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Do firm expectations respond to monetary policy announcements? ☆

Federico Di Pace [a,*], Giacomo Mangiante [b], Riccardo M. Masolo [c]

[a] Bank of England, Threadneedle St, London EC2R 8AH, United Kingdom
[b] Bank of Italy, Rome, Italy
[c] Università Cattolica del Sacro Cuore, Milan, Italy

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ABSTRACT

This paper investigates whether UK firms' price growth expectations respond to the Bank of England (BoE) monetary policy announcements and explores the underlying mechanism. Using microdata from the UK Decision Maker Panel survey, we isolate the exogenous component of the monetary policy decisions by comparing firms' responses filed before and after BoE announcements. Guided by a model of dispersed information, our analysis suggests that firms respond to monetary policy announcements but are, overall, not as informed and sophisticated as financial market participants. Firms' price expectations respond to actual interest rate changes, as well as to bank rate changes purged from their systematic component, but not to high-frequency surprises. The left tail of their expected price change distribution is particularly sensitive to monetary policy announcements. Furthermore, we unveil significant non-linear effects, with changes in interest rates of 50 basis points being mostly responsible for revisions in expectations. This implies that the recent tightening cycle was effective in shifting firms' expectations primarily at its peak when a sequence of consecutive large rate hikes was implemented. We also show that UK news coverage of the BoE's activities increases following policy rate changes, highlighting the media's crucial role in shaping public expectations.

1. Introduction

Central banks have traditionally focused their communication efforts on financial market participants (e.g., Blinder et al., 2008), who closely monitor and react to monetary policy decisions (e.g., Kuttner, 2001). However, recent years have seen a notable shift towards engaging with the general public (e.g., Blinder et al., 2022). Reaching out to firms, in particular, is essential for central banks, as they set prices and thus ultimately determine inflation. However, communicating with households and firms requires additional effort from central banks, as "households and firms have a low desire to be informed about monetary policy and are relatively inattentive to news about it". (Blinder et al., 2022, p. 8).

In this paper, we take advantage of detailed survey data to assess whether UK firms' price growth expectations respond to Bank of England (BoE) monetary policy announcements and, if so, how. We face two key empirical challenges. First, we must isolate the impact of monetary policy announcements from other concurrent news and events. Second, we need to accommodate the potentially many different ways in which firms gather information about monetary policy and process it.

☆ Disclaimer: The views expressed here are those of the authors alone and do not necessarily represent the views of the Bank of England, the Bank of Italy or any of their policy committees. *Declaration of interest:* Federico Di Pace is currently employed by Bank of England. Giacomo Mangiante is currently employed by Banca d'Italia and has been an intern at Bank of England between 2021 and 2022. Riccardo M. Masolo has been employed by Bank of England until July 31 2022.

* Corresponding author.
E-mail addresses: federico.dipace@bankofengland.co.uk (F. Di Pace), mangiante.giacomo@gmail.com (G. Mangiante), riccardomaria.masolo@unicatt.it (R.M. Masolo).

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To overcome the first challenge, we rely on the Decision Maker Panel (DMP) survey. The survey elicits the entire distribution of UK firms' expected price changes, enabling us to study different moments of their pricing plans. To disentangle the effects of monetary policy announcements, we exploit the timing of firms' responses to the survey questions. By comparing responses filed in the days preceding a Monetary Policy Committee (MPC) meeting to those submitted immediately afterward, we can capture the exogenous effect of the announcement.

Our second challenge concerns the information acquisition and processing of UK firms. We first present a simple theoretical model to guide our intuition regarding what constitutes a monetary policy shock to firms. Our model is a variation of the imperfect information model proposed by Woodford (2003). The model is very flexible and can accommodate a wide range of expectation formation mechanisms. Following (Singh and Mitra, 2022), we consider two extreme cases of expectation formation processes: firms can either be naive or sophisticated. Naive firms do not incorporate any information between subsequent monetary policy announcements and form expectations in a purely backward-looking fashion, largely ignoring the structure of the economy. For naive firms, a monetary policy shock is the actual change in the monetary policy rate. Conversely, sophisticated firms are highly informed and rational. They acquire and act on all available information, so the unpredictable component of the change in monetary policy rates represents a monetary policy shock for them. Empirically, this amounts to measuring monetary policy shocks with high-frequency market surprises (e.g., Kuttner, 2001).

In reality, firms' expectation formation processes can fall between these two extremes. Therefore, we also consider an intermediate scenario in which firms form expectations about monetary policy based on publicly available information about the main macroeconomic variables. To them, a monetary policy shock is represented by bank rate changes purged from the systematic component of monetary policy, in the tradition of Romer and Romer (2004) and Cloyne and Hürtgen (2016).

Our first contribution documents that firms significantly revise the median and the left tail of their expected price growth distribution following a bank rate change. They do so in the direction predicted by standard macroeconomic theory. The average responses are more precisely estimated when we clean the policy rate changes from the systematic component of monetary policy — in the tradition of Romer and Romer (2004). Conversely, firm pricing plans do not react to monetary policy shocks measured using high-frequency surprises, a robust finding across various refined proxies regardless of their size or sign. Taken together, these results suggest that firms indeed respond to monetary policy interventions but they do so in a way that is peculiar to them. They appear not to be as informed and sophisticated as financial markets. It is thus important for policymakers to understand how their announcements are perceived by firms and to design their communication to effectively shape their expectations (Coibion et al., 2020).[1]

Our second contribution demonstrates that the effects of actual bank rate changes on firms' expectations are highly non-linear with respect to the size of the adjustments. Firms appear to respond primarily to bank rate changes of 50 basis points or more. This non-linearity has significant implications, especially considering the BoE's recent tightening cycle. We find that it was the sequence of large (i.e., 50 basis points or more) policy rate changes, in late 2022 and early 2023, that had the most significant impact on firms' expectations — together with the policy intervention in March 2020, at the onset of the COVID pandemic.

The third contribution delves into the sources of information that are most likely to shape firms' expectations. Drawing from insights in the existing literature (e.g., Pinter and Kočenda, 2023), we investigate the role of news coverage in this context. Leveraging data on UK news coverage of the BoE activities from GDELT, we examine the media attention garnered by monetary policy announcements.[2] We find that press coverage strongly reacts to the BoE announcements only when monetary policy shocks are proxied by actual bank rate changes but not by high-frequency surprises, which can help us rationalize why firms, who tend to learn about monetary policy through news coverage (Pinter and Kočenda, 2023), respond only to interest rate adjustments. This also suggests that news outlets play an important role in the process by which central banks reach out to the general public.

Our results indicate that firms' price expectations do respond to monetary policy announcements, but that firms are not as informed and sophisticated as financial markets. We also find significant non-linearities in their responses, which can affect the transmission of monetary policy. Overall, our findings suggest that it is important for policymakers to understand how their announcements are perceived and to design their communication to effectively shape the expectations of different agents (Coibion et al., 2020). Media coverage of policy communications can enhance its effectiveness, foster a better comprehension of the policy goals, and reduce differences in perceptions across economic agents.

Related literature. This paper contributes to three strands of research.

First, our results complement the empirical evidence on the effects of monetary policy announcements on expectations using event studies. Previous analyses have primarily focused on households. For example, Lamla and Vinogradov (2019) find that FOMC announcements do not change average beliefs but increase awareness of central bank policies. Rast (2022) shows significant adjustments in household inflation expectations following policy rate announcements, unlike forward guidance and quantitative easing. De Fiore et al. (2022) report that only interest rate expectations are affected by FOMC meetings. Binder et al. (2022) evaluate household inflation expectation responses to FOMC announcements and macroeconomic news. Similarly, Lewis et al. (2020) demonstrate that changes in the federal funds target rate significantly and instantaneously affect economic confidence, while Claus and Nguyen (2020) document revisions in expectations about economic conditions following a monetary policy shock.

[1] Using a Bayesian VAR with micro-funded sign restrictions, we confirm that the effect of monetary policy announcements on firms' expectations translates into actual different pricing decisions at the aggregate level.

[2] GDELT (https://www.gdeltproject.org/about.html) is an open database monitoring news from around the world, which includes traditional newspapers as well as other news outlets, such as the BBC webpage.

More closely related to our study, Enders et al. (2019), Bottone and Rosolia (2019), and Ferrando and Forti Grazzini (2023) examine firm expectations. Enders et al. (2019) find that own price expectations of German firms adjust non-linearly to monetary policy surprises by the European Central Bank (ECB). Bottone and Rosolia (2019) show that Italian firms' inflation expectations negatively correlate with unanticipated market rate changes, though their pricing plans are unaffected. Ferrando and Forti Grazzini (2023) document that firms' bank loan expectations react to monetary policy shocks. We contribute to this strand of the literature by showing that firms adjust their price expectations in response to bank rate changes but not to high-frequency surprises. By leveraging the comprehensive nature of the DMP data, we show that the left tail of the distribution is especially sensitive to these announcements. We also find that firms respond primarily to sizable rate changes (50 basis points or more).

Second, we add to the body of research on how different agents form expectations and respond to shocks. Reis (2020) identifies large business-cycle fluctuations and disagreement in market prices and people's long-run inflation expectations. Coibion and Gorodnichenko (2012) reject the hypothesis of full information for consumers, firms, central bankers, and professional forecasters based on survey responses to aggregate shocks. Andre et al. (2022) find wide dispersion in beliefs about the effects of shocks among households and experts. Candia et al. (2024) show that U.S. managers have poorly anchored inflation expectations. Mikosch et al. (2024) highlight differences in responses to exchange rate uncertainty between firms and households. Household expectations have been extensively studied (e.g., Coibion and Gorodnichenko, 2012, 2015; Axelrod et al., 2018; Coibion et al., 2019), whereas evidence on firm expectations is more limited. We extend this literature by examining whether firms' expectation formation is better characterized as naive or sophisticated. Our findings suggest that firms are not as sophisticated as financial market participants, but they rely on publicly available information to form their expectations about monetary policy.

Third, our paper relates to the literature on the role of media in conveying information to the public about monetary policy. Television and newspapers have emerged as the primary sources of economic policy information for households, particularly regarding monetary policy (e.g., Blinder and Krueger, 2004; van der Cruijsen et al., 2015; Conrad et al., 2022). Berger et al. (2011) find that ECB decisions are reported less favorably if unanticipated and in high-inflation environments. Lamla and Vinogradov (2019, 2021) report negligible effects of monetary policy announcements on consumer perceptions and expectations but increased news awareness. Böhm et al. (2012) show that Czech National Bank decisions that surprise financial markets are not reported negatively by the media. Conrad et al. (2022) find that most households get ECB information through traditional media. Pinter and Kočenda (2023) demonstrate that French firms' and households' expectations react to central bank announcements when the media response is considered. We show that press coverage of the BoE intensifies following bank rate changes, while not responding to high-frequency surprises. This aligns with our finding that firms react to bank rate changes reported in the news, but not to unexpected high-frequency changes that are not covered.

The rest of the paper is organized as follows. Section 2 introduces a simple theoretical framework that illustrates how our empirical identification strategy can be understood in the context of a simple dispersed information model. In Section 3 we describe the DMP data and the measures of monetary policy shocks. Section 4 presents our identification scheme and estimation strategy. Section 5 presents the main empirical findings. In Section 6 we perform a battery of robustness checks. Section 7 concludes.

2. An organizing framework

There are two key ingredients of our empirical analysis. The first is information. Firms can adjust their expectations to the extent they receive some news (announcement) regarding an underlying monetary policy shock. The second is the expectation formation process, i.e., how they use the information at their disposal to form their expectations about the state of the economy. Our survey data gives us direct access to firms' subjective expectations. We complement them with empirical measures of monetary policy shocks that capture different levels of information and sophistication – i.e., rationality in the use of information – by firms. This section is devoted to the description of a simple theoretical model that illustrates the interplay between these dimensions of our empirical exercise.

Our setup is a variation of the dispersed-information firm pricing model first proposed by Woodford (2003). The economy comprises of a continuum of monopolistically competitive firms $h \in [0, 1]$. Prices are flexible but firms are subject to information frictions and a degree of strategic complementarity, as a result of monopolistic competition. We consider the linearized equilibrium conditions and assume that shocks are Gaussian for simplicity.

Each period corresponds to a month. We break each month into two sub-periods, or phases. The first, labeled $\mathcal{C}$, covers the period before the monetary policy announcement. $\mathcal{C}$ stands for *control*, because firms filing survey responses during this time form our control group. The second phase, denoted as $\mathcal{T}$, follows the announcement. Firms responding during this phase are part of the treatment group. For consistency, we assume that firms set their prices in the second phase, irrespective of when they file the survey answers. This assumption implies that firms are free to adjust prices throughout the period of interest, but has otherwise no impact in our analysis.

We define $\mathcal{I}_{h,t,\mathcal{C}}$ the information set of firm h, in the first phase of period t. It typically includes the entire history of past signals, including those related to previous monetary policy announcements. We do not need to be specific with regards to $\mathcal{I}_{h,t,\mathcal{C}}$ in the context of our model. Its composition is an empirical question for us. What is central to our identification strategy is the assumption that $\mathcal{I}_{h,t,\mathcal{T}} = \mathcal{I}_{h,t,\mathcal{C}} \cup s_{h,t}$, i.e., the information set of firm h in the treated phase of the period differs from that in the control phase exclusively by the monetary-policy related signal $s_{h,t}$.[3] Equally important for our analysis is the assumption that firms are randomly

[3] This constraint guides our empirical analysis regarding the selection of control and treatment groups, i.e., the number of days around monetary policy announcements we sample our firms over.

assigned to the two groups, meaning that the timing of their survey responses within the month is random. Formally, this amounts to maintaining that $f(h|h \in C) = f(h|h \in \mathcal{T}) = f(h)$, where $f(\cdot)$ represents the probability density function of the cross-section of firms.

To a first order, the pricing decision of a firm can be described as $p_{h,t} = \mathbb{E}_{h,t,\mathcal{T}} p_t + \alpha \mathbb{E}_{h,t,\mathcal{T}} y_t$, where $p_{h,t}$ is the price set by firm h in period t, p_t is the aggregate price level, and y_t the level of aggregate demand. Here α, with $0 < \alpha < 1$, measures the degree of strategic complementarity. $\mathbb{E}_{h,t,C}$ and $\mathbb{E}_{h,t,\mathcal{T}}$ denote the firm h *subjective* expectations in the two sub-periods.

For tractability, aggregate demand is typically modeled as an exogenous process in these models (Woodford, 2003). We refine this assumption to underscore the influence of the policy rate on aggregate demand. We posit a standard quantity theory of money equation and maintain an inverse relationship between money m_t and the policy rate i_t. We express aggregate nominal demand in log-linear and detrended terms as $-\eta i_t + v_t = p_t + y_t$, where $-\eta$ is the elasticity of money to interest rates and v_t an exogenous process for velocity capturing aggregate demand disturbances.

We do not need to be specific about the policy rule, but only to assume that it can ultimately be expressed as a linear function of monetary policy and velocity shocks.[4] The resulting pricing equation has the aggregate price index as the sole endogenous variable:

$$p_{h,t} = (1-\alpha)\,\mathbb{E}_{h,t,\mathcal{T}} p_t - \alpha \mathbb{E}_{h,t,\mathcal{T}} \left(\eta i_t - v_t\right) = \gamma \mathbb{E}_{h,t,\mathcal{T}} \underline{x}_t, \tag{1}$$

where $\gamma \equiv \begin{bmatrix} -\eta\alpha & \alpha & (1-\alpha) \end{bmatrix}$ is a vector of structural parameters and $\underline{x}_t \equiv \begin{bmatrix} i_t & v_t & p_t \end{bmatrix}'$ the state vector of this economy. Under the assumption that v_t is AR(1), we can describe the law of motion for the state vector as $\underline{x}_t = M\underline{x}_{t-1} + \mu \underline{u}_t$, where $\underline{u}_t$ contains the innovations to monetary policy and money velocity.[5]

We model the monetary policy signal $s_{h,t}$ as a linear function of the state of the economy plus some idiosyncratic noise $\varepsilon_{h,t}$: $s_{h,t} = \phi \underline{x}_t + \varepsilon_{h,t}$. The exact nature and informational content of $s_{h,t}$ is the object of our empirical analysis. For modeling purposes, any noisy signal related to the underlying monetary policy decision, is a valid candidate. The noisy component of the signal accounts for the fact that the different firm executives learn about monetary policy decisions from different news sources, as well as for any level of inattention on their part.[6]

The survey questions used in the analysis report the expected price distribution for firm h over the forthcoming year. We define the model counterpart to the survey response as the mean/median expected price change, consistent with the Linear-Gaussian framework of the model, as:

$$a_{h,t,g} = \mathbb{E}_{h,t,g} p_{h,t+j} - p_{h,t-1} \quad g \in \{C, \mathcal{T}\}. \tag{2}$$

Pricing decisions depend on expectations about the state of the economy — see Eq. (1). The key to computing $a_{h,t,j}$ is the firm h expectation-updating equation:

$$\mathbb{E}_{h,t,\mathcal{T}} \underline{x}_t = \mathbb{E}_{h,t,C} \underline{x}_t + K F_{h,t}, \tag{3}$$

where $F_{h,t} \equiv s_{h,t} - \mathbb{E}_{h,t,C} s_{h,t}$ is the surprise to firm h from the monetary policy announcement in period t. This general specification accommodates various expectation formation processes, including full rationality — in which case K corresponds to the Kalman gain coefficient.

Our empirical exercise tests whether the expectations of firms in the treatment group differ systematically from those in the control group. We obtain the model counterpart to the average survey response for a firm in the control group as follows:

$$a_{C,t} = \int_{h \in C} a_{h,t} f(h|h \in C)\; dh = \gamma M^j \mathbb{E}_{t,C} \underline{x}_t - p_{t-1}, \tag{4}$$

where $\mathbb{E}_{t,C} \underline{x}_t$ is the average expectation across firms in the control group.[7] Doing the same for firms in the treatment group obtains:

$$a_{\mathcal{T},t} = \int_{h \in \mathcal{T}} a_{h,t} f(h|h \in \mathcal{T})\; dh = \gamma M^j \left(\mathbb{E}_{t,C} \underline{x}_t + K F_t\right) - p_{t-1}, \tag{5}$$

where $F_t = \phi\left(\underline{x}_t - \mathbb{E}_{t,C} \underline{x}_t\right)$ is the average surprise, or forecast error in the monetary policy-related signal. F_t is the central input to our regressions, as it drives the wedge between the responses of firms in the control and treatment groups:

$$a_{\mathcal{T},t} - a_{C,t} = \gamma M^j K F_t. \tag{6}$$

The regression we estimate is the empirical counterpart to Eq. (6). From a theoretical standpoint, F_t summarizes our assumptions regarding the level of information and the degree of sophistication of firms. We thus consider alternative empirical measures, $\hat{F}_t$, because the search for the best proxy for a monetary policy shock of UK firms is ultimately an empirical question.[8]

[4] For instance a rule of the form $i_t = \frac{\mathbb{E}_{c,t} v_t}{\eta} + u_{m,t}$ stabilizes the expected value of aggregate demand (given the information set of the central bank), up to the monetary policy disturbance $u_{m,t}$.

[5] The equilibrium aggregate price can be solved for using undetermined coefficients or, equivalently, resorting to the higher-order expectations as in Woodford (2003), once the set of shocks and the expectation-formation mechanism are defined.

[6] Idiosyncratic means that $\int \varepsilon_{h,t} f(h)\; dh = 0,\ \forall t$, where $f(h)$ is the probability density function of the cross-section of firms.

[7] In the model we only focus on the average expected price growth. The rich nature of the DMP survey allows us to empirically evaluate how different moments of the price expectation distribution respond to monetary policy announcements. In particular, we study the effects on the mean, median and tails of the distribution.

[8] We denote the empirical counterpart to F_t with $\hat{F}_t$.

Following Singh and Mitra (2022), we consider two extreme cases of expectation formation processes: naive and sophisticated firms. Naive firms disregard any information in between policy meetings as well as the exact structure of the economy. They form expectations in a purely backward-looking fashion, as $\mathbb{E}_{h,t,C} s_{h,t} = s_{h,t-1}$. The monetary policy shock perceived by the average naive firm is the actual change in the policy rate.[9] On the contrary, sophisticated firms are as well-informed and knowledgeable as financial market participants. Formally, their expectations satisfy $\mathbb{E}_{h,t,C} s_{h,t} = \mathbb{E}\left[s_{h,t} | \mathcal{I}_{h,t,C}\right]$; i.e., firms' expectations are based on all available information before the announcement. Therefore, their expectations respond only to the purely unexpected component of the monetary policy announcement. In this case $\hat{F}_t$ is a market-based high-frequency surprise in the tradition of Gertler and Karadi (2015).

We do not intend to restrict the firms' expectation formation process to these extreme scenarios. As we can only estimate an average effect, we consider an intermediate case in which firms are informed about the key developments in the UK economy, e.g., published forecasts about inflation, and form expectations rationally given their information set and the economy's structure. A good proxy for their monetary policy surprise has to be orthogonal to public macroeconomic indicators. We construct a measure of monetary policy shocks in the tradition of Romer and Romer (2004), and Cloyne and Hürtgen (2016), who purge interest rate changes from the systematic component of monetary policy.

We defer a detailed description of these measures of monetary policy surprises to Section 3.2. In Section 5.3 we then use data on news coverage of monetary policy decisions to assess the merits of each of these assumptions.

3. Data

3.1. Decision Maker Panel

The Decision Maker Panel (DMP) is a monthly survey of UK firms, launched in August 2016 by the Bank of England, the University of Nottingham, and Stanford University; the data has been used in recent studies by Altig et al. (2020), Bloom et al. (2023) and Yotzov et al. (2023). It is now one of the largest regular business surveys, with a panel of 8000 firms and around 3000 responding in any given month. It is designed to be representative of the population of UK businesses. Respondents are the Financial Officers of small, medium, and large UK companies, operating in a broad range of sectors.[10] Our study is the first to examine how price change expectations, as reported in the survey, react to monetary policy announcements.

The key questions for our analysis are:

- *Looking ahead, from now to 12 months from now, what approximate % change in your AVERAGE PRICE would you assign to each of the following scenarios? (with five scenarios: lowest, low, middle, high, and highest provided).*
- *Please assign a percentage likelihood (probability) to the % changes in your AVERAGE PRICES you entered.*

These questions allow us to compute the distribution of the one-year ahead expectations about their own price growth for each firm. We refer to the subjective probability mass that firm h, in period t, assigns to scenario j in period $t+12$ by $\phi_{h,t+12,j}$, for $j = 1, \ldots, 5$. We denote the corresponding support points with $\Delta p_{h,t+12,j}$, for $j = 1, \ldots, 5$, the reported price changes in each of the five scenarios. By pricing plan or expected price growth distribution of firm h at time t, we refer formally to the collection $\left\{\left\{\phi_{h,t+12,1}, \Delta p_{h,t+12,1}\right\}, \ldots, \left\{\phi_{h,t+12,5}, \Delta p_{h,t+12,5}\right\}\right\}$.

We can then define the moments of individual distribution as:

- $\text{Mean}_{h,t} = \sum_{j=1}^{5} \Delta p_{h,t+12,j} \phi_{h,t+12,j}$,
- $\text{Median}_{h,t} = \Delta p_{h,t+12,k}$ with k such that $\sum_{j=1}^{k-1} \phi_{h,t+12,j} \leq 0.5$ and $\sum_{j=k+1}^{5} \phi_{h,t+12,j} \leq 0.5$,
- $\text{Left Tail}_{h,t} = \frac{\sum_{j=1}^{k} \Delta p_{h,t+12,j} \phi_{h,t+12,j}}{\sum_{j=1}^{k} \phi_{h,t+12,j}}$ with k such that $\sum_{j=1}^{k} \phi_{h,t+12,j} \leq 0.5$,
- $\text{Right Tail}_{h,t} = \frac{\sum_{j=k}^{5} \Delta p_{h,t+12,j} \phi_{h,t+12,j}}{\sum_{j=k}^{5} \phi_{h,t+12,j}}$ with k such that $\sum_{j=k}^{5} \phi_{h,t+12,j} \leq 0.5$,

where $\Delta p_{h,t+12,j}$ is the expected annual price change by firm h in scenario j, and $\phi_{h,t+12,j}$ is the subjective probability that firm h, in period t, assigns to scenario j in period $t+12$.

The sample used in the analysis runs from November 2016 (the date of firms' survey responses was unavailable before this month) to December 2023 (the latest available data). Summary statistics for various pricing plans are presented in Table 1. Firms exhibit significant heterogeneity in their forecasts, with average expected price growth ranging from −8% to 21% across the bottom and top 1% percentiles. This heterogeneity is evident across other moments of the expected price distributions as well. It is important to note that these expectations pertain to a firm selling price growth, not to aggregate inflation, thus the observed dispersion reflects both aggregate and idiosyncratic disturbances.

The DMP survey also provides some firm-level characteristics that we use as controls. Table 2 reports the results of a series of regressions where the four moments of the pricing plans are regressed against each firm's past 12-month price growth, sectoral fixed effects, firm size (categorized as small if <50 employees, medium if 50–250, and large if >250), and an exporter status dummy.[11]

[9] This follows immediately if we maintain that $s_{h,t}$ is a noisy announcement regarding the monetary policy rate and integrate across firms.

[10] More information about the representativeness of the data and the structure of the survey can be found https://decisionmakerpanel.co.uk

[11] These regressions include the same firms used in our baseline regressions, limited to those responding within a 5-day window around each announcement.

Table 1
Descriptive statistics.

Variable	Mean	Std. Dev.	P1	P5	P95	P99
Mean exp. price gr.	3.61	4.92	−7.75	−1.3	11.2	20.38
Median exp. price gr.	3.35	4.93	−10	0	10	20
Left tail exp. price gr.	2.30	4.78	−12.5	−3.2	9	18.36
Right tail exp. price gr.	4.88	5.53	−4.34	0	13.75	25

Notes: The Table reports descriptive statistics from the DMP survey on British firms that responded within 5 days of an MPC meeting for the period 2016m8 to 2023m12. The data are at the monthly frequency for the 12-month ahead mean, median, left tail, and right tail of own price growth expectations.

Table 2
Key moments of the individual expected price change distribution.

	(1) Mean price	(2) Median price	(3) Left tail price	(4) Right tail price
Past price growth	0.235***	0.218***	0.194***	0.268***
	(0.0202)	(0.0206)	(0.0206)	(0.0221)
Medium (50–250)	−0.850***	−0.627***	−0.514***	−1.135***
	(0.147)	(0.150)	(0.145)	(0.166)
Large (above 250)	−1.288***	−0.963***	−0.714***	−1.788***
	(0.155)	(0.159)	(0.157)	(0.174)
Exporter	−0.129	−0.157	−0.270**	0.00431
	(0.128)	(0.131)	(0.127)	(0.143)
Constant	3.599***	3.269***	2.228***	4.943***
	(0.164)	(0.172)	(0.162)	(0.191)
Observations	6664	6664	6664	6664
R^2	0.134	0.110	0.095	0.143
Sector FE	YES	YES	YES	YES

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Notes: The Table shows regression results for the different moments of the distribution of price growth expectations on firms' demographic characteristics within a 5-day window around the monetary policy announcements. Firms' expectations are obtained from the DMP survey. The analysis is performed using data for the period 2016M11:2023M12. Robust standard errors are displayed in parentheses.

Notably, larger firms report the lowest average price growth expectations, indicating a leftward shift in the pricing distribution with increasing size. Additionally, exporter status shows little impact on price expectations.

As in Boneva et al. (2020), past price growth is found to be a strong predictor for the different moments of the distribution of price growth expectations. This variable naturally captures any unobserved firm characteristic that is salient to its pricing decisions, e.g., whether a firm operates in a market niche subject to specific price dynamics. An alternative approach, followed by Enders et al. (2019), would entail controlling for each respondent's previously reported price expectation. The nature of the questionnaire drove our decision to use past price growth. First, the DMP survey inquires about 12-month ahead expectations, once every quarter. This means that the dependent variable and its lagged value from the previous quarter would overlap by about 9 months or so. Second, while firms report price expectations every quarter, they do not necessarily do so in the same month of the quarter which would further muddle the economic interpretation. Third, irregularities in the firms' responses using past price expectations would reduce our sample by over 30%. For all these reasons, we opt to use each firm's reported past price growth as their key individual control.

Finally, we validate the survey by comparing the time series of the mean expected price changes across firms with the year-on-year realized aggregate inflation.[12] Fig. 1 presents the mean expected price growth (red line) alongside annual CPI inflation (green line), covering August 2016 to December 2023, a period marked by significant uncertainty due to events such as the post-Brexit Referendum period, the actual implementation of Brexit, COVID-19, and the Ukraine-Russia conflict. Notably, the mean expected price growth series exhibits lower volatility compared to actual inflation and appears to lead it, especially around turning points. This suggests that, on average, firms' reported pricing plans impact actual inflation over the subsequent year.

3.2. Measures of monetary policy shocks

Despite the relatively short time horizon of the DMP survey, our sample includes sizeable variation in monetary policy rates. Panel A of Fig. 2 plots the changes in the BoE's bank rate. The BoE adjusted its policy rate several times in response to economic conditions, and in particular to the recent acceleration in the Consumer Price Index (CPI).

[12] A question on aggregate inflation expectations, as opposed to own price growth expectations, was added to the survey only at a later date. This results in a much shorter and not overlapping sample — as firms providing inflation expectations do not report price expectations and vice versa.

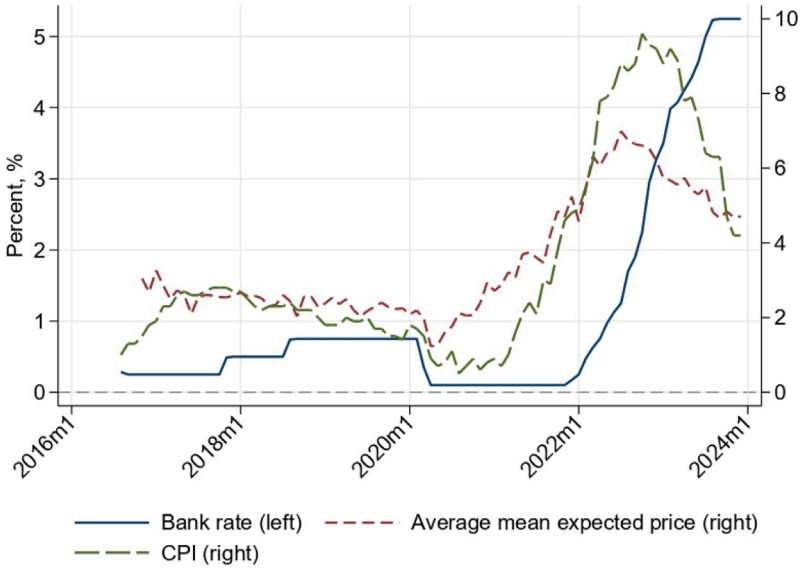

Fig. 1. Time series of the BoE bank rate, the CPI, and the average mean price.
Notes: The plot illustrates the evolution over time of the Bank of England Bank rate (blue, left axis), CPI inflation (green, right axis), and the average of the cross-sectional mean expected price growth at firm-level (red, right axis). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

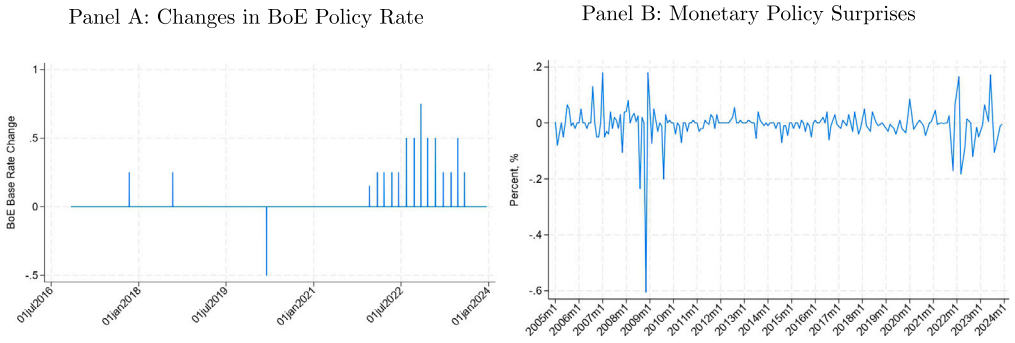

Fig. 2. Measures of monetary policy shocks.
Notes: Panel A plots the changes in Bank of England Base Rate over time. The vertical axis is in annual percentage points. Panel B reports monetary policy surprises, computed as the changes in the second front contract of the 3-month Sterling future, the 3-to-6 month ahead expectation about the 3-month Libor, in a 30-min window around monetary policy events.

As mentioned in Section 2, we consider different proxies of monetary policy shocks to UK firms. These proxies reflect different assumptions concerning the information firms gather and how they process it. In this section, we describe how we construct them. Under the assumption that firms are naive, i.e., they do not update their information sets between meetings, $\hat{F}_t$ corresponds to the simple change in the policy rates.

Since the seminal work of Romer and Romer (2004), it has been acknowledged that central banks adjust the policy rate based on expectations of future economic conditions, alongside current and past information (Romer and Romer, 2000). To evaluate the intermediate case in belief formation, we construct a measure of $\hat{F}_t$ following the approach of Cloyne and Hürtgen (2016), which applies the (Romer and Romer, 2004) methodology to the UK. We refer to this series as *BR Info clean*, short for Bank Rate changes cleaned for the information contained in headline macroeconomic variables and forecasts.

The third measure of $\hat{F}_t$ reflects the assumption that firms are as well informed as financial markets and equally sophisticated in forming expectations. Our baseline measure of market-based high-frequency monetary policy surprises is that computed for the UK by Cesa-Bianchi et al. (2020), based on the identification approach developed by Gürkaynak et al. (2005). It is constructed as the change in the price of 3-month Sterling future contracts expiring 2 quarters ahead within a 30-min window around announcements

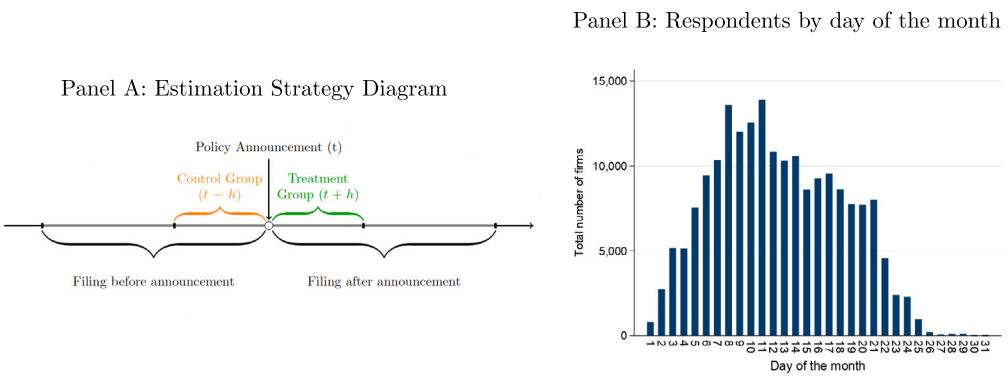

Fig. 3. Estimation strategy.
Notes: Panel A illustrates the timeline of a typical DMP survey wave in which the monetary policy announcement is made while survey answers are being collected. We restrict our attention to firms responding within a few days of the announcement. The histogram in Panel B reports the total number of firms that filed their survey responses by day of the month.

of the Bank of England's Monetary Policy Committee.[13] The time series of these monetary policy surprises is depicted in panel B of Fig. 2.

The recent macroeconomic literature has proposed several alternative high-frequency measures of monetary policy shocks. We consider some of the most popular as part of our battery of robustness checks. Following Swanson (2021), we decompose the surprises into a Target Factor and other factors such as the Forward Guidance Factor and Quantitative Easing Factor, measuring surprises at short and longer maturities, respectively. As in Braun et al. (2023), we use the first component as conventional monetary policy shocks (we refer to this series as *Target*). Moreover, following Romer and Romer (2004) and Cloyne and Hürtgen (2016), we clean the baseline surprises and Target factor from the systematic component of the actual policy rate changes. We refer to these adjusted series as *Info clean*. Additionally, monetary surprises may correlate with public economic and financial data, indicating endogeneity concerns. Following Bauer and Swanson (2023), we purge the Target factor and surprises by the so-called news component (*News clean*). To isolate the pure monetary policy shock, we also adopt the "poor man" approach by Jarociński and Karadi (2020), considering only surprises and the Target component that negatively correlate with the FTSE All Share index (*JK clean*). Detailed descriptions of these cleaning procedures are provided in Section B of the Online Appendix. In the same section, we also validate the shocks by adopting the same empirical specification described below but using as dependent variable market-based inflation expectations measured using the inflation-linked swaps at different forecast horizons. We find that financial market expectations respond to these high-frequency monetary policy surprises but not to bank rate changes. This confirms that the expectations of financial market participants are only affected by the exogenous component of the announcements captured by the monetary surprises.

4. Identification and estimation strategy

To ascertain the treatment effect of monetary policy announcements, we adopt a methodology similar to that followed by Lamla and Vinogradov (2019), Rast (2022), De Fiore et al. (2022) and Binder et al. (2022). It hinges on the comparison of DMP survey responses collected a few days before and after the Bank of England's Monetary Policy Committee announcements. The survey is administered monthly for 2 to 3 weeks. Participants can respond at any time during this period. Panel A of Fig. 3 illustrates the timeline of a typical survey wave. Our focus lies on responses submitted in proximity to monetary policy announcements.[14]

In the period under consideration, we observed actual rate changes for 13 out of 48 meetings and monetary surprises for a total of 47 MPC meetings.[15] Panel B of Fig. 3 reports the total number of respondents for each day of the month. The data reveals that the majority of firms submit their responses during the second week, with a considerable drop in the number of submissions during the last week. Consequently, if an announcement occurs towards the end of the month, it may not be feasible to include it in the analysis due to the lack of observations falling within the window surrounding the announcement. As our baseline, we consider a symmetric

[13] Note that from 2021 onward, Sonia-based futures replace Libor-based futures.

[14] Responses submitted on the day of the announcement are excluded because the actual submission times are not available. Moreover, months without an MPC meeting are omitted from our analysis to eliminate ambiguity. Such exclusion ensures a clear distinction between treatment and control groups. In addition, in some cases meetings are scheduled very early or late in the month, either before the survey is sent to firms or after all the responses have been collected; e.g., the meetings on 2 November 2017 and 26 March 2020. These meetings are included in the analysis as firms may still respond within the 5-day window examined in the empirical analysis.

[15] An additional meeting, the unscheduled meeting on March 11, 2020, resulted in a rate cut of 50 basis points. Shortly thereafter, on March 19, 2020, the Bank of England implemented a further rate cut of 15 basis points. Given the proximity of this meeting to the significant monetary policy announcement on March 11, it is excluded from our analysis to prevent confounding treated and control firms.

window of 5 days around the MPC announcements. The resulting time series of bank rate changes and surprises associated with the MPC meetings are depicted in Figure 2 of the Online Appendix, providing further context for our estimation approach.

Restricting our attention to a few days around each monetary policy announcement reduces the number of observations in our sample and, more importantly, means that we cannot directly exploit the panel dimension of the DMP survey. Overall, 6664 responses fall into our 5-day window around the announcements. They come from 2761 distinct firms. We observe some within-firm variation for less than 15 percent of those. The others either respond only once (1445 firms, more than 50%) or are always in either the control or treatment group. We thus primarily exploit variation in the cross-sectional distribution of the firms' price expectations.

Our identification strategy relies on the assumption that firms file their responses to the survey questions randomly throughout the month, i.e., the date on which firms file their responses does neither depend systematically on firm characteristics nor the timing of the policy announcement. Following the methodology of Bottone and Rosolia (2019), we test this assumption by examining the predicted probability of filing survey questions before or after the MPC announcement (in Figure 4 of the Online Appendix). These probabilities are derived from a probit model that includes past price growth, firm size, and industry and exporter status as control variables. The predicted probabilities are virtually indistinguishable, indicating that the decision to submit survey responses is not influenced by the observable characteristics considered.[16]

Our main regression is specified as follows:

$$y_{h,t} = \alpha + \gamma D_{h,t} + \beta D_{h,t}\ \hat{F}_t + X_{h,t} + \epsilon_{h,t}, \tag{7}$$

where $y_{h,t}$ is one of the moments – i.e., mean, median, or tails – of the 12-month ahead price growth distribution of firm h at time t. $D_{h,t}$ is a dummy variable that takes the value 1 if the firm responds after the announcement and 0 otherwise. We refer to this variable as *Dummy MPC*. $\hat{F}_t$ represents a measure of monetary policy shocks introduced in Section 2, $X_{h,t}$ is a matrix of control variables, and $\epsilon_{h,t}$ is the error term. These controls comprise a size categorical variable, exporter status, past price growth, and sector and wave fixed effects.[17] Robust standard errors are employed throughout the analysis.

To ensure that we isolate the impact of the monetary policy announcements from other macroeconomic news, we also control for surprises in data released by the Office for National Statistics (ONS) within the chosen window.[18] We do so by introducing a dummy variable that takes the value of 1 if firms submit their responses after ONS releases concerning inflation and labor market data (wages or unemployment), and 0 otherwise. Additionally, we incorporate interactions between the ONS dummies and the surprises of these variables. These surprises are defined as the difference between the market median expectations for the release from Refinitiv Datastream and the actual data released by the ONS.[19]

5. Empirical results

In this section, we present our key empirical findings. First and foremost, we find that firms revise their price expectations in response to actual and information-cleaned interest rate changes but not to high-frequency surprises. In line with the theoretical prediction, a monetary policy tightening induces a leftward shift in the distribution of firms' expected price changes. We document that the effect is mainly driven by a change in the left tail of the distribution. Moreover, we establish that firms do not revise their pricing plans in response to market-based high-frequency measures of monetary policy shocks. In other words, our results suggest that firms are less sophisticated than financial market participants in forming expectations regarding monetary policy.

We also show that the responsiveness of firms' price expectations to actual rate changes varies significantly with the size of the interest rate adjustment. Firms display heightened reactions to changes in the BoE's policy rate of 50 basis points or more, which has important implications, especially in light of the recent tightening cycle. Only large rate changes, which in the recent past occurred mostly right in the middle of a tightening cycle, prompt firms to revise their pricing plans.

Finally, we propose a possible explanation for why firms respond to rate changes but not to high-frequency shocks. We find that news coverage of the Bank of England's activities increases in response to actual policy rate changes but not to high-frequency surprises. So it is plausible that the information set of firms, which learn about monetary policy announcements primarily through the press, includes details about rate changes but not about high-frequency surprises. This also suggests that mass media are an important channel through which central banks communicate with the general public and ultimately impact their beliefs.

[16] Alternatively, we can demonstrate a similar outcome by omitting the interaction term between the dummy variable, indicating the timing of the firms' responses and the monetary policy shocks, in the baseline specification. In Table 5 of the Online Appendix, we report the coefficients from this alternative model. Specifically focusing on the variable *Dummy MPC*, we find that the coefficients are not statistically significant. This indicates that whether a firm responded before or after an MPC meeting does not help predict variations in the moments of the price expectation distribution. Consequently, neither firms in the treatment group nor those in the control group exhibit different expectations, nor do the MPC meetings themselves lead to a reduction in price expectations, regardless of the actual policy rate changes.

[17] Wave and month fixed effects are equivalent in our analysis as only one wave is conducted for each month. They control for the composition of the firms responding in a particular month and for macroeconomic conditions such as inflation, unemployment, interest rates, and monetary policy shocks. In Section 6, we provide results from alternative specifications to gauge the level of saturation of our model. Specifically, we explore the effects of monetary policy announcements on both the median and left tail of the price expectation distribution. The analysis is conducted while controlling for meeting fixed effects, meeting and industry fixed effects (the baseline), as well as meeting × industry fixed effects.

[18] In Section B of the Online Appendix, we document the significant reaction of financial markets inflation expectations to the ONS releases. This observation aligns with the findings of Yotzov et al. (2024), who demonstrate that firms participating in the DMP survey adjust their price expectations following ONS inflation releases.

[19] The days of the releases are excluded if they fall within the window of the MPC announcements to avoid ambiguity in distinguishing firms that responded to the survey before the release from those that responded after. This way we prevent potential confusion regarding the timing of firms' responses relative to both MPC announcements and ONS releases.

Table 3
MPC announcements and firms' expectations, actual and cleaned bank rate changes.

	(1) Mean price	(2) Median price	(3) Left tail price	(4) Right tail price	(5) Mean price	(6) Median price	(7) Left tail price	(8) Right tail price
BR change × Dummy MPC	−0.354	−0.402*	−0.447**	−0.302				
	(0.228)	(0.236)	(0.222)	(0.262)				
BR change (Info clean) × Dummy MPC					−0.793**	−0.871**	−0.824**	−0.821**
					(0.349)	(0.351)	(0.333)	(0.400)
Dummy MPC	−0.525*	−0.385	−0.355	−0.643*	−1.025**	−0.929**	−0.845**	−1.184**
	(0.299)	(0.305)	(0.280)	(0.348)	(0.414)	(0.413)	(0.375)	(0.482)
Past price growth	0.185***	0.166***	0.146***	0.215***	0.185***	0.166***	0.146***	0.215***
	(0.0210)	(0.0214)	(0.0216)	(0.0231)	(0.0210)	(0.0214)	(0.0216)	(0.0230)
Medium (50–250)	−0.565***	−0.332**	−0.249*	−0.824***	−0.562***	−0.328**	−0.246*	−0.820***
	(0.147)	(0.150)	(0.145)	(0.165)	(0.147)	(0.150)	(0.145)	(0.165)
Large (above 250)	−0.966***	−0.633***	−0.415***	−1.435***	−0.965***	−0.632***	−0.413***	−1.434***
	(0.155)	(0.159)	(0.158)	(0.173)	(0.155)	(0.159)	(0.158)	(0.173)
Exporter	−0.132	−0.163	−0.276**	0.00187	−0.127	−0.158	−0.272**	0.00710
	(0.126)	(0.128)	(0.125)	(0.140)	(0.126)	(0.128)	(0.125)	(0.140)
Constant	4.081***	3.678***	2.619***	5.498***	4.326***	3.939***	2.826***	5.790***
	(0.293)	(0.304)	(0.276)	(0.344)	(0.336)	(0.339)	(0.308)	(0.394)
Observations	6664	6664	6664	6664	6664	6664	6664	6664
R^2	0.183	0.161	0.140	0.191	0.183	0.161	0.140	0.192
Wave FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES	YES	YES	YES	YES
ONS controls	YES	YES	YES	YES	YES	YES	YES	YES
Number of meetings	48	48	48	48	48	48	48	48
BR change meetings	13	13	13	13				

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Notes: The Table shows regression results for different moments of the distribution of price growth expectations on monetary policy shocks within a 5-day window around the monetary policy announcements. Price expectations are obtained from the DMP survey. The monetary policy shocks are measured using the actual changes in the bank rate (columns 1–4) and the series cleaned following the procedure from Cloyne and Hürtgen (2016) and described in the main text (columns 5–8). The two series are normalized so that the coefficient corresponds to the response to a 25 basis point. Further controls included (discussed in the main text, not shown). The analysis is performed using data for the period 2016M11:2023M12. Robust standard errors are displayed in parentheses. The coefficients pertaining to ONS dummies and their interaction with the surprises are omitted to save space.

5.1. What monetary policy shocks do firms respond to?

We begin by analyzing how firms adjust their subjective expectations in response to actual changes in the bank rate, which describes the monetary policy shock to naive firms as discussed above. The underlying series of policy rate changes is normalized so that the coefficient corresponds to the response to a 25 basis point increase.

Columns 1–4 of Table 3 report the estimates of our empirical specification.[20] The coefficients of interest are the interactions between bank rate changes and the *Dummy MPC*, which are negative, in line with the predictions of economic theory. Following a 25 basis point increase in the policy rate, the median expected price growth significantly decreases by about 0.4 percentage points. The effect is asymmetric along the firm pricing plans and it is mainly driven by a decrease of the left tail of the distribution. Firms react to monetary policy primarily by re-assessing the low-price states of their pricing plan. This is consistent with the observation that firms are more sensitive to low-price scenarios as their profit function is asymmetric (e.g., Fernández-Villaverde et al., 2015; Masolo and Monti, 2021).

We also entertain the possibility that firms use additional publicly available information released concurrently with monetary policy announcements to discern the unpredictable component of such announcements. We thus estimate Eq. (7) with a measure of rate changes that is made orthogonal to macroeconomic variables in the tradition of Romer and Romer (2000, 2004) and Cloyne and Hürtgen (2016).[21] Estimation results are reported in Columns 5–8 of Table 3. We observe statistically significant responses across various moments of the firms' price expectation distribution. Upon adjusting for additional macroeconomic information, the reaction of pricing plans to a contractionary monetary policy shock of 25 basis points is more precisely estimated. Specifically, both the mean and median of the expected price growth distribution fall by approximately 0.79 to 0.87 percentage points.

We then turn to analyzing how subjective firms' expectations respond to monetary shocks as proxied by the high-frequency market surprises, computed by Cesa-Bianchi et al. (2020) and standardized so that the coefficients correspond to the response to a 25 basis point surprise. The regression estimates are presented in Table 4.

None of the interaction coefficients in the regressions is statistically significant, indicating that firms' expectations do not react to high-frequency surprises. This lack of response suggests that firms may either not possess the same level of information as financial markets or simply are less sophisticated in processing the information at their disposal. In Section 6, we explore potential non-linear effects concerning both the size and sign of the surprises, as well as different measures of high-frequency monetary shocks. Our finding extends to those alternative specifications.

[20] The coefficients pertaining to ONS dummies and their interaction with the surprises are omitted to save on space.

[21] This adjusted series, referred to as *BR Info clean*, is standardized to ensure that the coefficient corresponds to the response to a 25 basis point increase. For a comprehensive explanation of the cleaning procedure, please refer to Section B of the Online Appendix.

Table 4
MPC announcements and firms' expectations, high-frequency surprises.

	(1) Mean price	(2) Median price	(3) Left tail price	(4) Right tail price
Surprise × Dummy MPC	1.897	1.694	1.087	2.469*
	(1.277)	(1.281)	(1.232)	(1.417)
Dummy MPC	−0.774**	−0.672*	−0.642**	−0.891**
	(0.343)	(0.347)	(0.317)	(0.400)
Past price growth	0.184***	0.164***	0.143***	0.214***
	(0.0211)	(0.0214)	(0.0216)	(0.0232)
Medium (50–250)	−0.634***	−0.406***	−0.320**	−0.898***
	(0.149)	(0.151)	(0.146)	(0.168)
Large (above 250)	−1.031***	−0.710***	−0.477***	−1.511***
	(0.157)	(0.159)	(0.158)	(0.176)
Exporter	−0.165	−0.193	−0.306**	−0.0338
	(0.129)	(0.131)	(0.128)	(0.144)
Constant	4.328***	3.936***	2.840***	5.781***
	(0.292)	(0.298)	(0.270)	(0.345)
Observations	6287	6287	6287	6287
R^2	0.186	0.164	0.141	0.198
Wave FE	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES
ONS controls	YES	YES	YES	YES
Number of meetings	47	47	47	47

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Notes: The Table reports regression results for different moments of the distribution of price growth expectations on monetary policy shocks within a 5-day window around the monetary policy announcements. Price expectations are obtained from the DMP survey. Monetary policy shocks are measured using high-frequency interest rate changes in a tight window around monetary policy meetings, taken from Cesa-Bianchi et al. (2020). The surprise series is normalized so that the coefficient corresponds to the response to a 25 basis point increase. Further controls included (discussed in the main text, not shown). The analysis is performed using data for the period 2016M11:2023M12. Robust standard errors are displayed in parentheses.

In summary, our empirical analysis reveals that firms' price expectations react to bank rate changes but not to high-frequency surprises. Firms appear to draw upon readily available public information about the macroeconomy but are not, on average, nearly as sophisticated as financial markets.

5.2. Non-linear effects of actual rate changes

The average effects documented thus far may mask important non-linearities in firms' reactions to monetary policy announcements. In this section, we explore whether the responsiveness of firms' price expectations varies over time or depends on the size of the bank rate changes. In Section 6, we show that conditioning for the sign or the size of the monetary surprises does not change the fact that price expectations do not respond to these shocks.

We start by categorizing bank rate changes according to their size. Specifically, we differentiate between rate changes smaller than 50 basis points and those of 50 basis points and above. Out of the 13 meetings featuring a policy rate adjustment, we have 7 changes of less than 50 basis points and 6 of 50 basis points and above.

We find that the effects documented in Table 3 are predominantly driven by the larger interest rate adjustments (see Table 11 of the Online Appendix). Firms' pricing plans exhibit only a negative and statistically significant response to bank rate changes of a larger magnitude, highlighting an important heterogeneity in terms of size.

The non-linear effects documented have implications for the Bank of England's tightening cycle. As depicted in Fig. 1, the post-COVID period saw a significant surge in the UK inflation rate, mirroring global trends, reaching levels unprecedented in years and peaking in October 2022 at nearly 10%. Responding to these inflationary pressures, the Bank of England initiated a series of rate hikes from December 2021, gradually increasing the bank rate from 0.1 to 5.25 percentage points. Initially, the rate hikes were modest, typically around 15 to 25 basis points. However, as inflation continued to pick up, the Bank implemented a series of more substantial rate hikes of 50 basis points or more. As inflationary pressures abated, the Bank maintained its tightening stance but with smaller rate adjustments in magnitude. Since August 2023, the bank rate has remained unchanged until the end of the sample period in December 2023.

In light of these developments, we consider a time-dependent cut of the data. Examining the time series of bank rate changes depicted in Panel A of Fig. 2, we categorize these changes into three distinct groups based on their size and timing. We construct three dummy variables, identify the different groups, and then interact each of these with bank rate changes. The interaction coefficients

Table 5
MPC announcements and firms' expectations, non-linear effects.

	(1) Mean price	(2) Median price	(3) Left tail price	(4) Right tail price
Covid BR change	−0.902***	−0.978***	−0.923***	−0.964**
	(0.330)	(0.333)	(0.316)	(0.381)
Bookends cycle BR changes	0.890	0.872	0.606	1.203*
	(0.568)	(0.577)	(0.535)	(0.650)
Peak cycle BR changes	−1.736**	−1.718*	−1.542*	−1.980**
	(0.868)	(0.885)	(0.845)	(0.956)
Dummy MPC	−1.338***	−1.223***	−1.047***	−1.626***
	(0.423)	(0.414)	(0.378)	(0.495)
Past price growth	0.186***	0.166***	0.146***	0.215***
	(0.0210)	(0.0214)	(0.0216)	(0.0230)
Medium (50–250)	−0.567***	−0.333**	−0.250*	−0.826***
	(0.146)	(0.150)	(0.145)	(0.165)
Large (above 250)	−0.965***	−0.632***	−0.414***	−1.435***
	(0.155)	(0.159)	(0.157)	(0.173)
Exporter	−0.118	−0.150	−0.265**	0.0184
	(0.126)	(0.128)	(0.125)	(0.140)
Constant	4.812***	4.403***	3.220***	6.384***
	(0.398)	(0.399)	(0.370)	(0.460)
Observations	6664	6664	6664	6664
R^2	0.184	0.162	0.141	0.193
Wave FE	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES
ONS controls	YES	YES	YES	YES
Number of meetings	48	48	48	48
BR change meetings	13	13	13	13

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Notes: The Table shows regression results for different moments of the distribution of price growth expectations on monetary policy shocks within a 5-day window around the monetary policy announcements. Price expectations are obtained from the DMP survey. The monetary policy shocks are measured using the actual changes in the bank rate. The bank rate changes are divided into three different periods. The bank rate change series is normalized so that the coefficient corresponds to the response to a 25 basis point increase. Further controls included (discussed in the main text, not shown). The analysis is performed using data for the period 2016M11:2023M12. Robust standard errors are displayed in parentheses.

capture the effects of a 25 basis points increase during specific periods.[22] The first group, labeled *COVID BR change*, is equal to 1 for the singular rate cut of 0.5 basis points in response to the outbreak of the COVID pandemic on March 11, 2020, and 0 otherwise.[23] The second group, *Peak cycle BR changes*, identifies the MPC meetings taking place from July 2022 to February 2023 in which the BoE implemented large consecutive rate hikes of at least 50 basis points — in November 2022 BoE increased the bank rate by 75 basis points. The third group, *Cycle bookends BR changes*, highlights the MPC meetings at the beginning and end of the cycle, which are characterized mainly by small rate hikes of 15 and 25 basis points. This group of meetings includes the period from December 2021 to June 2022 and the period from March 2023 to December 2023.

Table 5 presents the results of monetary policy announcements on firms' price expectations when we classify bank rate changes into different groups. The coefficient associated with the COVID announcement indicates a significant shift in firms' price expectations, with the bank rate cut leading to an increase of around 0.9 percentage points in the mean, median, and tails of the price expectation distributions.[24]

As previously documented, firms' price expectations exhibit a negligible reaction to small bank rate adjustments, a trend that is consistent with findings for the first and last phase of the tightening cycle, when the interaction coefficients are imprecisely estimated. Conversely, during the peak of the cycle, the coefficients are significant and economically sizeable. In reaction to substantial interest rate hikes, the entirety of the price expectation distribution displays a downward revision.

Overall, we document significant non-linear effects in firms' responsiveness to bank rate changes, depending on the size of the interest rate adjustment. Our findings indicate that over the recent tightening cycle, the BoE effectively reduced firms' expected price growth primarily at the peak when a series of substantial rate hikes were implemented. This heterogeneity over time of the

[22] Including also the dummies in the regressions is not possible as they would be absorbed by the meeting/wave fixed effects. Moreover, we find similar results with the information-cleaned measure of bank rate changes.

[23] This is the only bank rate change we have in the sample until November 2021; unfortunately, the announcements of the 2nd of November 2017 and the 2nd of August 2018 happened too early in the month.

[24] The rate change at the onset of COVID represents the sole rate cut in our sample, so the sign of the coefficient needs to be reversed for interpretation.

effects aligns with Weber et al. (2023), who found that households and firms paid more attention to inflation as it surged after COVID. Despite the high inflation environment, we demonstrate that central banks can still influence economic agents' expectations by strongly reacting against inflation.

5.3. News coverage

In the previous section, we documented that price expectations respond to monetary policy shocks measured as actual and information-cleaned bank rate changes while showing no reaction to high-frequency surprises. In light of our simple theoretical model, we can trace these findings back to the information firms have and how they process it. We now investigate if it is plausible that firms are aware of policy rate changes and, more generally, of macroeconomic developments, while not being as informed as financial market participants.

We do so by studying how news outlets cover monetary policy announcements by the Bank of England. We compute different measures of news coverage around the BoE policy announcements and examine whether they react to the monetary policy shock proxies. We focus on media as they have been found to be a primary source of information for households (Blinder and Krueger, 2004, van der Cruijsen et al., 2015, Conrad et al., 2022). A role highlighted in particular by Pinter and Kočenda (2023), who show that the extent to which French firms and consumers revise their expectations in the wake of monetary policy announcements depends critically on news coverage.

We collect data from GDELT, an open database supported by Google Jigsaw that covers news media data from around the world on a daily basis, including both newspapers and other news outlets, such as the BBC for what concerns the UK.[25] We restrict the sample to the UK and extract the percentage of total news articles mentioning specific keywords. Our goal is to assess whether the response of UK press coverage to monetary policy announcements aligns with the reaction we observe in firms. We first consider two keywords, `Bank of England`, concerning coverage of the policy decisions, and `Inflation`, as the key endogenous driver of those same decisions. We then consider a broader group of keywords that relate to monetary policy decisions – namely, `Bank of England`, `Policy Rate`, and `Interest Rate` –, and one pertaining to inflation – which includes `Inflation`, `Prices` and `Consumer Price Index`. For these series, we have daily data from January 2017 to December 2023, which aligns almost perfectly with the DMP survey period.

In Figure 3 of the Online Appendix, we report the shares of articles for the four keyword groups on the day of the MPC meeting, juxtaposed with bank rate changes. News coverage remains relatively stable from 2017 until late 2021. Coverage surged following the MPC meeting of March 2020, at the time of an interest rate cut aimed at stimulating the economy at the onset of the pandemic. From late 2021 onward, news coverage for both `Bank of England` and `Inflation` increased, as the central bank started its tightening cycle to counter the rise in inflation. Coverage peaked in the middle of the cycle and gradually waned as interest rate hikes became smaller in magnitude.

A strong positive correlation emerges between news coverage of Bank of England decisions and actual bank rate changes. Moreover, we observe a clear hump-shaped pattern in news coverage over the tightening cycle. This is very much consistent with our finding that interest rate decisions impact firms' price expectations particularly during the pandemic and later at the peak of the tightening cycle.

To more formally evaluate the relationship between monetary policy announcements and media coverage, we regress the time series representing the share of news coverage for the four keyword groups considered onto the absolute value of bank rate changes and high-frequency surprises:

$$y_t = \alpha + \gamma D_t + \beta D_t \, |BR \;\; Changes_t| + \delta D_t \, |Surprise_t| + X_t + \epsilon_t, \tag{8}$$

where y_t denotes the time series of news coverage for the four keyword groups. D_t is a dummy variable taking the value of 1 in the 5 days after a policy announcement and 0 otherwise.[26] Because news coverage should not be influenced by whether the shock is positive or negative, we take the absolute value of actual rate changes and surprises. X_t represents the matrix of control variables, encompassing MPC meeting fixed effects and ONS controls as detailed in the previous section.

The results are reported in Table 6. We find that only the interaction coefficients pertaining to bank rate changes are statistically significant. This is true both for `Bank of England` and `Inflation` taken as individual keywords (Columns 1 and 2) or as part of the broader sets of words listed above (Columns 3 and 4).

In conclusion, our analysis reveals that UK media increase their coverage of the BoE's activities when there is a change in the policy rate. Instead, we find no evidence of news coverage responding to high-frequency monetary policy surprises. Under the assumption that most firm officers acquire information about monetary policy decisions via the press, this evidence supports our finding that firms respond primarily to bank rate changes, and highlights the important role of news outlets as a conduit for communicating monetary policy decisions to the general public and shaping their information set.

[25] More information about GDELT can be found here https://www.gdeltproject.org/.

[26] We maintain a symmetric time window around MPC announcements of 5 days, with the day of the announcement included, reflecting the immediate response expected from news outlets post-BoE announcements.

Table 6
MPC announcements and newspaper coverage.

	(1) News on BoE	(2) News on Infl.	(3) News on BoE (broader)	(4) News on Infl. (broader)
Dummy MPC	0.0107***	−0.00402	0.00722*	0.00113
	(0.00393)	(0.00510)	(0.00430)	(0.00766)
Abs. BR change × Dummy MPC	0.0241***	0.0289***	0.0248***	0.0295**
	(0.00852)	(0.0100)	(0.00891)	(0.0128)
Abs. Surprise × Dummy MPC	0.0344	0.0348	0.0477*	0.0592
	(0.0245)	(0.0327)	(0.0266)	(0.0497)
Constant	0.0235***	0.0783***	0.0351***	0.229***
	(0.00156)	(0.00288)	(0.00176)	(0.00416)
Observations	554	554	554	554
R^2	0.491	0.816	0.503	0.835
Wave FE	YES	YES	YES	YES
ONS controls	YES	YES	YES	YES
Number of meetings	56	56	56	56

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Notes: The Table shows regression results for news coverage on the absolute value of monetary policy surprises and the changes in the BoE bank rate within a 5-day window around the monetary policy announcements. The dependent variables are the share of news outlets including the word `Bank of England` (Column 1) and `Inflation` (Column 2). We also consider a broader coverage of the BoE's activities using as a dependent variable the share of news outlets mentioning one or more of the following keywords `Bank of England`, `Policy Rate` or `Interest Rate` (Column 3) as well as `Inflation`, `Prices` or `Consumer Price Index` (Column 4). News coverage is obtained from the GDELT 2.0 API Client. Further controls are included (discussed in the main text, not shown). The analysis is performed using data for the period 2017M1:2023M12. Robust standard errors are displayed in parentheses.

6. Robustness and validation

Fixed effects. As a robustness check, we test the sensitivity of our results to different levels of saturation of the regression specification. We consider (a) meeting fixed effects, (b) meeting and industry fixed effects (our baseline), and (c) meeting-industry interaction fixed effects.[27] We show that different combinations of fixed effects have only marginal effects on the estimated responses to both actual and information-cleaned bank rate changes (Tables 7 and 8 of the Online Appendix). We also confirm that firms do not adjust their price expectations to monetary policy surprises under alternative fixed effects specifications. Therefore, we conclude that different degrees of saturation do not alter the main conclusion of the analysis.

Market-based monetary policy shocks. High-frequency monetary policy surprises aim to capture the unanticipated component of monetary policy announcements for highly informed and sophisticated agents. Studies have demonstrated that these surprises may be predictable based on information available to policymakers at the time of decision-making (Romer and Romer, 2000), or by macroeconomic news released between monetary policy meetings (Bauer and Swanson, 2020). Thus, in line with existing literature, we purge the surprises to eliminate predictable components, resulting in purer measures of monetary policy shocks.[28] We find that, while the magnitude of responses varies across measures, our key finding remains unchanged: firms' price expectations do not react to high-frequency monetary policy shocks.

Sign and size of the surprises. We assess whether the lack of responsiveness to high-frequency surprises may mask non-linear effects. Indeed, not all announcements weigh equally and the size of the market surprises varies considerably across monetary events. This non-linearity has been documented by Enders et al. (2019), who show how the overall effect of monetary policy announcements on German firm expectations depends on the magnitude of the surprises. Table 9 of the Online Appendix reports that over the period of analysis firms' price expectations do not respond to monetary policy surprises, and this is irrespective of their size.[29]

[27] In Tables 6, 7, and 8 of the Online Appendix, we present the effects of monetary policy shocks on both the median and left tail of the price expectation distribution. Monetary policy shocks are measured using actual bank rate changes (Table 7), information-cleaned bank rate changes (Table 8), and high-frequency surprises (Table 6).

[28] Section B of the Online Appendix details the different cleaning procedures adopted. The impacts of these alternative shock measures on price expectations are detailed in Table 4 of the Online Appendix. For brevity, we only target the median price expectations as it is one of the most responsive moments of the distribution under the baseline. All surprises are standardized to quantify the response of firms to a 25 basis point shock.

[29] Following Enders et al. (2019), we modify Eq. (7) to assess whether the size of the surprises influences the firms' responses. Specifically, we sort the monetary surprises prior to estimation according to their size and allocate them into three bins of equal size, $b = 1, \dots, 3$. We then estimate the following model:

$$y_{h,t} = \alpha + \gamma D_{h,t} + \sum_{b=1}^{3} \beta_b D_{i,t} \hat{F}_{t,b} + X_{h,t} + \epsilon_{h,t}, \tag{9}$$

where the interaction captures the effect if the surprise $\hat{F}_{t,b}$ falls into bin b, being zero otherwise. In the bottom tercile, only large negative surprises are registered and in the top tercile only large positive surprises. Table 9 of the Online Appendix reports the results from this alternative specification. The coefficients capturing potential non-linear effects in the size of the surprises are not significant for any of the moments of the price expectation distribution.

We then evaluate whether firms update their price expectations differently to positive and negative surprises.[30] We find that the signs of the surprises play no role in shaping firms' price expectations. Considering non-linear effects regarding both the size and sign of the monetary policy surprises still result in muted firm responses. We therefore conclude that firms' price expectations do not respond to monetary policy shocks computed using financial data.

Alternative window-sizes. Key to our analysis is the 5-day window that precedes and follows monetary policy announcements. The decision to adopt a 5-day window trades off the will to reduce the contamination from non-monetary news against the need to mitigate estimation noise by having a sufficiently large number of observations. As a sensitivity check, we examine two different window sizes: 3 days and 7 days. Changing the window size has marginal effects on the magnitude of the estimated coefficients, which we report in the Online Appendix.[31] The magnitude of the response associated with actual bank rate changes is always preserved but the coefficients are less precisely estimated when shortening the window, in line with the reduced number of observations. We repeat the exercise with information-cleaned measures of bank rate changes and surprises. The estimates with information-cleaned bank rate changes remain negative and statistically significant, while those with market-based surprises are insignificant. This leads us to conclude that our findings are robust to alternative window sizes.

Firm Heterogeneity. We explore whether firms exhibit heterogeneous responses to monetary policy shocks based on observable characteristics, such as firm size, sector, and exporter status. We add to the baseline regression the triple interactions between the post-announcement dummy, monetary policy shocks, and one of the following characteristics: firm size, exporter status, and a financial sector dummy. The results, using the median of the reported expected price distribution, are reported in Tables 12, 13, and 14 of the Online Appendix. We observe differences across groups, but we detect no statistically significant difference in the responses to monetary policy shocks. The results with bank rate changes and high-frequency surprises remain largely unaffected when accounting for observable firm characteristics.

Macroeconomic effects. We conclude our battery of robustness checks by testing if the immediate impact of monetary policy announcements on firms' price expectations we identify using individual-level data translates into aggregate effects. And, if so, how long it takes for the change in firms' price expectations to transmit to headline inflation.

To answer these questions, we estimate a Bayesian monthly Vector Autoregression (VAR) model and use our firm-level evidence to identify our shock of interest. Our main finding suggests a straightforward sign restriction: a contractionary announcement leads to a contemporaneous rise in policy rates and a fall in firm pricing expectations. This identification strategy refines the traditional sign-restriction identification of monetary policy shocks, as pioneered by Uhlig (2005), which assumes that the monetary policy rate and actual *prices* move in opposite directions on impact.[32]

We include in our VAR specification measures of unemployment, interest rates, and aggregate prices — specifically the Retail Price Index excluding mortgage payments.[33] From the DMP survey, we incorporate the aggregate 12-month ahead firms' price growth and the reported price changes over the past 12 months, computed as cross-sectional averages — see Section C of the Online Appendix for more details.

We find that the drop in price expectations – reported in Figure 5 of the Online Appendix – is persistent, lasting for more than a year. Notably, neither the reported price changes nor the RPI excluding mortgages respond for the first six months or so. After that, both become negative in a persistent manner. They respond gradually but well within the 12-month horizon of the price plans reported in the DMP survey.

These results confirm that price expectations play an important role in shaping firm pricing decisions, and ultimately the transmission of monetary policy to inflation. Firms' price expectations lead inflation in response to a monetary policy shock, consistent with the idea that firm revise their pricing plans upon the announcement and then actually implement them over the course of a few months.

7. Conclusion

Inflation-targeting central banks make policy decisions aimed at keeping inflation close to target. One of the most effective strategies for achieving this goal is for monetary authorities to manage expectations, thereby influencing economic decisions (Coibion et al., 2020). Consequently, firms' price expectations play a crucial role in the determination of inflation. In this paper, we study how UK firms revise their pricing plans in response to the Bank of England monetary policy announcements. We particularly focus on the interplay between the monetary policy decision itself, the announcement and its news coverage, the information that reaches firms, and how it is processed by them.

[30] We modify Eq. (7) and report the results in Table 10 of the Online Appendix.

[31] Tables 15 and 16 of the Online Appendix compare the estimated coefficients for the median expected prices under these alternative specifications. Monetary policy shocks are measured using bank rate changes (Columns 1, 3, and 5) and high-frequency surprises (Columns 2, 4, and 6). Columns 1 and 2 show the coefficients using a 3-day window, Columns 3 and 4 using the 5-day baseline, and Columns 5 and 6 using the 7-day window. Expanding the window to 7 days adds 2 more events, almost doubling observations from around 6500 to 12,000. Conversely, narrowing the window to 3 days loses one event, reducing observations to around 4500.

[32] We consider it a refinement because while we have evidence that expectations respond immediately, it is plausible that actual prices take longer to respond. A claim we can verify immediately by analyzing our impulse responses.

[33] This inflation measure is commonly used for VARs estimated on UK data (Cloyne and Hürtgen, 2016; Gerko and Rey, 2017) because it excludes the direct impact of a policy rate increase on mortgage interest payments, which are very prominent in the UK due to the prevalence of floating-rate mortgages.

Using the Decision Maker Panel survey responses around Monetary Policy Committee meetings, we find that firms revise their pricing plans in response to both actual and information-cleaned policy rate changes, but not to high-frequency market-based surprises. The revisions of firms' pricing plans are in line with theoretical predictions and are predominantly driven by the left tails of their expected price change distribution. We also document that firms' expectations are most responsive to policy rate adjustments of 50 basis points or more. Large rate hikes at the peak of the recent tightening cycle were central to the observed revision in firms' pricing plans. Furthermore, we find that news coverage of the Bank of England increases following rate changes, underscoring the role of media as a key communication channel.

Overall, central bank announcements do affect firms' price expectations in the desired direction, although firms appear to exhibit a lower degree of sophistication in expectation formation compared to financial markets. As firms ultimately set prices, it becomes imperative for central banks to understand how these agents react to policy announcements. Recognizing the specificities of firms' behavior, relative to other economic agents, is critical for monetary authorities to shape effective communication strategies and correctly assess the impact of their policy decisions.

Data availability

The data that has been used is confidential.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT and Grammarly in order to improve readability and grammar check the manuscript. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.jmoneco.2024.103648.

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