effect of news on households' readiness to spend is limited. One channel how news could lead to changes in the readiness to spend is through changes in households' expectations. Burke and Ozdagli (2013) analyze data from the RAND's American Life Panel survey from 2008 to 2012 to see if households' expected inflation and interest rates affected their durable and non-durable goods expenditures. They find that a rise in expected interest rates has a positive (but barely significant) effect on durable expenditures. Ichiue and Nishiguchi (2015) look at survey micro-data for Japan from 2006 to 2013 and find a significantly positive effect of expected inflation on current real spending. Bachmann et al. (2015) obtain the opposite result using the Michigan Survey of Consumers data, with expected inflation reducing the probability of a positive attitude to spending. The results in our paper indicate that monetary condition news affects households' readiness to spend potentially by changing their (borrowing) interest rate expectations rather than their inflation expectations.

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Several papers investigate similar questions using randomized control trials. For example, Coibion et al. (2019) find reading the FOMC statement has a similar effect on household inflation expectations to simply providing information about the Fed's inflation target, and further, reading a news article about the FOMC meeting outcome is half as effective as reading the statement itself. When providing forward guidance of interest rates, information about the short run has a strong effect on households' expectations, while information beyond a year does not (Coibion et al., 2020a). When it comes to policy communications during COVID, Coibion et al. (2020b) find new information about monetary and fiscal policy responses do not alter households' expectations. While it is advantageous to use randomized control trials to pin down how people adjust their interpretation of information in a controlled environment, this does not take account of any information frictions that might arise before receiving the news information (eg: Mankiw et al. (2004)), nor explicitly does it take account of the extent of unawareness of policy communications (Binder, 2017) and any weak desire to be informed (Van der Cruijsen et al., 2015). This could potentially overestimate the impact of monetary policy communications, especially during the zero lower bound period when central banks have had to rely on unconventional monetary policies.

The paper is organized as follows. Section 2 describes the data used and the models applied. Section 3 presents the results on interest rates expectations while Section 4 shows the results for inflation expectations. Section 5 evaluate the sources through which monetary condition news impact on expectations. Section 6 considers readiness to spend on capitals, and Section 7 concludes.

2. The data and the modeling strategy

In this paper we utilise detailed individual household data collected by the University of Michigan's Survey of Consumers (MSC). Since 1978, MSC surveyed around 500 US households each month about their expectations on various economic variables, exposure on business cycle news, readiness to spend, forecast on their own personal finance conditions, and rich information on their demographic characteristics.[1]

2.1. Monetary condition news

The MSC survey asks respondents to indicate whether they have heard news on business conditions, and if yes, the content of the news:

> *During the last few months, have you heard of any favorable or unfavorable changes in business conditions? What did you hear?*

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[1]The data can be found at https://data.sca.isr.umich.edu/

The key news we are interested in this paper is related to monetary conditions: changes in credit conditions and interest rates (in general). Respondents may indicate that they have heard about 'Tight money, interest rates high' or 'Easier money, credit easy to get, low interest rates'[2]. Since the question asks the respondent to recall news on monetary conditions heard earlier, the news is exogenous to the formation of expectations and the readiness to spend. The top panel of Figure 1 shows the fraction of the households who heard monetary conditions news, as well as the timing of the actual Federal Open Market Committee (FOMC) meetings and press conferences. In most cases the FOMC meetings and press conferences capture the increase in the fraction of households hearing monetary conditions news, which is consistent with Lamla and Vinogradov (2019)'s finding that central bank announcement events make people more likely to receive news about monetary policy.
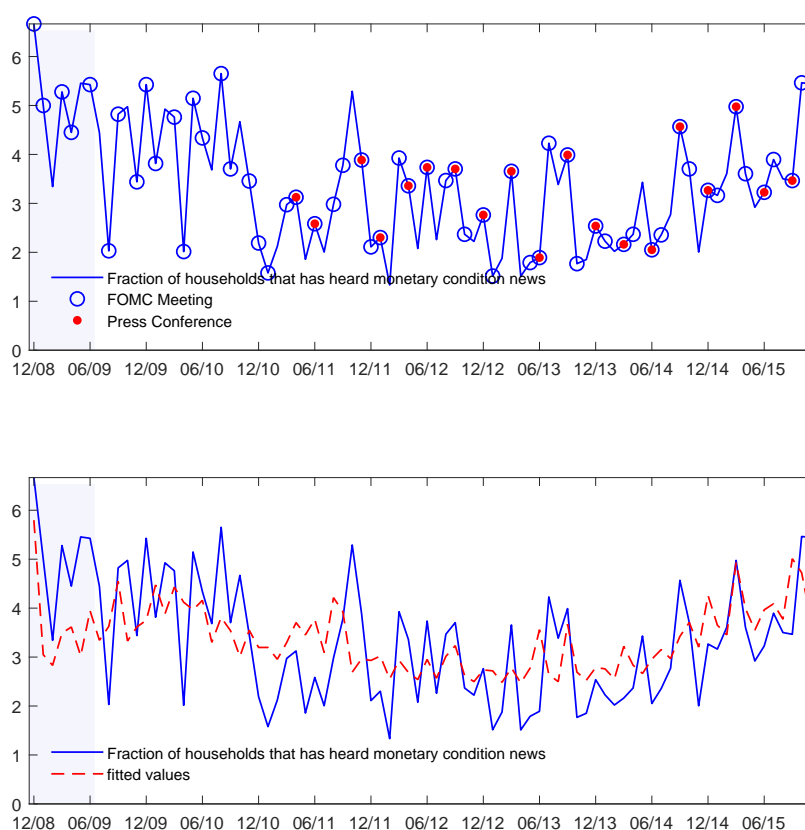

Figure 1: Fraction of households that heard monetary conditions news. The top panel shows the fraction and the timing of FOMC meetings. The lower panel shows the fitted values of the fraction from Equation 1.

Households may derive news from the reporting of changes in various aspects of monetary

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[2]It is worth mentioning that households do not necessarily have the federal funds rate in mind when reporting this news.

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policy themselves, as well as professional interpretations of such policies. We use the absolute value of surprise changes of interest rate (Δi_t), forward guidance (Δfg_t) and asset purchase ($\Delta lsap_t$) as constructed by Swanson (forthcoming) to measure unexpected changes of monetary policies. Professional forecasters' interpretations are approximated by the absolute value of professional forecasters' evaluation of the interest rate path for the next year. Using the Survey of Professional Forecasters (SPF), the evaluation is constructed by the difference between the average forecast of the twelve month ahead T-bill rate and its current value (spf_t). We regress these potential channels that deliver news of changes in monetary conditions against the fraction of households who indicated they had heard monetary condition news (fra_t):

$$fra_t = 2.39 + 0.67\Delta i_t + 0.50\Delta fg_t + 0.17\Delta lsap_t + 1.39spf_t + \epsilon_t^j \qquad (1)$$
$$(0.24)\ (0.68)\qquad (0.27)\qquad\quad (0.29)\qquad\quad (0.37)$$

The equation is estimated using simple OLS, with the estimated coefficients and the associated standard errors reported in Equation 1. Although surprise changes along all three policy dimensions are associated with an increase in the fraction of household hearing monetary condition news, only forward guidance is statistically significant (with a p-value less than 0.1): a one standard deviation surprise increase in forward guidance is associated with 0.5 per cent increase in the fraction. Professional evaluations are also strongly and significantly associated with the fraction, with a 1 per cent change in the forecasted T-bill rate over the next year correlating with a 1.39 per cent increase in the fraction. This parsimonious specification closely tracks the fraction, with a R^2 of 0.92. The lower panel of Figure 1 shows the fitted values from Equation 1 tracking well the actual fraction of hearing monetary condition news. This preliminary analysis of the aggregate data suggests the fraction of households hearing monetary condition news is closely related to changes in forward guidance, as well as to professionals' evaluation of the future path of the short-run interest rate. We will provide a more detailed analysis of these changes, and of the interpretation of the changes in monetary policy on consumer expectations at the individual level in Section 5.

2.2. Inflation and interest rate expectations

MSC asks households to provide their evaluations on key macroeconomic indicators. The question on interest rate expectations is presented to respondents with the following:

> *No one can say for sure, but what do you think will happen to interest rates for borrowing money during the next 12 months–will they go up, stay the same, or go down?*

Households give a qualitative response on their evaluation of the future path of interest rates for borrowing. We construct two indicator variables according to the qualitative evaluation on the future course of interest rates for each household: an expected rate increase indicator

takes the value 1 if households expect these interest rates to increase, and a value 0 if they do not; and an expected rate decrease indicator takes the value 1 if households expect them to decrease and 0 otherwise.

The survey also asks households to provide their qualitative evaluations of both short-term (1 year) and long-term (5-10 years) price paths. The relevant qualitative questions are:

- *During the next 12 months, do you think that prices in general will go up, or go down, or stay where they are now?*
- *What about the outlook for prices over the next 5 to 10 years? Do you think prices will be higher, about the same, or lower, 5 to 10 years from now?*

Similar to interest rates, for both short-term and long-term price paths, we construct two indicators: an expected inflation takes the value 1 if households expect higher prices and 0 if they do not; and an expected deflation takes the value 1 if households expect a lower prices and 0 if they do not. Along with the price paths, households are also asked to provide their point estimates of inflation:

- *By about what percent do you expect prices to go (up/down) on the average, during the next 12 months?*
- *By about what percent per year do you expect prices to go (up/down) on the average, during the next 5 to 10 years?*

We will investigate the impact of monetary condition news on both interest rate and inflation expectations.

2.3. A Bayesian updating model

In this paper we utilise the rotating feature of the dataset. Since July 1980, about 40 per cent of current respondents were re-interviewed one more time, six month later. We follow Kandel and Zilberfarb (1999) in modelling households' expectation formation process as a Bayesian updating process. Each household j forms its expectations according to Bayes' rule:

$$f^j(E|N,X) \propto f^j(E|X)g^j(N|E) \tag{2}$$

where $f^j(E|N,X)$ is the posterior belief on expectation E of household j after observing the monetary condition news N and other past relevant economic signals X. $f^j(E|X)$ is $j's$ prior belief on expectation E, conditional on the vector of past available signal. $g^j(N|E)$ is the likelihood function of the monetary condition news. Assuming normality when forming prior and news signals with mean N, Bayes' rule implies the mean of the posterior is just the weighted average of the prior mean and the likelihood:

$$E_{post}^j = \rho E_{prior}^j + (1-\rho)N \tag{3}$$

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where E_{post}^j and E_{prior}^j are the posterior and prior means respectively. $0 \leq \rho \leq 1$ is the weight attached to the prior belief. Assuming a reporting error e^j that follows a normal distribution with mean 0, we can write Equation 3 as:

$$E_{post}^j = \rho E_{prior}^j + (1 - \rho)N + e^j \tag{4}$$

Equation 4 captures the essence of how agents update their expectations in receiving a news signal on monetary conditions. The differences in households' posterior expectations reflects either they have heterogeneous prior beliefs or heterogeneous information sets, which may arise because of the presence of information rigidities (eg: Mankiw et al. (2004) and Mankiw and Reis (2002)). Owing to the limitation of the self-reported nature of the news data, we do not focus on the heterogeneous interpretation of public information, which is documented in the literature (e.g. Kandel and Zilberfarb (1999) and Lahiri and Sheng (2008)).

2.4. The empirical strategy

The key question we address in this paper is whether perceived monetary conditions news impacted on household expectations at the individual level. We test this hypothesis by estimating equation (5):

$$E_t^j = \alpha + \rho E_{t-1}^j + \beta N_t^j + \phi(E_{t-1}^j \times N_t^j) + D_t^j \theta' + C_t^j \gamma' + \epsilon_t^j \tag{5}$$

where E_t^j is the expectation of the future interest rate or price path of household j after hearing the monetary condition news. E_{t-1}^j is that expectation the last time when the household was surveyed, which broadly captures household j's prior belief. As quantitative inflation point forecasts, E_t^j and E_{t-1}^j are the respective point forecasts. N_t^j is the measure of the perceived monetary condition news. From household responses, we construct a categorical perceived news variable, with a value of 1 if the consumer has heard about 'tight money or interest rates high'; a value of 0 if the consumer has not heard any monetary condition news; and a value of -1 if the consumer has heard about either 'easier money, credit easy to get or low interest rates'. The key parameter of interest is β, which measures the extent to which households update their evaluation on the course of borrowing interest rates and the price path upon hearing monetary condition news. ϕ captures the impact of the cross term between news heard N_t^j and previous expectations E_{t-1}^j. If the household follows Bayesian updating in revising their expectations upon hearing the news, we expect the sign of ϕ to be negative, which implies households place less weight on their priors (the last recorded expectations) if they have perceived the monetary condition news. α is a constant. D_{it} captures demographic variables for households i, including income quartiles (with the first quartile serving as the reference group), age, gender (1 for a female), and the level of education (with the reference group being those respondents who did not attend high school).[3] $C_t \in [ip_{t-1}, u_{t-1}, \pi_{t-1}]$

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[3]High school includes Grade 0-12 with a high school diploma; College includes Grades 13-16 either with or without a college degree; Postgraduate includes Grade 17 and beyond.

collects publicly available macroeconomic data on the previous month's industrial production growth rate, unemployment rate and CPI inflation rate respectively. These variables are important for forming the interest rate and inflation expectations of household j, and inclusion of these variables is intended to capture developments of the macro-economy in a parsimonious way.[4]

3. Results for interest rate expectations

We employed pooled logistic regressions to quantify the impact of monetary conditions news on binary interest rate expectations.[5] Our monthly repeated cross-sectional sample starts in December 2008 and ends in December 2015, containing 31,516 individual records in total. Out of this sample, 10,678 households of current respondents were re-interviewed one more time six month later. This rotating panel structure enables us to identify how households update their expectations upon hearing perceived news on monetary conditions. Out of 10,678 individuals that had been surveyed twice, 476 indicated they had heard about monetary condition news in the second wave.

3.1. Benchmark regressions

The first two columns (Model 1) of Table 1 show how households updated their 1-year ahead borrowing interest rate expectations upon perceiving monetary condition news without any controls. Hearing news of a tightening in monetary conditions increases significantly the probability of expecting an increase in the interest rate by 0.55-fold (=exp(0.44-1)), while this news does not significantly change the likelihood of expecting a lower interest rate. This is not surprising as many of the interest rates encountered by households are correlated with the FED's policy rate, which was already at its zero lower bound and consequently, monetary conditions news was unlikely to affect the likelihood of expecting a lower borrowing interest rate. Our results also indicate a strong persistence in the formation of expectations. A prior expectation of a higher (lower) interest rate increases the likelihood of expecting a higher (lower) interest rate by 1.03 (1.80)-fold. These results show that households to some degree behave like Bayesians: households who have heard about news on monetary conditions place a smaller weight on their past recorded expectations when forming an upward trajectory of future interest rates. This is seen from the parameter of the interaction term between news and prior expectations being negative (-0.47). Since unconventional monetary policies were

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[4]For each month, the survey is typically conducted at the end of the previous month and continued through to the second half of the current month. For example, for August 2018, the survey began on 25 July and ended on 27 August. On the other hand, the month t unemployment rate is typically released at the beginning of the month $t + 1$, and the industrial production and CPI inflation rate data are even later, around mid-month $t + 1$. Therefore the consumer information set with these macroeconomic data at time t only includes those data released at time $t - 1$.

[5]We also conduct multinominal logistic regression on categorical outcomes of interest rate expectation and the results are very similar.

the major contributor to changes in monetary conditions in our sample period, our results are consistent with the signalling channel for households (eg: Melosi (2017)).

Model 2 of Table 1 confirms results in the existing literature that households with different demographic backgrounds disagree on their expectations (for example Bryan and Venkatu (2001a,b), Easaw et al. (2013),Blanchflower and MacCoille (2009) and Jonung (1981)). In the case of higher interest rate expectations, we find that households, who are older, male and with a larger household size tended to have a higher likelihood of expecting higher interest rates. Households who are in the top quartile of the income distribution, are older and male tended to have a lower likelihood of expecting a lower interest rate. These demographic impacts may be because different household types have different consumption bundles, subject to different levels of credit constraints, and are at different life-cycle stages – implying different micro-information sets, and thus forming interest rate expectations differently. Further, different demographic groups may have different expectations formation processes (Pfajfar and Santoro, 2008), which may in part be due to differences in experiences (Madeira and Zafar, 2015). Interestingly, our results do not show education as a significant factor in driving households' interest rate expectations. This does not necessarily imply that financial literacy (Bruine de Bruin et al., 2010) does not matter in forming interest rate expectations, since higher education attainment does not necessarily imply higher financial literacy—as we will show in Model 7 in the subsequent section, this lack of association between education and interest rate expectations is confined only to the zero lower bound period.

Model 3 adds key macroeconomic variables that maybe useful in forming borrowing interest rate expectations. As expected, a higher growth in industrial production, a lower unemployment rate and a higher inflation rate raise the likelihood of expecting a higher interest rate and reduces the likelihood of expecting a lower interest rate. These results are consistent with what a prototype Taylor rule would predict and shows households had some understanding of the Fed's behaviour during the zero lower bound era (Carvalho and Nechio (2014)). [6]

In summary, hearing perceived monetary conditions news significantly impacted the likelihood of expecting a higher borrowing interest rate but was irrelevant for expecting a lower rate during the zero lower bound period. These results imply that unconventional monetary

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[6]We also investigate if the perceived monetary condition news merely reflects the information delivered by the FOMC meeting. We do so by constructing a FOMC meeting dummy that has a value of 1 when there is a meeting in the month and a value of 0 if otherwise. The survey period and meeting dates vary throughout the sample, and the survey for date t+1 often starts in late t. We therefore code the FOMC meeting into t+1 if it happened at or after the 25th of month t. We add the dummy in our benchmark regression Model 3, omitting the variables involving monetary condition news, instead dividing the sample according to whether the respondents heard the monetary condition news. The results show FOMC meetings do not have a significant impact on household interest rate expectations for both households with and without hearing monetary condition news. These results are consistent with the thesis of the paper that household interest rate expectations respond to interpretations of perceived changes in the market conditions.

MODEL:	1		2		3	
Expect interest rate to go:	Up	Down	Up	Down	Up	Down
News: monetary conditions	0.44***	0.10	0.47***	0.01	0.50***	-0.11
Expectation(t-1)	1.03***	1.59***	1.03***	1.54***	0.99***	1.35***
Expectation(t-1) ×						
News: monetary conditions	-0.47**	-0.27	-0.49**	-0.16	-0.47**	0.01
Income quartile: 26-50%			-0.10	-0.18	-0.09	-0.23**
Income quartile: 51-75%			-0.03	-0.14	-0.00	-0.21*
Income quartile: top 25%			-0.06	-0.38***	-0.04	-0.47***
Age			0.00***	-0.02***	0.00**	-0.02***
Gender (female=1)			-0.17***	0.19***	-0.12***	0.13*
Household size			0.05***	-0.04	0.05**	-0.04
Education: high school			-0.05	0.13	-0.07	0.16
Education: college			-0.01	-0.00	-0.07	0.08
Education: postgraduate degrees			0.08	-0.30	-0.02	-0.16
Industrial production rate(t-1)					0.19***	-0.51***
Unemployment rate(t-1)					-0.15***	0.25***
CPI inflation(t-1)					0.30***	-0.52***
Constant	-0.62***	-2.66***	-0.81***	-1.53***	0.42**	-3.50***
Observations	10678	10678	10678	10678	10678	10678

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

All models are estimated using logistic regressions. Model 1 includes only news, the last observed expectations and their cross terms; Model 2 adds households demographic characteristics; and Model 3 adds key macroeconomic variables.

Table 1: Pooled logistic regression results

policies potentially can play an important role in driving households' relevant interest rate expectations, provided they have been perceived by households. Our results are consistent with the literature on the effects of media news on households expectations (eg: Dräger and Lamla (2017), Pfajfar and Santoro (2013) and Wang et al. (2020)), and shows that exposure to news significantly alters households' expectations. Our results are also broadly consistent with the emerging literature investigating the impact of monetary policy communications using randomized trials (eg: Coibion et al. (2019),Coibion et al. (2020a)), who show that consumers' expectations respond to information on monetary policies.

3.2. Alternative specifications

Along with monetary condition news, households may also report they have heard news on major macroeconomic indicators, including inflation, employment and GDP. Although such news may correlate with news on monetary conditions, they may add to households' information sets in forming their notions of the path of future interest rates. Model 4 in Table 2 shows the results when controlling for these additional news items. Adding news on other macroeconomic indicators has only marginal impacts on the estimates for monetary conditions news. The additional news is irrelevant for interest rate expectations. This lack of impact of news about other key macroeconomic indicators is consistent with the idea of

rational inattention Sims (2003): since households have direct exposure to news on monetary conditions and it is costly for them to process this information, they would naturally rely on only the most relevant information in forming their interest rate expectations.

Exploiting the richness of the dataset, we can construct the monetary conditions news according to the content of the news. For each household j, we define two dummy variables: easier perceived monetary conditions that takes a value of 1 when household j hears news on easier money, easier credit or lower interest rates, and 0 otherwise; and, tighter perceived monetary conditions is 1 when household j hear news on either tight money or credit, or high interest rates, and 0 otherwise. Model 5 in Table 2 shows that both easing and tightening news have an impact on the likelihood of households expecting a higher interest rate, but neither changes the likelihood of expecting a lower interest rate. The hearing of easier monetary conditions reduced the likelihood of higher interest rate by 0.33-fold (=1-exp(-0.4)) while hearing tighter monetary condition news increased the likelihood by 0.82-fold(exp(0.6)-1). Although the absolute difference between the impact of easing and tightening news seems large ($|0.6| - |-0.4| = 0.2$), the χ^2 test shows they are not statistically different from each other(p-value = 0.48). This differs from Wang et al. (2020), who find evidence of an asymmetric impact of news in the case of inflation expectations since the 1990s. Our evidence of symmetry may reflect that households in the zero lower bound period placed a similar weight on easing and tightening monetary condition news when it came to forming expectations about when tapering would actually begin.

Not every household follows the development of the economy closely. In our sample, around a third of households claim that they did not hear any business cycle related news.[7] This could be due to (1) it is perceived that there were no significant changes in the economy; (2) there were major changes in the economy but were unlikely to impact on the respondent, so that the household did not recall any news; or (3) the household did not concern itself with the development of the economy, and therefore do not follow news on business cycles. Since we cannot distinguish these possibilities from the data, we re-estimate Model 3 by excluding households who do not hear any business cycle news. Model 6 in Table 2 shows the results, which are similar. Excluding households who did not hear any news hardly changes the estimates for the perceived monetary conditions news, implying the presence of disengaged households is unlikely to significantly change our conclusions.

Model 7 shows the results using all available samples between July 1980 and May 2020 for a comparison.[8] The impact of perceived monetary conditions news on the likelihood of expecting a higher interest rate is largely consistent with the zero lower bound period: hearing a

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[7]During the period between December 2008 and December 2015, 32.34 per cent of respondents says they do not hear any news on business cycles.

[8]We thank the editor for suggesting this interesting comparison. The rotating panel structure was started in July 1980 and hence our sample used began then.

MODEL:	4		5		6		7	
Expect interest rate to go:	Up	Down	Up	Down	Up	Down	Up	Down
News: monetary conditions	0.51***	-0.13			0.50***	-0.12	0.54***	-0.57***
News: easing monetary conditions			-0.40*	0.04				
News: tightening monetary conditions			0.60***	-0.19				
Expectation(t-1)	0.99***	1.35***	0.99***	1.37***	0.96***	1.40***	1.06***	1.29***
Expectation(t-1) ×								
News: monetary conditions	-0.46**	0.02			-0.47**	0.03	0.11	0.21**
Expectation(t-1) ×								
News: easing monetary conditions			0.47	-0.41				
Expectation(t-1) ×								
News: tightening monetary conditions			-0.48	-0.79				
Income quartile: 26-50%	-0.09	-0.23**	-0.09	-0.23**	-0.13	-0.23	-0.04	-0.08*
Income quartile: 51-75%	-0.00	-0.21*	-0.00	-0.21*	-0.05	-0.23	-0.02	-0.06
Income quartile: top 25%	-0.04	-0.46***	-0.04	-0.47***	-0.07	-0.50***	-0.06*	-0.07
Age	0.00**	-0.02***	0.00**	-0.02***	0.01***	-0.02***	0.00	-0.01***
Gender (female=1)	-0.12***	0.12	-0.12***	0.13*	-0.19***	0.06	-0.01	-0.07**
Household size	0.05**	-0.04	0.05**	-0.04	0.04*	-0.06	0.01	-0.01
Education: high school	-0.06	0.16	-0.07	0.16	-0.16	0.46	-0.16***	-0.05
Education: college	-0.07	0.09	-0.08	0.09	-0.09	0.27	-0.09**	-0.08
Education: postgraduate degrees	-0.02	-0.14	-0.03	-0.14	-0.05	0.02	-0.01	-0.17**
Industrial production rate(t-1)	0.19***	-0.50***	0.19***	-0.51***	0.20***	-0.53***	0.13***	-0.15***
Unemployment rate(t-1)	-0.14***	0.24***	-0.15***	0.25***	-0.16***	0.25***	-0.11***	-0.01
CPI inflation(t-1)	0.30***	-0.52***	0.30***	-0.53***	0.31***	-0.55***	0.22***	-0.07
News: employment	0.05	-0.08						
News: GDP	0.23	-0.21						
News: inflation	-0.13	0.06						
Constant	0.36*	-3.46***	0.42**	-3.51***	0.50*	-3.82***	0.19***	-1.46***
Observations	10678	10678	10678	10678	7424	7424	56486	56486

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

Model 4 adds other perceived news heard that are important in determining interest rate expectations. Model 5 decomposes monetary condition news according to the content of the news; Model 6 excludes respondents who do not hear any business cycle news; and Model 7 utilises sample from July 1980 to May 2020 for comparison.

Table 2: Alternative specifications

tightening (easing) conditions increases (reduces) the likelihood by 0.72 fold ($=(\exp(0.54)-1)$. As expected, monetary condition news also impacted on the likelihood of a lower interest rate expectations when the zero lower bound was not binding: hearing easing (tightening) monetary conditions news increased(reduced) the likelihood by 0.77 fold. Our results also suggest that households are not Bayesian when it comes to updating beliefs across this sample: the cross term between the news and the prior–last observed expectation (ϕ) is either insignificant or positively significant, indicating receiving news is reinforcing the prior rather than updating it.[9]

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[9]Including a zero lower bound dummy and a cross term between the dummy and monetary condition

3.3. Self-selection

Exposure to business cycle news may depend on characteristics of households, potentially making the exposure a non-random process. Although this is inevitable given the self-reporting nature of the dataset, we are able to estimate the average treatment effect after accounting for the covariates that predict news exposure using propensity score matching (PSM). PSM attempts to correct the self-selection bias by creating a comparable set of treatment and control groups, according to households' characteristics. Matching is done using a propensity score, which is the probability a household with certain characteristics will be assigned to the treatment group. We use households' income, age, gender, household size and education to create matching sets of treatment and control groups.

Expect interest rate to go	Up	Down
Average Treatment Effect	0.13***	0.00
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$		

Table 3: Propensity Score Matching

PSM estimates the average treatment effect by comparing the difference in the expected values of the treatment group with the matched control group. Table 3 shows that the average treatment effect for expecting the interest rate to go up is 0.14-fold (=exp(0.13)-1), less than the benchmark results but is still significant at 1%. As expected, the average treatment effect for expecting a lower interest rate is neither economically, nor statistically significant. These results imply that the potential presence of self-selection could moderate the effect of news on interest rate expectations quantitatively, but it unlikely to change our results qualitatively.

4. Results for inflation expectations

We consider both short- and long- term household inflation expectations in this section. Since the previous literature (for example Dräger and Lamla (2017) Pfajfar and Santoro (2013) and Wang et al. (2020)) suggests that consumer inflation expectations are heavily influenced by inflation news, we also control for inflation news when considering inflation

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news in Model 7 yields a negative (positive) coefficient of the cross term for higher (lower) interest rate expectations at a 1 per cent significance level. This result indicates the impact of monetary condition news had less impact on interest rate expectations during the zero lower bound period. This may reflect: 1) the information content of the monetary condition news during normal times may also contain actual changes in the interest rate which households may interpolate to form their future expected interest rate paths; and 2) households may have been exposed to changes in monetary conditions that may reflect changes in the market rather than changes in monetary policy. The results are available upon request from the corresponding author.

expectations. For binary inflation and deflation expectations we use logistic regressions, and for point inflation expectations, OLS is used. Table 4 presents the results.

MODEL:	8: 1 year ahead			9: 5-10 years ahead		
Expect	Inflation	Deflation	Rate	Inflation	Deflation	Rate
News: monetary conditions	-0.25	0.01	0.12	-0.63	0.28	0.11
News: inflation	0.80***	-0.99***	0.41*	0.75*	-0.33	0.27
Expectation(t-1)	1.32***	1.45***	0.32***	2.06***	2.27***	0.33***
Expectation(t-1) ×						
News: monetary conditions	0.44	-0.53	0.04	0.46	0.31	0.02
Expectation(t-1) ×						
News: inflation	-0.02	0.58	-0.01	-0.28	-0.81	-0.05
Income quartile: 26-50%	-0.02	-0.11	-0.60***	0.18	-0.07	-0.28***
Income quartile: 51-75%	0.00	-0.23	-0.80***	0.43***	-0.55***	-0.38***
Income quartile: top 25%	-0.14	-0.14	-1.04***	0.64***	-0.65***	-0.46***
Age	0.00***	-0.01***	0.01***	-0.00	-0.00	0.00
Gender (female=1)	0.09*	-0.18	0.18**	0.03	-0.10	0.14***
Household size	0.02	0.03	0.06*	0.02	0.00	0.02
Education: high school	0.07	0.57	-0.24	0.28	-0.10	-0.35*
Education: college	0.05	0.74*	-0.27	0.41**	-0.26	-0.42**
Education: postgraduate degrees	0.00	0.65	-0.46*	0.63***	-0.59*	-0.51**
Industrial production rate(t-1)	0.42***	-0.69***	-0.20***	0.19***	-0.15*	-0.06
Unemployment rate(t-1)	-0.21***	0.26***	0.15***	-0.20***	0.13***	0.10***
CPI inflation(t-1)	0.75***	-0.60***	0.14	0.06	0.33	0.13
Constant	1.70***	-5.52***	1.99***	1.87***	-4.01***	1.88***
Observations	10678	10678	10678	10678	10678	10678

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

Model 8 shows results for 1 year ahead while Model 9 shows for 5-10 years ahead inflation expectations.

Table 4: Pooled regression results for inflation expectations

The results show households do not adjust their inflation expectations upon hearing monetary condition news, neither in the short-term (1 year) nor long-term (5-10 years). This suggests that, while households expected a lengthened period of low interest rates at the zero lower bound, they believed unconventional monetary policies would not have a significant impact on inflation. Consistent with the literature on inflation news (Dräger and Lamla (2017) Pfajfar and Santoro (2013) and Wang et al. (2020)), hearing news on inflation increases the likelihood of expecting short-term inflation, reduces the likelihood of expecting deflation, and increases household short-term point inflation expectation by 0.41 per cent on average. However the inflation news increase the likelihood of expecting long-term inflation (only at 10% significance level), but neither is relevant to the likelihood of expecting a long-term deflation nor the long-term point expectation. This suggests that the long-term inflation rate was more anchored compared to the short-term rate, likely by the low average inflation experience in the previous two decades, and also contributed by the FED's medium-term inflation target (set explicitly at 2% in 2012). None of the cross terms between the prior

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expectations and the two news are significant, suggesting households do not discount prior expectations in forming both short and long run inflation expectations upon receiving news. This strong influence of prior expectations may reflect that households derive their inflation expectation from their living experience about the price of their typical consumption bundle, their past inflation experiences, as well as any anchoring provided by the central bank.

Similar to the results for interest rate expectations, households form inflation expectations differently according to their demographic characteristics. In general richer households are more likely to expect a long-term inflation and less likely to expect a long-term deflation, but expect a lower rate for both short- and long-term inflation. Older households tend to have a higher likelihood to expect inflation, lower likelihood to expect deflation and have a higher expectation of the inflation rate for short-term inflation only. Female households tend to have a higher likelihood to expect an inflation in the short-term, and tend to expect a higher inflation rate for both short- and long-term. Households with higher education attainment tend to have a lower expected rate of inflation, and this is especially the case when forming long-term inflation expectations. Our results are broadly consistent with the literature that documents the role of demographic backgrounds in forming inflation expectations(see for example (Blanchflower and MacCoille, 2009), (Bryan and Venkatu, 2001a,b) and (Easaw et al., 2013)) These demographic impacts may indicate that different household types have different consumption bundles – generating different micro-information and thus forming inflation perceptions based on disparate price signal subsets. Further, different demographic groups may have different expectations formation processes (Pfajfar and Santoro, 2008), different level of financial literacy (Bruine de Bruin et al., 2010) or due to differences in experience Madeira and Zafar (2015).

In general when economic activity is high (higher industrial production growth and lower unemployment rate), households are more likelihood to expect inflation and less likely to expect deflation, both in the short- and long-term – which is consistent with a demand-side view of business cycles. Households also tend to forecast a lower inflation rate in the short-run, possibly because they also expect the Fed to start the tapering process (expecting the interest rate to rise as shown in Table 1) when economic activity is high. So although they are likely to expect an inflation, they forecast a lower inflation rate. The actual inflation rate also matters for their short-run inflation expectation, with a higher actual rate inducing a higher likelihood to expect inflation and lower likelihood to expect deflation, but only for short-run expectations.

In summary, our results do not indicate that the perceived monetary condition news significantly change households' short- and long-run inflation expectations. Combining with the results for interest rates, our results suggest that the monetary condition news works primarily through the interest rate channel.

5. The underlying source content of perceived news

Although households directly state whether they have heard news on credit conditions and interest rates, they do not report on the specific context these *outcomes* were drawn, nor the specific media outlets they heard it from. However, given much of the effort of monetary policy in the zero lower bound period was placed on influencing expectations, we can assess the *common sources* that led to the news households were exposed to. In our sample period there were three main channels that the inferences on credit conditions and interest rate could be drawn: by unconventional monetary policy measures such as forward guidance and quantitative easing; and by professional economists' interpretation of changes in these policies, which often appeared in media outlets. Carroll (2003) documents households may derive information from professional forecasters when forming their own expectations. In this section we analyse the extent to which these sources contribute to household expectations through perceived monetary condition news. Since Section 4 showed monetary condition news did not significantly change households inflation expectations, we focus here on interest rate expectations through the following regression:

$$E_t^j = \alpha + \rho E_{t-1}^j + \beta N_t^j + \phi E_{t-1}^j \times N_t^j + \lambda S_t + \delta S_t \times N_t^j + D_t^j \theta' + C_t^j \gamma' + \epsilon_t^j \qquad (6)$$

where S_t represents one of the three common sources that could lead to news on the monetary conditions that households perceived: 1) a measure of surprise changes of the FED forward guidance as constructed in Swanson (forthcoming); 2) a measure of surprise changes of the FED's Large Scale Assets Purchases (LSAPs) also as constructed by Swanson (forthcoming) to approximate shocks to quantitative easing policies; 3) professional opinion on the one-year-ahead path of interest rate derived from the Survey of Professional Forecasters. The professional forecasters' opinion on future path of interest rates is constructed by taking the difference between the average one-year ahead three-month T-bill rate and its current level.[10] Note that all three sources are aggregate measures and are common across household for any given month. λ measures the average impact of these source on households' interest rate expectations and δ measures the *additional* impact through the perceived monetary condition news. We expect λ and δ to have the same sign, and if households respond *more* when exposed to monetary condition news, δ would be statistically significant. Table 5 below shows the results. We also include the same set of households' demographic characteristics (income, age, gender, household size and education) and key macroeconomic indicators (industrial production growth rate, unemployment rate and CPI inflation rate), but we only report the estimates for the three potential news content items.[11]

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[10]The Survey of Professional Forecaster is a quarterly survey, so we interpolate the missing data by using the last known value.

[11]The results are broadly consistent with the estimates reported for Model 3 and they are available upon request from the authors.

MODEL:	8		9		10		11		12	
Expect interest rate to go:	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down
News: monetary conditions	0.48***	-0.10	0.51***	-0.22	0.43***	-0.17	0.37*	0.12	0.34	-0.06
Expectation(t-1)	1.01***	1.38***	1.01***	1.38***	1.00***	1.38***	1.01***	1.38***	1.01***	1.38***
Expectation(t-1) ×										
News: monetary conditions	-0.43**	0.03	-0.39*	0.07	-0.41*	-0.06	-0.43**	0.03	-0.37*	-0.01
Forward guidance	0.24***	-1.02***	0.23**	-1.02***	0.24***	-1.02***	0.24**	-1.01***	0.23**	-1.01***
Forward guidance ×										
News: monetary conditions			0.68*	-0.61					0.75**	-0.46
LSAPs	-0.61***	0.01	-0.61***	0.01	-0.61***	0.01	-0.61***	0.01	-0.61***	0.01
LSAPs ×										
News: monetary conditions					-0.35	-0.54			-0.46	-0.40
Professional interest rate forecast	0.47***	-0.26**	0.47***	-0.25**	0.47***	-0.26**	0.47***	-0.26**	0.46***	-0.25**
Professional interest rate forecast ×										
News: monetary conditions							0.21	-0.47	0.24	-0.39
Constant	0.29	-3.41***	0.30	-3.41***	0.30	-3.41***	0.29	-3.41***	0.30	-3.41***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10678	10678	10678	10678	10678	10678	10678	10678	10678	10678

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

Model 8 adds surprise changes of a forward guidance measure, an asset purchase measure both constructed by Swanson (forthcoming) and professional forecasters' average forecasts of interest changes for next year. Model 9-11 adds an interaction term between each source and monetary condition news, one at a time. Model 12 jointly consider all three sources of the respective interaction terms.

Table 5: Information content of the perceived monetary condition news

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Model 8 shows that all three sources significantly impact on households' interest rate expectations, except that the asset purchase program (LSAPs) does not significantly change the likelihood of expecting a lower interest rate. Specifically, a one standard deviation positive surprise change of forward guidance (which implies an increase in future interest rates) increases the likelihood of expecting such path by 0.27-fold (exp(0.24)-1), and reduces the likelihood of expecting a lower interest rate by 0.64-fold (1-exp(-0.96)); a one standard deviation increase in LSAPs (increase in money supply) would reduce the likelihood of expecting a higher interest rate by 0.46-fold (1-exp(-0.61)) but do not significantly impact on the likelihood of expecting a lower interest rate; a percentage point increase of the average professional forecast (difference between 12-month ahead forecast and the current level) would increase the likelihood of expecting an increase in interest rate by 0.60-fold (exp(0.47)-1), and reduce the likelihood of expecting a lower interest rate by 0.23-fold (1-exp(-0.26)). These results suggest that households on average updated their expectation according to news on forward guidance and asset purchase programs, in the way intended by the FED. Our results are consistent with Carroll (2003) and suggest there is a link between professional and consumer interest rate expectations. Note that adding any of these three sources has only a marginal impact on the estimate of monetary condition news.

Model 9 builds on Model 8 and shows that the interaction term between monetary condition news and the surprise measure of forward guidance is both economically and statistically significant. A one standard deviation increase in forward guidance will *further* increase the likelihood of expecting a higher interest rate by 0.97-fold (exp(0.68)-1) for households that perceived the monetary condition news. Note that other estimates barely change when the interaction term is added. Model 10 and 11 shows that both LSAPs and professional forecasts do not have an additional impact on households perceived monetary condition news. However, Model 11 shows that the impact of perceived news diminishes significantly (both economically and statistically) once the interaction term between professional forecasts and the perceived news is introduced, albeit this interaction term is neither statistically or economically significant.[12] Model 12 jointly considers all three sources and their respective interaction terms with the perceived news and confirms the results in Models 9-11 still hold.

Although suggestive, our results show that the perceived monetary condition news conveys information on forward guidance and from professional forecasts – but with important distinctions.[13] While perceiving monetary condition news *amplify* the impact of forward

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[12]Replacing professional forecasts with the yield slope as a proxy for prevailing professional interest rate expectation delivers exactly the same qualitative conclusion: the yields slope itself is important in driving the likelihood of expecting a higher interest rate for an average household independent of the impact from monetary condition news; although the interaction term with monetary condition news is insignificant, once adding the cross term wipes out any economic and statistical significance of the monetary condition news.

[13]Romer and Romer (2000) show the Fed has considerable more information on inflation compared to professional forecasters, and this additional information is likely to stem from the additional resources and their commitment to forecasting. These forecasts were likely manifested in the Feds communications on

guidance on interest rate expectations, its own impact on interest rate expectation seems to be derived mainly through professional forecasts. Our result suggests the monetary authorities could maximise the impact of forward guidance by clearly communicating their policy intentions in such a way that aligns with market expectation, particularly for Odyssean-style forward guidance (when a central bank publicly commits monetary policy to a future action) (eg: Campbell et al. (2012)).

6. Does monetary conditions news affect households' readiness to spend?

The fundamental basis of counter-cyclical monetary policy is that policy variations affect monetary conditions in financial markets, which in turn have a significant impact on private sector plans and actions for their expenditures upon perceiving changes in monetary conditions. During the zero lower bound period, the ability of unconventional monetary policy to change private agents' purchasing plan hinged on how much perceived monetary condition changes drove their expectations and how these changes of expectations altered their purchasing plans. Absent any of these links, unconventional monetary policy becomes ineffective. In Section 3 and 4, we investigated how households update their interest rate and inflation expectations upon perceiving monetary condition news. In this section we investigate to what extent these perceived changes in monetary conditions alter households' purchasing plans.

The microeconomic evidence of how expectations might be linked with consumers' purchasing intention is scarce. One exception is Bachmann et al. (2015), who use the same dataset as we do, and find an increase in consumer inflation expectations reduces households' probability of having a positive attitude towards durable spending during the zero bound period – a result that contradicts what a central banker might hope and what most theories would have predicted (eg: Eggertsson and Woodford (2003)). This puzzling result is confirmed by Burke and Ozdagli (2013), but they point out consumers' willingness to purchase a car increases when they expect a higher inflation rate. The insight from standard macroeconomic theories would suggest a positive relationship between inflation expectations and consumption: an increase in inflation expectations reduces real interest rates, *ceteris paribus*, thus stimulating consumption. Although our data does not allow us to precisely pin down households' real interest rate expectations, an important consideration when making large ticket item purchases is the future path of the nominal interest rate. The link would be strong for those purchases requiring longer-term borrowings. In fact, MSC asks respondents to provide the top two reasons why they have indicated their respective intentions for house, car and durable goods purchases. Figure 2 shows the percentage of respondents indicating either

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their future monetary policy intentions, and therefore became a constituent of the monetary condition news heard by households. However, we cannot separately identify to what extent the Feds private information contributed to perceived monetary condition news, nor can we evaluate its impact on the formation of households expectations and readiness to spend.

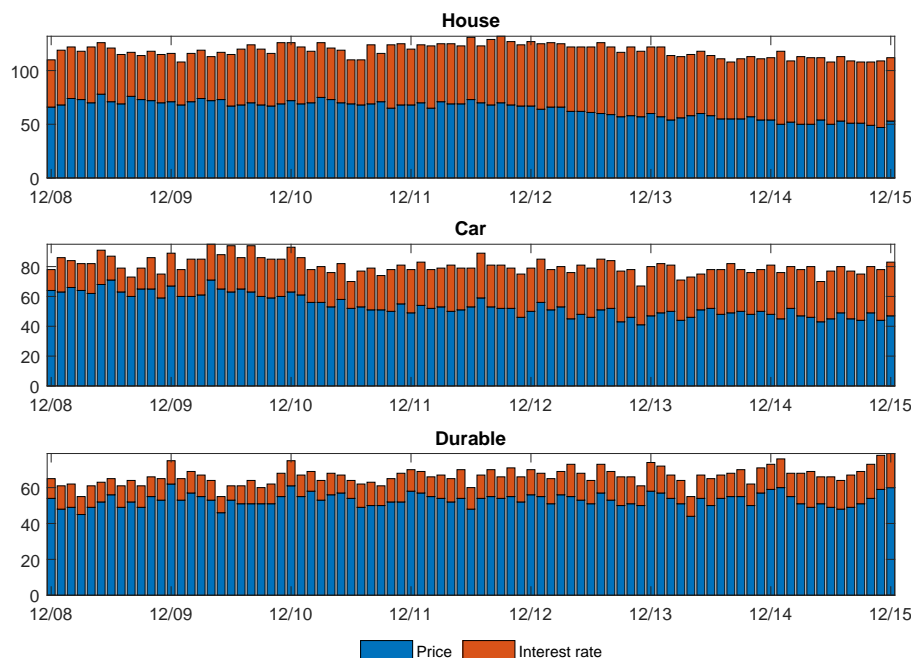prices or interest rates as the main reason for their purchasing intention.[14]

Figure 2: Fraction of households indicating prices and interest rates as the main reason for their purchasing intentions. The fraction can add up more than 100 percent as households provide their top two reasons for a given purchasing intention.

It is expected that interest rate considerations are more important for capital items that involve longer terms of borrowing of funds (houses), and less important for items that require shorter terms (durables). It is interesting to note that interest rate considerations became more important towards the second half of our sample for all capital items, albeit the trend is most significant for houses. Since the measurement of monetary condition news include both interest rates and credit conditions, exposure of monetary condition news could potentially change households' readiness to spend in three ways: 1) forward-looking consumers update their expectation on the future path of nominal interest rates upon hearing the news, and thus the optimal timing for such intertemporal decisions may change accordingly; 2) monetary condition news includes information on any changes in the level of difficulty in obtaining credit, which potentially has an impact on consumer credit at both the intensive and extensive margin; and 3) forward-looking households may adjust their inflation expectations upon hearing the news, which will in turn change their intertemporal decisions. Since our results in Section 3 and 4 suggest that monetary condition news significantly change consumers' interest rate expectations, we expect the first two channels played a major role in

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[14]Households may indicate a range of reasons: 52 categories for houses, 76 categories for durable and 42 categories for durables.

transmitting the impact. Nevertheless it is an empirical question about the extent monetary condition news drives households' purchasing intentions.

Each month, the MSC survey asks households about their purchasing intentions on durable goods, cars and houses. The relevant survey questions are:

- *Generally speaking, do you think now is a good or a bad time for people to buy major household items?*

- *Speaking now of the automobile market – do you think the next 12 months or so will be a good time or a bad time to buy a vehicle, such as a car, pickup, van, or sport utility vehicle?*

- *Generally speaking, do you think now is a good time or a bad time to buy a house?*

The respondents indicate whether they think it is a good, bad or indifferent time to make the respective purchase. From the qualitative responses, we construct two indicator variables for each item: a good time to purchase indicator that has a value of 1 for households thinking it is a good time and 0 otherwise; and a bad time indicator that has a value of 1 for households thinking it is a bad time to make the purchase and 0 otherwise. We elicit the impact of monetary condition news on these purchasing decisions through the following econometric model:

$$P_t^j = \alpha + \rho P_{t-1}^j + \beta N_t^j + \phi P_{t-1}^j \times N_t^j + D_t^j \theta' + C_t^j \gamma' + \epsilon_t^j \tag{7}$$

where P_t^j is respective the purchasing indicator for home, car and durable consumptions at time t where P_{t-1}^j is the last observed purchasing intention respectively. β measures the impact of monetary condition news on purchasing intentions, and we expect ϕ to be negative as households would place more weight on their prior attitude if they do not perceive any news. We run logistic regressions for each indicator across all three items, conditional on the same set of control variables as used in our benchmark Model 3. The long-, medium-, and short-term nature of borrowing to fund, respectively, houses, cars and durable goods is borne out in the results in Table 6.

Hearing tighter (easier) monetary condition news reduces (increases) the likelihood of households responding that it is a good time to purchase houses and increases(reduces) the likelihood of reporting a bad time (Model 13). The result is consistent with the results in Rahal (2016), who finds house prices and residential investments increased after an unconventional monetary policy shock for eight OECD countries including the US. For car and durable purchases, tighter news significantly increase the likelihood of declaring the time is bad (Model 14), and reduces the likelihood of reporting a bad time for durables (Model 15). Our results also suggests a significant persistence in the purchasing intention. The majority of the intersection terms are insignificant except one case (good time for durables), which shows an opposite sign compared to how a Bayesian learner should behave, indicating households do not update their purchasing intention in a way consistent with Bayesian learning. In

MODEL:	13		14		15	
Readiness to spend on:	Houses		Cars		Durables	
	Good time	Bad time	Good time	Bad time	Good time	Bad time
News: monetary conditions	-0.66**	0.39**	-0.10	0.34**	-0.41**	0.11
Readiness to spend(t-1)	2.06***	2.07***	1.43***	1.43***	1.48***	1.53***
Readiness to spend(t-1) ×						
News: monetary conditions	0.13	0.23	-0.21	-0.24	0.41*	0.31
Income quartile: 26-50%	0.27***	-0.27***	0.18**	-0.18**	0.12	-0.15**
Income quartile: 51-75%	0.45***	-0.46***	0.32***	-0.34***	0.19**	-0.23***
Income quartile: top 25%	0.72***	-0.75***	0.48***	-0.50***	0.35***	-0.40***
Age	0.00	-0.00	0.00	-0.00	0.00	-0.00
Gender (female=1)	-0.10*	0.09	-0.12**	0.11**	-0.28***	0.28***
Household size	-0.04*	0.05*	-0.06***	0.05***	-0.06***	0.06***
Education: high school	0.43***	-0.47***	0.18	-0.20	0.24*	-0.25*
Education: college	0.63***	-0.65***	0.27**	-0.32**	0.23*	-0.24*
Education: postgraduate degrees	0.68***	-0.75***	0.30**	-0.35**	0.32**	-0.37**
Industrial production rate(t-1)	-0.04	0.05	-0.04	0.03	0.17***	-0.17***
Unemployment rate(t-1)	-0.02	0.01	-0.09***	0.09***	-0.16***	0.17***
CPI inflation(t-1)	0.10	-0.12	-0.08	0.10	0.00	-0.01
Constant	-0.55**	-1.46***	0.34	-1.77***	1.17***	-2.61***
Observations	10678	10678	10678	10678	10678	10678

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

Table 6: Purchasing intention

general, richer, male, more educated and smaller households tend to report a good time and are less likely to report a bad time to make a purchase across all three purchase categories, while age is irrelevant for purchasing intentions. Interestingly, current realised CPI inflation rates do not drive households' purchasing intentions at all while higher unemployment rates lower (increase) the likelihood of reporting a good (bad) time to purchase cars and durables. Industrial production seems to only matter for durables, with a higher growth rate increasing (decreasing) the likelihood of reporting a good (bad) time to make such purchases.

Overall, our results suggest that households change their readiness to spend upon perceiving monetary condition news, although we do not directly observe whether these changes in their readiness to spend translate into actual changes in households consumption.

7. Conclusions

Using individual household data from the Michigan Survey of Consumers, we test whether perceived news on monetary conditions impacted on household expectations of borrowing interest rates and inflation and their readiness to spend on capital items during the zero lower bound period of the global financial crisis between December 2008 to December 2015.

Our results suggest that perceiving news on tighter (easier) monetary conditions significantly increased (reduced) the likelihood of expecting a higher borrowing interest rate, but neither affect the likelihood of expecting a lower interest rate, nor on the likelihood of both short and medium run inflation forecasts. Our results provide evidence that the information content of the perceived monetary condition news was likely due to the Fed's forward guidance and professional forecasts of future short term interest rates.

There is significant evidence that monetary conditions news changed households' readiness to spend on capital items. However, the effect depended on the type of purchase. In general, receiving tightening monetary condition news reduced the likelihood of reporting it was a good time to purchase houses and durables, and increased the likelihood of reporting it was a bad time to purchase houses and cars. Since monetary condition news does not change households' inflation expectations, our results point towards interest rate expectations as the most likely channel through which the news impacts on households' readiness to spend.

Due to the restricted availability of data, our measure of monetary conditions news is not a perfect reflection of exogenous monetary policy variations. Also we have used only information on households' readiness to spend, not their actual consumption behaviour. Should the relevant data become available, future research could investigate whether these changes in interest rate expectations upon perceiving monetary conditions news translate into changes in actual household expenditures.

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