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Robin Braun,⁽¹⁾ Silvia Miranda-Agrippino⁽²⁾ and Tuli Saha⁽³⁾

Abstract

We introduce the UK Monetary Policy Event-Study Database (UKMPD), a new and rich dataset of high-frequency monetary policy surprises for the United Kingdom. Intraday surprises are computed around the Bank of England's Monetary Policy Committee's announcements, as well as around the press conference that follows the publication of the quarterly Monetary Policy Report. The dataset also includes factors that disentangle the different dimensions of UK monetary policy. We use the data to estimate the causal effects of UK monetary policy, and provide novel insights on how financial markets have responded to the changes in the communication strategy of the Bank of England.

Key words: UK monetary policy surprises, event-study, intraday, monetary policy transmission, dataset.

JEL classification: E43, E44, E52, E58, G14.

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1 Introduction

The study of monetary policy and its effects have regained central attention in recent decades. This particularly after the financial crisis of 2008 and subsequent Great Recession, when many central banks resorted to alternative tools to achieve their remits while short-term rates were at their effective lower bounds. And again more recently, after interest rates have quickly risen in most advanced economies to face off the risks that a sudden and persistent inflationary environment posed.

Empirical studies on the effects of monetary policy focus almost exclusively on the US and the Euro Area (EA). This is undoubtedly a reflection of the prominent role of the Federal Reserve and the European Central Bank on the global scene. But it is also in large part due to the fact that a systematic recording of the intraday reaction of financial markets to central bank announcements — regarded as the standard to empirically assess the effects of monetary policy — has only been available for these currency areas.

This paper makes two distinct contributions. First, we introduce the UK Monetary Policy Event-Study Database (UKMPD), a rich and novel dataset of intraday monetary policy surprises for the UK which we have assembled to the same standards of those constructed for the US (Gürkaynak, Sack and Swanson, 2005) and the EA (Altavilla, Brugnolini, Gürkaynak, Motto and Ragusa, 2019). The UKMPD collects high-frequency reactions of a wide array of asset prices around the Bank of England's Monetary Policy Committee's decisions announcements, as well as around the press conferences that accompany the publication of the quarterly Monetary Policy Report. The dataset includes data on interest rate futures, treasury (gilt) yields and overnight index swaps, as well as the stock market and exchange rates. The data are made available since 1997, the year that the Bank of England (BOE) was granted operational independence over monetary policy, and we expect it to be regularly updated.¹

Second, we use the UKMPD to provide the first comprehensive assessment of the Bank of England's monetary policy, and of its effects on financial markets and macroeconomic aggregates. We separately discuss the effects of conventional monetary policy shocks that operate primarily via changes in the level of the policy rate — Bank Rate —, of the Monetary Policy Committee's (MPC) communication about the future path of policy, and of QE announcements. We measure these different dimensions of monetary policy using the methodology developed in Gürkaynak, Sack and Swanson (2005) and Swanson (2021).

¹The UKMPD is available for download at https://tinyurl.com/BOESWP1050-UKMPD.

Similarly to the Fed and the ECB, BOE policy announcements elicit strong responses of financial markets, and with a pattern that conforms to the type of policy signal that we consider. Bank Rate shocks tend to move shorter maturity interest rates the most, while communication and QE announcements have larger effects at longer maturities.² The stock market and the value of the British pound also respond strongly, particularly to Bank Rate and QE news. Announcements of asset purchases, as well as the communication of their features, have successfully steered financial markets while the policy rate was at its effective lower bound, thus providing an effective additional policy lever to the MPC.

The BOE also records the voting pattern of the MPC, which allows us to analyse whether the effect of policy news depends on the degree of dissent amongst Committee members (Gerlach-Kristen, 2004; Riboni and Ruge-Murcia, 2014). Unconditionally, when a subset of MPC members votes in favour of a more restrictive policy stance, this is typically associated with easing policy news in financial markets, suggesting that MPC dissent reflects to some extent the distribution of markets expectations around policy decisions. We find that financial markets extract significant policy news from MPC dissent. In particular, markets extract tightening news about the possible future path of policy when a subset of MPC members votes in favour of a higher Bank Rate.

We also provide novel evidence on how financial markets have interpreted and have reacted to the changes in the communication strategy of the MPC that started with the introduction of the BOE Super Thursdays in August of 2015. Previously, the MPC met every month, and Bank Rate decisions were announced together with a brief accompanying statement. The main monetary policy publication, at the time called the Inflation Report (IR), followed a quarterly publication schedule and was typically published two weeks after the Bank Rate decision of the same month. The press release that followed the publication of the IR offered a chance for the MPC to share insights into the rationale for the decisions, and to discuss the prevailing judgements that concurred to inform their view of the UK macroeconomic outlook. Starting from August 2015, MPC meetings and policy decisions have been moved to a six-week cycle and, once every quarter, the monetary policy decisions are released together with the publication of the Monetary Policy Report, and of the meeting's minutes. A press conference then follows on the same day.

²As we discuss more in detail in Section 2, BOE's Target shocks capture short-term monetary policy in a somewhat broader sense relative to equivalent factors extracted for the Fed and the ECB. This is due to sufficiently liquid short-maturity interest rate futures contracts in the UK embedding a three-month maturity. Thus, a Bank Rate shock as defined in this paper has a broader connotation than in the US and EA.

We show that before Super Thursdays, Bank Rate announcements contained little information about the future stance of policy. This was then revealed to market participants on the day of the publication of the Report, during the press conference. This configuration has shifted considerably over the years. Over the most recent sample, the bulk of monetary policy news has been more concentrated around the medium-term policy stance, which is inferred by markets at the time of the policy announcements. Thus, MPC decision announcements have become the primary source of information about monetary policy in the *medium* term, and elicit strong responses of interest rates across the maturity spectrum, of the British pound against the Euro and US dollar, and of the broad stock market. Conversely, the press conference is now a relatively less dominant source of monetary policy news, while still providing the public with important information around the prevailing judgements on the evolution of the UK economic outlook. Press conferences that reveal the composition and features of complex stimulatory packages are the exception.

We also study the effects of UK monetary policy shocks on macro aggregates using a standard VAR framework. Our results show that Bank Rate decision shocks lead to standard type of responses to conventional monetary policy shocks. A oneoff Bank Rate increase leads to a rise in corporate spreads and sudden repricing in the stock market. Output exhibits a more sluggish response, and contracts over the subsequent year. The inflation response is subdued, but becomes more pronounced when considering a shock to the medium-term policy path, which also elicits a stronger and more prolonged appreciation of the pound. These shocks also lead to a more frontloaded fall in output.

Previous studies that have analysed the transmission of monetary policy shocks in the UK using high-frequency identification have typically relied on a single measure of monetary policy surprises as embedded in a single short-term interest rate futures (Miranda-Agrippino, 2016; Gerko and Rey, 2017; Cesa-Bianchi, Thwaites and Vicondoa, 2020). None of these earlier works had provided a systematic analysis of the reaction of financial markets to UK monetary policy shocks, nor a distinction between the effects of different types of policy news. Reeves and Sawicki (2005) studied the effect of the Bank of England's communication using the variance of asset prices around announcements. More recently, Mumtaz, Saleheen and Spitznagel (2023) have provided a detailed analysis of the information content of MPC speeches, and have shown that financial markets respond strongly to this type of communication. Kaminska and Mumtaz (2022) apply a term structure model to monetary policy surprises in gilt yields to study the monetary policy transmission in the UK during QE. Our paper complements and expands upon this existing research. More broadly, our paper connects to the large and growing literature that relies on high-frequency identification to estimate the causal effects of monetary policy, building on the seminal work of Kuttner (2001).

The remainder of the paper is organised as follows. Section 2 introduces the Bank of England's communication flow and describes in detail the construction and content of the UKMPD. Sections 3 and 4 collect our main results on the transmission of monetary policy on financial markets and the aggregate economy respectively. Finally, Section 5 concludes. Additional results are reported in the online Supplementary Material.

2 Measuring UK Monetary Policy Surprises

In this section we describe the content of the UK Monetary Policy Event-Study Database (UKMPD). We start with a primer on the policy cycle and communication flow of the Bank of England's Monetary Policy Committee. This serves as a background to motivate the list of relevant monetary policy events. The remainder of the section describes in detail how we have computed the monetary policy surprises, and the content of the database. The UKMPD is available at https://tinyurl.com/BOESWP1050-UKMPD.

2.1 The Bank of England's Policy Cycle and Communication Schedule

The Bank of England was granted operational independence over monetary policy in 1997. At its inception, the Monetary Policy Committee convened once a month, and used the policy interest rate — Bank Rate — to meet its inflation target.³ Monetary policy announcements were typically scheduled for 12:00 noon local time, and always included a brief statement that accompanied the monetary policy decision. Once a quarter, in February, May, August and November, the BOE also published its Inflation Report (IR), the main monetary policy publication which also included the official forecasts. The publication of the IR was typically scheduled a week after the Bank Rate announcement, at 10:30 local time, and it was immediately followed by a 1-hour press conference. The press conference offered an outlet for the MPC to discuss the main projections for the UK economy included in the Report, the key conjunctural issues, and the rationale behind the monetary policy decisions and

³Until 2003 the inflation target was defined in terms of the retail price index excluding mortgage interest rates. Since 1997, the target was set to 2.5 percent annual rate. From 2003 onward, the inflation target has been specified to be 2 percent as measured by the 12-month increase in the consumer price index (Cloyne and Hürtgen, 2016).

stance. The minutes of each MPC decision meeting were published two weeks after each announcement, at 9:30 local time.⁴

During these initial years, the information content of the minutes was somewhat downplayed by the delay with which they were made available to the public. Moreover, the release of the minutes often coincided with data releases that are also likely to substantially influence markets. For example, the publication often coincided with the release of the Labour Force Survey — which includes the release of unemployment figures —, of statistics on money and lending activities and, in some instances, even of GDP figures. Due to these limitations, we do not include the release of the minutes in the set of the policy relevant events in this earlier part of the sample.

Since August 2015, the monetary policy cycle of the BOE was changed to follow a six-week cycle, which reduced the number of decision meetings from twelve to eight per year. Moreover, in an attempt to improve transparency, the MPC communication flow was also revised, and the delays in the publication of the IR and minutes removed. Currently, the monetary policy decision, statement and minutes of each meeting are released jointly, on a Thursday, at 12:00 local time. The main monetary policy publication, later renamed the Monetary Policy Report (MPR), maintained the same quarterly publication cycle. When due, it is published together with the monetary policy decision, and the associated press conference is scheduled on the same day, from 12:30 to 13:30 (originally from 12:45 to 13:45). This quarterly occurrence has come to be known of as the BOE's "Super Thursday".⁵

The MPC has traditionally conducted monetary policy by setting the desired Bank Rate level, either as its sole instrument, or as its primary instrument in most recent years. While forward guidance was not explicitly part of the toolkit until 2013, communication around the future conduct of monetary policy has featured in the statements and minutes numerous times. For example, as early as August 1997, the Committee communicated that "monetary policy has now reached a position at which it should be possible to pause in order to assess the direction in which the risks are likely to materialise".⁶ As the policy rate reached its effective lower bound in 2009, the MPC expanded the set of tools at its disposal, and launched its first large-scale asset purchase programme — or quantitative easing, QE — in March of 2009. QE-related announcements are communicated jointly with Bank Rate decisions, and following the same six-week cycle.

 $^{^4\}mathrm{Before}$ October 1998, the minutes were published with a six week lag (Reeves and Sawicki, 2005).

⁵A schematic depiction of the changes in the BOE policy and communication cycles is reported in the online Supplementary Material.

⁶See https://www.bankofengland.co.uk/inflation-report/1997/august-1997.

The MPC communicates with the public also through speeches. While these can reveal relevant information around the conduct of monetary policy, or around the perceived outlook and indicators that are most salient in informing each member's judgement, they are typically given outside of market operating hours, and do not follow a predetermined schedule. For these reasons, we exclude these events from our database.⁷

2.2 The UKMPD

The UK Monetary Policy Event-Study Database (UKMPD) collects high-frequency changes in a variety of asset prices computed around MPC announcements and main publications since 1997. Moreover, it includes structural factors that are meant to capture the different dimensions of UK monetary policy. We discuss each in turn in what follows. A more detailed description of the data and the estimation procedure is reported in the online Supplementary Material.

2.2.1 High-Frequency Monetary Policy Surprises & Measurement Windows

Following Gürkaynak et al. (2005), we define monetary policy surprises as highfrequency revisions in asset prices around monetary policy events. To ensure that no competing events distort the measurement, monetary policy surprises are calculated over narrow time windows that bracket the announcements, as the difference between the price that prevails before and after the relevant monetary policy event.

As is customary, for monetary policy decisions we use a 30-minute measurement window, from 10 minutes before to 20 minutes after the announcement. For the press-conference that follows the release of the IR/MPR, we instead use a longer 75-minute window, from 10 minutes before its beginning to 5 minutes after its end. To avoid misquotes, and following Altavilla et al. (2019), for each event we define the pre-event price as the median quote in the ten minutes before the beginning of each window, and the post-event price as the median quote in the 10 minutes after the end of each window. Figure 1 summarises the details using the post Super Thursday schedule as an example. The intraday tick data are from Refinitiv Tick History.⁸

The evolution of the policy cycle and communication schedule discussed previously imply that the measurement windows will include different events over the sample. In the pre Super Thursday sample (1997-2015), the announcement window

⁷See Mumtaz et al. (2023) for a detailed study of the information content of MPC speeches. ⁸https://www.refinitiv.com/en/market-data/data-feeds/tick-history

includes Bank Rate and other policy announcements (e.g. QE from 2009) and the release of the policy statement. The press conference window instead includes the publication of the IR and the whole duration of the press conference. In the post Super Thursday sample (2015-2023), the press conference window only covers the actual press conference. Policy decisions, the publication of the MPR, as well as the release of the minutes and the statement all enter the announcement window.⁹ Accordingly, we make available two versions of the dataset, one for each measurement window. The data cover the period from August 1997 to December 2023, for a total of 286 decision announcements, and 106 press conferences. In the empirical section that follows we also make use of a monetary event window. This is obtained as the union of the announcement and press conference windows. In the pre Super Thursday sample, this translates into an increased number of daily events, due to the announcement and press conference happening on different days over that sample. In the post Super Thursday sample, the monetary event window yields the sum of the price movements across the two windows, which since 2015 happen on the same day.

High-frequency surprises in asset prices that are directly linked to monetary policy expectations — such as e.g. overnight index swaps (OIS) or interest rate futures allow us to map the degree to which the monetary policy event triggered a revision in market-based expectations about the path of policy. Surprises in other asset prices, such as the stock market index or the exchange rate, capture the response of these markets to the decisions. Taken in conjunction, the monetary policy surprises from different asset prices allow to gauge how markets interpret the monetary policy decisions. For example, an easing surprise in OIS rates — which can result from the policy rate being lowered by more than expected, or it being hiked by less than expected — can be accompanied by either positive or negative surprises in the stock market. Jarociński and Karadi (2020) interpret the first case as a conventional monetary policy shock, while attributing the second to information effects, that is, to the central bank implicitly revealing information about deteriorating conditions ahead.¹⁰

To measure expectations about short-term interest rates, we include in the dataset a collection of different instruments. Firstly, the first four quarterly Short Sterling Futures contracts, that capture maturities from three months to one year ahead. Al-

⁹Said differently, the announcement window includes the policy announcement and statement throughout the whole sample. Similarly, the press conference window includes the press conference throughout the entire period. The publication of the IR/MPR switches from being included in the press conference window pre 2015 to being included in the announcement window post 2015. The minutes enter the announcement window post 2015 but are not captured in the pre 2015 sample.

¹⁰See also Melosi (2017); Nakamura and Steinsson (2018); Miranda-Agrippino and Ricco (2021) among others.

FIGURE 1: MEASUREMENT WINDOWS FOR POLICY SURPRISES



Panel A: Announcement Window

Panel B: Press Conference Window



Notes: The figure sketches the measurement windows used for constructing the monetary policy surprises. For policy announcements (Panel A) we use a 30-minute window, from 10 minutes before to 20 minutes after the event. For press conferences (Panel B) we use a 75-minute window, from 10 minutes before to 5 minutes after the event. For each window, we define the pre-event price as the median quote in the pre-event window which covers the 10 minutes prior to the beginning of the measurement window, and the post-event price as the median quote in the post-event window which covers the 10 minutes after the event window which covers the 10 minutes prior to the beginning of the measurement window after the end of the measurement window.

though based on the 3-month Libor, historically these futures have been considered as the most liquid measures of interest rate expectations in the UK, and are available since 1997 (Joyce, Relleen and Sorensen, 2008). In 2021, the Libor-based futures were phased out. As a result, from that point onward we switch to futures that are based on the 3-month SONIA rate instead, at equivalent maturities.¹¹ Secondly, we include OIS rates ranging from one month to two years maturities. While more directly linked to Bank Rate expectations, OIS rates are only consistently available since the end of 2008. To measure medium to long-term interest rate expectations, we include gilt (i.e. UK Treasury) yields. We use the 1, 2, 5 and 10-year reference bonds as defined by Refinitiv. The database also includes high-frequency surprises in the stock market — FTSE 100, FTSE 250 and FTSE All Share — and the bilateral exchange rates of the British pound against the Euro and the US dollar.

Figure 2 plots the evolution of the 2-year gilt yield around two monetary policy events as an illustration. The left panel refers to the Super Thursday of the 4th of August 2016. At its previous meeting in July, the first after the vote to leave the European Union, the MPC had maintained policy unchanged, but noted that "most members of the Committee expect monetary policy to be loosened in August. The precise size and nature of any stimulatory measures will be determined during the August forecast and Inflation Report round".¹² At its August meeting, the MPC voted to lower the policy rate by 25bps, to 0.25%, and introduced a rich and extensive package of stimulative measures.¹³ While the introduction of further measures had been largely anticipated, the size and composition of them had not, which resulted in gilt yields declining significantly during the announcement.

The right panel of the figure refers instead to the policy decision of the 30th of January 2020. The evolution of the 2-year gilt yield is in this case the result of a change in the MPC guidance about the future path of policy. Indeed, at this meeting the MPC had voted to maintain the policy rate at its 0.75% level, and to maintain its stock of bond purchases unchanged. However, while the Committee continued to judge the existing stance to be appropriate, it changed the language around its policy guidance. At its previous meeting in November of 2019, the Committee had noted that "Further ahead [...] some modest tightening of policy, at a gradual pace and to a limited extent, may be needed to maintain inflation sustainably at the target." In

¹¹See https://www.ice.com/products/68361266/Three-Month-Sonia-Index-Futures.

¹²See https://www.bankofengland.co.uk/monetary-policy-summary-and-minutes/2016/mpc-july-2016.

¹³This included a new Term Funding Scheme to reinforce the pass-through of the Bank Rate cut; the purchase of up to £10 billion of UK corporate bonds; and an expansion of the asset purchase scheme for UK government bonds of £60 billion, taking the total stock of these asset purchases to £435 billion. See https://www.bankofengland.co.uk/monetary-policy-summary-and-minutes/2016/mpc-august-2016.



FIGURE 2: 2-YEAR GILT YIELDS AROUND SELECTED EVENT

Notes: Evolution of the 2-year gilt yield around selected monetary policy events. Times are expressed in GMT and account for the switch to British Summer Time that occurs between March and October each year. The shaded areas denote the pre-event (blue) and post-event (orange) windows used to calculate the pre and post event prices for the calculation of the monetary policy surprises. Source: Refinitiv.

January, the qualification "at a gradual pace and to a limited extent" was removed, which resulted in gilt yields drifting upwards following the announcement.¹⁴

2.2.2 High-Frequency Monetary Policy Factors

Increasingly, and particularly since the policy rate reached its effective lower bound following the financial crisis of 2008, the MPC has conducted monetary policy through different tools designed to affect specific segments of the yield curve. While conventional Bank Rate policy was aimed predominantly at the short-end, alternative interventions such as forward guidance and QE aim at affecting rates expectations at substantially longer maturities.

Capturing the different components of policy is not a trivial task. In their seminal contribution, Gürkaynak et al. (2005) showed how structural factors could be used to summarise the market reaction to policy decisions at different points of the maturity spectrum. They identified a Target factor that summarised the immediate policy rate decision, and a Path factor that instead captured information about the future path of policy, thus embedding both implicit and explicit forward guidance. Swanson (2021) further developed this intuition to capture the effects of QE announcements. Intuitively, the factors summarise variation in monetary policy surprises at the short,

¹⁴See https://www.bankofengland.co.uk/monetary-policy-summary-and-minutes/ 2019/november-2019 and https://www.bankofengland.co.uk/ monetary-policy-summary-and-minutes/2020/january-2020.

medium and long end, and can be used to separate combination of policy tools based on the maturity they most directly target.

To estimate the UK-specific factors, we apply the model in Swanson (2021) to monetary surprises in the first four short sterling futures, and in the 2, 5 and 10-year gilt yields. The estimation proceeds in two steps. First, principal components are used to summarise the common variation in the monetary surprises in the seven asset prices.¹⁵ Second, additional identifying restrictions are imposed to pin down the structural factors and facilitate their interpretation. Out of the three estimated factors, only the first one (Target) is allowed to load on the first short sterling futures. To distinguish between the second (Path) and third (QE) factors, the variance of the latter is minimised over the pre-2009 sample. The factors are orthogonal to one another by construction.

The presence of press conferences throughout the sample period makes the BOE policy cycle more similar to that of the ECB than of the Fed. In this sense, the construction of the UKMPD shares many similarities with the EAMPD of Altavilla et al. (2019). However, owing to the evolution of the BOE policy cycle and to the composition of the dataset, we make two main departures relative to their study. Firstly, we allow for a Target factor during the press conference window. This is due to UK futures data not permitting a consistent measurement of policy rate expectations at the very short-end of the maturity spectrum throughout the sample. As noted above, short sterling futures settle based on the interest rate of a threemonth deposit. As a result, the front contract in the matrix of surprises used for the factor extraction embeds a 3-month horizon, which typically covers at least two upcoming MPC decision meetings. For this reason, we allow for a Target factor to be potentially present also during the press conference, where information about the policy trajectory in the immediate future is likely to be released. This is different from what is done in Altavilla et al. (2019) where the shortest maturity contract is the 1-month OIS.¹⁶ Secondly, we perform the factor extraction after having pooled together the monetary surprises measured across both the announcement and press conference windows. That is, the number of observations used is equal to 392 (286 policy decisions plus 106 press conferences). We then attribute the observations in

¹⁵A formal Cragg-Donald test suggests the presence of three factors in the UK, similar to what found for the US (Swanson, 2021), and the euro area (Altavilla et al., 2019). The factors collectively explain 99% of the common variation of the monetary policy surprises, with the individual shares for the Target, Path and QE being respectively 61%, 17%, and 21%.

¹⁶In an alternative identification scheme, we disentangle the Target and Path factors by minimising the variance of the former during the press conference window. In turn, this allows to relax the exclusion restriction of the Path factor on the first quarterly futures. As discussed in the supplementary online material, the alternative identification scheme yields very similar factors which are made available upon request.

each factor to the MPC or PC window ex post. This is supported by formal statistical tests suggesting the presence of three factors in the policy surprises around MPC announcements, three factors in the policy surprises around the press conferences, and three factors when both types of surprised are pooled (see online supplementary material). Our choice of pooling together all the observations is further motivated by the publication of the IR/MPR switching window over the sample. Pooling the observations allows for a more consistent treatment of this feature while ensuring orthogonality of the factors throughout the sample. However, we verify in the online supplementary material that our results are robust to extracting two sets of different factors specific to each window.

The UK factors behave very similarly to those extracted using either US or EA policy surprises in previous studies, with the important difference that due to the 3-month maturity of the front short sterling contract, the UK Target factor captures short-term policy in a somewhat broader sense than equivalent factors for the US and EA. The loadings of the Target factor decrease as the maturity lengthens, while the opposite is true for the QE factor, which has largest loadings associated with the 5and 10-year gilt yields. The Path factors loads mostly on medium-maturity interest rates, with a peak around the 1-year horizon. The Path factor loads more heavily at the 1 year horizon compared to the US and EA factors which have instead somewhat higher loadings at maturities between 1 and 2 years.¹⁷ The largest readings of the Target factor are associated with the policy easing decisions taken in response to the financial crisis of 2008, with the 150bps Bank Rate cut of November 2008 as the single largest observation in our sample. Large Target surprises tend to happen during meetings that are not associated with an IR/MPR publication. It is also worth noting that there is generally little variation in the Target factor during the press conferences. The largest observation of the Path and QE factors are instead more recent, and registered during the Covid pandemic and subsequent recovery. The largest Path surprise is February 2022, when it became clear that a hiking cycle had begun, and that the indicative Bank Rate threshold that the MPC had set to start reversing QE was nearer than previously thought. Very interestingly, the largest QE surprise does not correspond to the first QE round of 2009, which had been amply communicated in advance, and is instead associated with the additional $\pounds 200$ billion of asset purchases that were announced in March of 2020 after the UK economy had entered its first lockdown.

UK short-term rate surprises tend to be heavier-tailed than in the US and the EA. This is especially true in the period around the financial crisis of 2008, where the UK registered the sharpest moves in the front-end, potentially reflecting somewhat

¹⁷The factors and associated loadings are plotted in the online supplementary material.

higher uncertainty around policy relative to the other regions. Conversely, large Path and QE surprises seem to be more prevalent for the US and EA respectively, which may reflect different combinations of policy tools used by the three central banks (see online supplementary material).

3 The response of UK asset prices to monetary policy news

In this section we use the monetary policy factors to study how financial markets respond to the different pieces of information released by the MPC. We consider different subsamples to study how the change in the communication strategy that started with the Super Thursdays has affected how markets process monetary policy news. And explore the extent to which dissent amongst MPC members around the appropriate Bank Rate level influences the response of asset prices to monetary policy news. Results on the effects of QE announcements are presented separately due to the different sample over which this tool was used.

We study the reaction of financial markets to monetary policy news using regressions of the form

$$\Delta y_t = \alpha + \beta Target_t + \gamma Path_t + \delta QE_t + \epsilon_t , \qquad (1)$$

where Δy_t denotes the daily or intradaily change in the relevant asset price, and $Target_t$, $Path_t$ and QE_t are the monetary policy factors all normalised such that an increase in the factor corresponds to a tightening of the monetary policy stance.

Using a narrow measurement window guarantees that, absent other contemporaneous events, the monetary policy surprises (and related factors) measure the extent to which the decision was interpreted as a surprise, or news, by market participants. However, whether that price revision can be used to proxy for a monetary policy shock is a different matter. As noted earlier, confounding factors such as information effects may still be present.

In what follows, we identify days when policy news was prevalent using the 'poor man' sign restrictions of Jarociński and Karadi (2020), that is, based on whether the contemporaneous comovement between stock prices and bond yields is negative.¹⁸ Specifically, we identify monetary policy news days as those where the high-

¹⁸An alternative procedure would be to control for the official forecasts as proposed in Miranda-Agrippino and Ricco (2021). In a recent paper, Bauer and Swanson (2023) show that when estimating the effects of monetary policy on survey expectations, the confounding effect can also be resolved by projecting on the news in macroeconomic data that are released between the time at which the survey is conducted, and the time of the central bank announcement.



FIGURE 3: HIGH-FREQUENCY COMOVEMENT BETWEEN UK MONETARY POLICY FACTORS AND THE STOCK MARKET

Notes: Scatter plots of the intraday comovement between the factors and the FTSE 250 stock market index. In the top panels the factors are computed around MPC announcements, while in the bottom panel using the press conference (PC) window. The darker markers denote observations that align with the theoretical responses to monetary policy as in Jarociński and Karadi (2020).

frequency correlation between each of the extracted factors and the FTSE 250 index is negative.¹⁹

Figure 3 plots the high-frequency comovement between the factors and the stock market index distinguishing between MPC decisions (top row) and press conferences (bottom row). The darker colour highlights policy news days. We note that it is generally the case that markets interpret monetary policy announcements as revealing monetary policy news (top panels of the figure). The correlation is negative in most cases, but there exists a non-trivial number of instances in which the market response to the policy decision reflects the presence of information effects (hollow circles). This effect becomes more pronounced when considering the Path factor, and particularly when the factor is extracted around the press conference.

Jarociński (2020) and Miranda-Agrippino and Nenova (2022) note how information effects tend to be more prevalent around ECB announcements than around Fed announcements. This phenomenon is explained by the ECB adopting a more

¹⁹We use the FTSE 250 as the reference stock market index as it covers companies that collect revenues mostly in the UK, and are thus more closely tied to the UK economy. Results are largely equivalent when using the FTSE All Share for the sign restrictions.

transparent communication strategy with the public, relative to the Fed. For example, while the Fed introduced press conferences only in 2011, these were part of the communication strategy of the ECB since 1999. Moreover, the ECB publishes staff forecasts promptly after they are produced, whereas Fed's staff forecasts are typically only released with a five-year lag. The communication schedule of the ECB resembles that of the BOE, insofar as both central banks regularly and promptly publish their official forecasts, and have regularly made use of press conferences to communicate with the public. Consistently, we find that like for the ECB, a little over half of the BOE surprises are classified as monetary policy events, with the share raising to 60% for Bank Rate announcements.

3.1 Intraday Reactions

Table 1 collects the intraday reaction of the nominal gilt curve at maturities 1, 2, 5 and 10 years, of the bilateral exchange rates with the Euro and US dollar, and of the main stock market indices to the Bank of England's monetary policy communication over the full sample, from June 1997 to December 2023. Panel A uses all the MPC interest rate decisions. Panel B only those Bank Rate decisions that are identified as conveying monetary policy news using the sign restriction discussed above. Finally, Panel C considers the monetary policy news in the monetary event window that combines MPC Bank Rate announcements and MPR press conference.

Comparing the results in Panels A and B reveals how accounting for information effects is important to correctly estimate the responses, particularly for the Path factor. For short-term Bank Rate decisions, information effects are not strong enough to flip the sign of the average market response. Looking at the results in Panel A, we see that a positive Bank Rate surprise, or equivalently, a surprise policy tightening, moves the full nominal gilt curve upwards, with effects that decay in magnitude as the maturity increases. The British pound appreciates against both currencies, and the stock market declines. Surprisingly, however, Bank Rate decisions seem to elicit a very strong response also at very long maturities, even though the R^2 of the regression is very low. Similarly, MPC communication over the medium term seems to have no strong effects on financial markets, except for the short end of the curve. Results in Panel B show that these conclusions are a consequence of the confounding operated by information effects.

Once this is properly accounted for, a more reasonable pattern of responses emerges. Bank Rate decisions cease to move the long end of the curve, while the response of the exchange rate and the stock market remains largely unchanged. MPC communication about the future path of policy as embedded in Bank Rate decisions

	GBT1Y	GBT2Y	GBT5Y	GBT10Y	GBPEUR	GBPUSD	FTSEAS	FTSE250	FTSE100	
Panel A:	Announcem	ent window								
TARGET	$\begin{array}{c} 0.617^{***} \\ (0.064) \\ [9.665] \end{array}$	0.525^{***} (0.063) [8.358]	$\begin{array}{c} 0.377^{***} \\ (0.048) \\ [7.881] \end{array}$	$\begin{array}{c} 0.207^{***} \\ (0.043) \\ [4.824] \end{array}$	1.391^{*} (0.731) [1.903]	$1.790^{***} \\ (0.684) \\ [2.617]$	-2.372*** (0.863) [-2.750]	-2.626^{***} (0.512) [-5.125]	-2.321^{***} (0.445) [-5.216]	
PATH	$\begin{array}{c} 0.416^{***} \\ (0.106) \\ [3.913] \end{array}$	$\begin{array}{c} 0.469^{***} \\ (0.097) \\ [4.837] \end{array}$	0.209^{*} (0.127) [1.652]	0.037 (0.137) [0.268]	$1.888^{**} \\ (0.797) \\ [2.368]$	1.454^{*} (0.803) [1.809]	$\begin{array}{c} 0.051 \\ (1.180) \\ [0.044] \end{array}$	-1.257 (0.976) [-1.288]	-1.069 (0.940) [-1.137]	
R^2 N	$0.622 \\ 285$	$0.580 \\ 285$	$0.322 \\ 285$	$0.110 \\ 285$	$0.093 \\ 274$	$0.115 \\ 286$	$0.161 \\ 285$	$0.203 \\ 285$	$0.188 \\ 285$	
Panel B: Announcement window, monetary policy news										
TARGET	$\begin{array}{c} 0.648^{***} \\ (0.103) \\ [6.289] \end{array}$	0.540^{***} (0.108) [5.019]	0.270^{**} (0.105) [2.574]	$\begin{array}{c} 0.119 \\ (0.083) \\ [1.438] \end{array}$	1.503^{**} (0.728) [2.064]	$ \begin{array}{r} 1.916^{***} \\ (0.713) \\ [2.685] \end{array} $	-1.850*** (0.682) [-2.714]	-2.948^{***} (0.519) [-5.676]	-2.667*** (0.500) [-5.335]	
PATH	$\begin{array}{c} 0.643^{***} \\ (0.137) \\ [4.702] \end{array}$	$\begin{array}{c} 0.698^{***} \\ (0.131) \\ [5.325] \end{array}$	$\begin{array}{c} 0.635^{***} \\ (0.200) \\ [3.167] \end{array}$	$\begin{array}{c} 0.514^{**} \\ (0.216) \\ [2.378] \end{array}$	3.455^{**} (1.514) [2.283]	3.043^{**} (1.377) [2.210]	-1.226 (0.850) [-1.443]	-1.534* (0.916) [-1.674]	-1.514* (0.870) [-1.739]	
R^2 N	$0.857 \\ 86$	$\begin{array}{c} 0.828\\ 86 \end{array}$	$\begin{array}{c} 0.601 \\ 86 \end{array}$	$\begin{array}{c} 0.415\\ 86 \end{array}$	$\begin{array}{c} 0.252 \\ 82 \end{array}$	$\begin{array}{c} 0.267 \\ 86 \end{array}$	$\begin{array}{c} 0.409 \\ 85 \end{array}$	$\begin{array}{c} 0.497 \\ 85 \end{array}$	$0.515 \\ 85$	
Panel C: Announcement & Press Conference window, monetary policy news										
TARGET	0.634^{***} (0.099) [6.375]	0.575^{***} (0.106) [5.439]	$\begin{array}{c} 0.276^{***} \\ (0.098) \\ [2.825] \end{array}$	$\begin{array}{c} 0.172^{**} \\ (0.071) \\ [2.445] \end{array}$	1.756^{**} (0.836) [2.100]	$\begin{array}{c} 1.972^{***} \\ (0.742) \\ [2.658] \end{array}$	-1.508** (0.701) [-2.150]	-3.063*** (0.491) [-6.242]	-2.717^{***} (0.480) [-5.657]	
PATH	$\begin{array}{c} 0.735^{***} \\ (0.109) \\ [6.728] \end{array}$	0.640^{***} (0.111) [5.745]	$\begin{array}{c} 0.635^{***} \\ (0.147) \\ [4.315] \end{array}$	0.375^{**} (0.154) [2.440]	$2.580 \\ (1.645) \\ [1.568]$	2.594** (1.208) [2.147]	-2.364** (1.059) [-2.233]	-0.895 (0.768) [-1.165]	-1.176 (0.757) [-1.554]	
R^2 N	$0.828 \\ 112$	$0.767 \\ 112$	$0.552 \\ 112$	$0.348 \\ 112$	$\begin{array}{c} 0.204 \\ 107 \end{array}$	$0.237 \\ 112$	$0.383 \\ 111$	$0.390 \\ 111$	$\begin{array}{c} 0.419 \\ 111 \end{array}$	

TABLE 1: INTRADAY REACTIONS TO BOE POLICY COMMUNICATION

Notes: All regressions include a constant. The monetary policy news is extracted as in Jarociński and Karadi (2020). Sample: June 1997- December 2023. Coefficients are expressed in % points. Announcement Frequency. Robust SE in parentheses, t-stats in square brackets, * p < 0.1, ** p < 0.05, *** p < 0.01.

becomes very informative. Responses of the gilt curve are largest at the two-year horizon, and still very pronounced at longer maturities. The British pound responds very strongly to this type of monetary policy information. The stock market is also sensitive to longer horizon policy news, even though the estimates are less precisely estimated. Accounting for information effects also brings out the information content of monetary policy news more clearly, as highlighted by the much higher R^2 compared to Panel A.

Over the full sample, there does not seem to be additional information released during the MPR press conference. Indeed, the results in Panels B and C are largely equivalent. Results over the full sample however mask a large degree of subsample heterogeneity.

	GBT1Y	GBT2Y	GBT5Y	GBT10Y	GBPEUR	GBPUSD	FTSEAS	FTSE250	FTSE100
Panel A:	June 1997- 1	March 2009.	Announcen	nent window					
TARGET	$\begin{array}{c} 0.720^{***} \\ (0.121) \\ [5.975] \end{array}$	$\begin{array}{c} 0.593^{***} \\ (0.143) \\ [4.152] \end{array}$	$\begin{array}{c} 0.431^{***} \\ (0.099) \\ [4.364] \end{array}$	$\begin{array}{c} 0.306^{***} \\ (0.053) \\ [5.769] \end{array}$	$ \begin{array}{c} 1.075 \\ (0.876) \\ [1.227] \end{array} $	$2.086^{**} \\ (0.899) \\ [2.319]$	-2.088** (0.900) [-2.321]	-3.387*** (0.572) [-5.922]	-3.059*** (0.546) [-5.600]
РАТН	0.422^{**} (0.169) [2.498]	$0.507 \\ (0.307) \\ [1.653]$	$0.075 \\ (0.183) \\ [0.408]$	-0.100 (0.114) [-0.878]	2.954 (2.157) [1.370]	$1.045 \\ (2.203) \\ [0.474]$	$0.315 \\ (1.377) \\ [0.229]$	0.287 (0.905) [0.318]	$\begin{array}{c} 0.221 \\ (0.836) \\ [0.264] \end{array}$
R^2 N	$0.907 \\ 42$	$0.873 \\ 42$	$0.787 \\ 42$	$0.665 \\ 42$	$0.294 \\ 38$	$\begin{array}{c} 0.307 \\ 42 \end{array}$	$\begin{array}{c} 0.499 \\ 42 \end{array}$	$0.687 \\ 42$	$0.698 \\ 42$
Panel B:	June 1997- 1	March 2009.	Press Confe	erence windo	w				
TARGET	$\begin{array}{c} 0.987^{***} \\ (0.235) \\ [4.200] \end{array}$	$\begin{array}{c} 0.946^{***} \\ (0.162) \\ [5.848] \end{array}$	$\begin{array}{c} 0.840^{***} \\ (0.175) \\ [4.789] \end{array}$	0.555^{***} (0.167) [3.330]	$\begin{array}{c} 0.858 \ (1.876) \ [0.458] \end{array}$	$1.041 \\ (1.086) \\ [0.958]$	-0.543 (2.118) [-0.257]	-1.385 (2.582) [-0.536]	-1.453 (2.318) [-0.627]
РАТН	$\begin{array}{c} 0.475^{***} \\ (0.144) \\ [3.291] \end{array}$	$\begin{array}{c} 0.346^{***} \\ (0.066) \\ [5.212] \end{array}$	0.119* (0.060) [1.974]	0.017 (0.061) [0.273]	$ \begin{array}{r} 1.298 \\ (1.231) \\ [1.054] \end{array} $	$1.090 \\ (0.744) \\ [1.465]$	-4.089* (1.967) [-2.079]	-1.806 (1.184) [-1.525]	-2.138* (1.122) [-1.906]
R^2 N	$0.835 \\ 18$	0.873 18	$0.835 \\ 18$	0.623 18	-0.001 17	0.096 18	0.492 18	0.045 18	$0.154 \\ 18$
Panel C:	August 2015	5 - December	r 2023. Ann	ouncement w	vindow				
TARGET	$\begin{array}{c} 0.891^{***} \\ (0.165) \\ [5.384] \end{array}$	$\begin{array}{c} 0.906^{***} \\ (0.200) \\ [4.540] \end{array}$	$\begin{array}{c} 0.999^{***} \\ (0.219) \\ [4.566] \end{array}$	$\begin{array}{c} 0.706^{**} \\ (0.258) \\ [2.733] \end{array}$	$\begin{array}{c} 12.403^{***} \\ (3.700) \\ [3.352] \end{array}$	$ \begin{array}{r} 12.818^{***} \\ (4.294) \\ [2.985] \end{array} $	-8.975*** (1.095) [-8.196]	-8.736*** (2.786) [-3.136]	-8.613*** (2.197) [-3.921]
PATH	$\begin{array}{c} 0.501^{***} \\ (0.069) \\ [7.262] \end{array}$	$\begin{array}{c} 0.602^{***} \\ (0.056) \\ [10.739] \end{array}$	$\begin{array}{c} 0.501^{***} \\ (0.054) \\ [9.233] \end{array}$	$\begin{array}{c} 0.430^{***} \\ (0.084) \\ [5.109] \end{array}$	$\begin{array}{c} 0.794 \ (0.937) \ [0.847] \end{array}$	$\begin{array}{c} 0.848 \ (0.893) \ [0.949] \end{array}$	-0.068 (0.485) [-0.141]	$\begin{array}{c} 0.112 \\ (0.704) \\ [0.159] \end{array}$	0.074 (0.603) [0.122]
- 0	0.785	0.770	0.690	0.546	0.419	0.445	0.688	0.330	0.422

TABLE 2: INTRADAY REACTIONS TO BOE POLICY COMMUNICATION: SUBSAMPLES

Panel D: August 2015 - December 2023. Announcement & Press Conference window

TARGET	$\begin{array}{c} 1.240^{***} \\ (0.298) \\ [4.163] \end{array}$	$ \begin{array}{c} 1.167^{***} \\ (0.234) \\ [4.988] \end{array} $	$\begin{array}{c} 1.014^{***} \\ (0.322) \\ [3.149] \end{array}$	$\begin{array}{c} 0.856^{**} \\ (0.327) \\ [2.618] \end{array}$	$\begin{array}{c} 13.212^{***} \\ (3.615) \\ [3.655] \end{array}$	$\begin{array}{c} 13.052^{***} \\ (4.315) \\ [3.025] \end{array}$	-10.397*** (3.230) [-3.219]	-7.091** (3.012) [-2.354]	-7.600*** (2.642) [-2.876]
РАТН	$\begin{array}{c} 0.606^{***} \\ (0.113) \\ [5.385] \end{array}$	$\begin{array}{c} 0.422^{***} \\ (0.108) \\ [3.916] \end{array}$	$\begin{array}{c} 0.529^{***} \\ (0.108) \\ [4.902] \end{array}$	$\begin{array}{c} 0.168 \\ (0.138) \\ [1.222] \end{array}$	-1.331 (1.313) [-1.014]	-0.391 (1.154) [-0.339]	0.207 (0.744) [0.279]	1.685^{*} (0.905) [1.862]	1.393^{*} (0.752) [1.852]
R^2 N	$0.799 \\ 24$	0.662 24	0.518 24	$0.335 \\ 24$	$0.293 \\ 24$	$0.316 \\ 24$	$0.557 \\ 23$	0.083 23	0.166 23

Notes: All regressions include a constant and use only the monetary policy news of each factor. The monetary policy news is extracted as in Jarociński and Karadi (2020). Coefficients are expressed in % points. Announcement Frequency. Robust SE in parentheses, t-stats in square brackets, * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 2 repeats the same analysis over two subsamples. The first one (Panels A and B) ends with the financial crisis and the policy rate reaching its effective lower bound. The second subsample starts in August 2015, when the first Super Thursday occurred (Panels C and D). All the regressions in Table 2 use only the days where monetary policy news was prevalent. Over the first subsample, we separate the announcement from the press conference events. During this period the two events happened on different days. Over the second subsample we compare the effects of the announcement with that of the full monetary event (announcement and press conference). The small number of press conference events classified as monetary policy days in the latter subsample prevents us from focusing on these events separately.

We start with analysing the pre-crisis sample (Panels A and B). Two interesting patterns emerge. First, the Path factor computed around Bank Rate announcements only (Panel A) picks up no relevant variation beyond the first year, whereas it is more informative when computed around the press conference (Panel B) even though the smaller number of observations makes the estimates more uncertain. Thus, over this sample, markets extracted relevant information around the path of policy from the IR/MPR press conferences, rather than from the Bank Rate decisions. Second, and perhaps more strikingly, the behaviour of the Target factor is markedly different across the two measurement windows. At the announcement (Panel A), the pattern of coefficients mimics that obtained over the full sample. But, very interestingly, the Target factor for the press conference window (Panel B) induces a more homogeneous shift across the whole yield curve, thus capturing information well beyond the current stance. This signals that the bulk of the information around the current stance of policy was effectively contained within the Bank Rate decision announcements, while the press conferences captured most of the medium-term policy stance. It is worth recalling that, over this sample, the press conference window also includes the publication of the Inflation Report.

Taken together, these results show that over this sample the communication strategy of the MPC was perceived by financial markets to be fairly segmented. Bank Rate announcements contained all the relevant information about the current stance of policy. And all the information around the future stance was instead extracted from the Inflation Report and the associated press conference. This is a sample where the policy rate was the only active monetary policy instrument, and forward guidance featured less regularly in the MPC statements that accompanied the rate decision. At that time, the press conference was the main outlet through which further clarification about the monetary policy decision was provided. And the publication of the official forecasts included in the Report offered a view into the reaction function of the MPC and the prevailing judgements around the economic outlook. The response of financial markets over this period conforms very clearly with this setup.

Panels C and D of the table report results obtained in the sample that includes the Super Thursdays. A note of caution is in order, since restricting the attention to the last eight years in the sample drastically reduces the number of observations over which these regressions are run. As a result, all coefficients are typically estimated with a much larger degree of uncertainty. A further caveat is the peculiarity of this sample, which combines almost 6 years of ELB with the rapid Bank Rate increase from 0.1% to 5.25% over the last two years (we report results estimated up to 2021 in the online Supplementary Material). This notwithstanding, the results are informative on how market participants now perceive the MPC communication with the public.

Two results in particular are worth highlighting. First, the coefficients of the Path factor are strongly significant up to a 5-year horizon, and do not change across the two panels. This suggests that, differently from the previous sample, MPC announcements, rather than the press conference per se, have become the primary source of information about the monetary policy stance over the *medium* term. It is also worth noting that the number of press conferences classified as monetary policy events using the sign restrictions over this sample is tiny, which reinforces the view that most of the short and medium-term monetary policy news over this sample is contained in the announcements. Second, the coefficients of the Target factor become much larger and much more homogeneous across the maturity spectrum. This could be interpreted as a combination of the cross-maturity constraints induced by the ELB, and the effects of the large (and largely unexpected) sequence of Bank Rate increases in the latter part of the sample. Equally, it may also reflect an increasing effect of monetary policy news on term premia, particularly for what concerns the response of longer maturity interest rates (see e.g. Hanson and Stein, 2015; Kaminska, Mumtaz and Å ustek, 2021, amongst others).

Our last set of intraday results is reported in Table 3, where we collect the responses of the same set of asset prices to QE announcements over the sample 2009-2023. As done for the other factors, we separate announcement effects from those elicited during the press conference. And, as above, we normalise the factor such that a positive QE surprise signals a tightening of the policy stance. The results show that the Bank of England's QE policy was extremely effective at steering asset prices while short-term rates were at the ELB. The yield curve, the stock market, and the British pound all respond very strongly and very significantly to QE news. Very interestingly, the effects estimated over the announcement (Panel A)

	GBT1Y	GBT2Y	GBT5Y	GBT10Y	GBPEUR	GBPUSD	FTSEAS	FTSE250	FTSE100	
Panel A: Announcement window, monetary policy news										
QE	0.866***	0.866***	1.090***	1.075***	6.118***	6.304***	-5.270***	-5.881***	-5.653***	
	(0.063)	(0.078)	(0.043)	(0.031)	(1.724)	(1.826)	(1.587)	(1.102)	(1.078)	
	[13.668]	[11.062]	[25.568]	[35.109]	[3.548]	[3.452]	[-3.321]	[-5.335]	[-5.243]	
R^2	0.826	0.821	0.948	0.980	0.431	0.438	0.542	0.547	0.580	
Ν	79	79	79	79	79	79	78	78	78	
Pan	Panel B: Press Conference window, monetary policy news									
QE	0.788^{***}	1.000***	1.195***	1.058^{***}	8.613***	7.635***	-4.991***	-4.384***	-4.333***	
	(0.182)	(0.166)	(0.038)	(0.042)	(1.415)	(1.492)	(1.147)	(1.113)	(1.088)	
	[4.339]	[6.040]	[31.703]	[25.371]	[6.087]	[5.119]	[-4.350]	[-3.937]	[-3.982]	

TABLE 3: INTRADAY REACTIONS TO BOE QE ANNOUNCEMENTS

Notes: All regressions include a constant. The monetary policy news is extracted as in Jarociński and Karadi (2020). Sample: March 2009- December 2023. Coefficients are expressed in % points. Announcement Frequency. Robust SE in parentheses, t-stats in square brackets, * p < 0.1, ** p < 0.05, *** p < 0.01.

0.468

30

0.429

30

0.428

30

0.378

30

0.412

30

0.943

30

and press conference (Panel B) windows are largely equivalent. This signals that communication around the features of the asset purchases programmes was at least as important as the announcement effect.

Results in Table 3 help to put those discussed earlier in perspective. In particular, while the press conference has seemingly ceased to reveal information about the shorter term policy stance to market participants, the advent of QE has effectively shifted the bulk of the information content of the press conference towards longer maturity interest rate news.

3.1.1 The role of MPC dissent

 R^2

Ν

0.455

30

0.634

30

0.869

30

The Bank of England maintains a public record of the voting pattern of all its MPC members, for every decision round, and since its inception. In this section, we use the MPC's voting history to study how and to what extent the degree of dissent amongst MPC members about the appropriate Bank Rate level affects markets' reaction to Bank Rate news.

We measure MPC dissent using the indices developed by Gerlach-Kristen (2004) and Riboni and Ruge-Murcia (2014). The two dissent indices are very similar in nature, and designed to capture the average distance between the prevailing Bank Rate and the vote of each Committee member. The difference between the two is mainly quantitative. Gerlach-Kristen (2004) measures dissent as the percentage point difference between the voted and prevailing rate averaged across members.

FIGURE 4: BOE MPC DISSENT INDEX



Notes: The figure plots the dissent indices of Gerlach-Kristen (2004) calculated using the voting history of the Bank of England's MPC. The yellow line is the level of Bank Rate (right axis). Sample: June 1997 - December 2023.

Riboni and Ruge-Murcia (2014) instead use an indicator variable that takes value 1 if a member preferred a higher rate, -1 if a looser stance was preferred, and 0 if the vote coincided with the prevailing rate. The dissent index is then constructed as the average of this variable across MPC members.²⁰

Figure 4 plots the index of Gerlach-Kristen (2004) which we use in our baseline results.²¹ The index is equal to zero in case of unanimous vote. Positive readings of the index signal that, on balance, a subset of MPC members preferred a stricter stance than the prevailing one. The chart shows that dissent amongst MPC members is a very common occurrence, regardless of the actual composition of the MPC. Naturally, the margin of dissent is larger when the policy rate is not constrained at the ELB. But, interestingly, the index picks up quite a few instances in which some MPC members were ready for the ELB to end long before it actually did. And that were inclined to raise the policy rate by more than it did when the ELB was temporarily abandoned in the years between the EU Referendum and the Covid pandemic.

MPC dissent correlates negatively and significantly with Bank Rate news unconditionally. That is, the more MPC members vote for higher BR than the prevailing one, the more likely it is that markets will perceive that decision as an easing surprise. In this sense, the disagreement amongst MPC members reflects to some extent financial markets expectations. This correlation becomes sensibly stronger (from -0.38 to -0.57) in the post Super Thursday sample.

The voting split within the MPC is revealed in the minutes of each policy meeting, and thus made known to the public at the time of the policy announcement since

 $^{^{20}{\}rm This}$ definition allows us to use also voting records in the earlier years when dissent was recorded as "Increase" or "Decrease" without quantitative information.

²¹Using the measure of Riboni and Ruge-Murcia (2014) leads to largely equivalent results (see online Supplementary Material). The correlation between the two indices is 0.93.

	GBT1Y	GBT2Y	GBT5Y	GBT10Y	GBPEUR	GBPUSD	FTSEAS	FTSE250	FTSE100		
Announcement window											
TARGET	0.556^{**} (0.223) [2.496]	$\begin{array}{c} 0.572^{**} \\ (0.219) \\ [2.609] \end{array}$	0.477^{*} (0.260) [1.833]	$\begin{array}{c} 0.318 \\ (0.256) \\ [1.243] \end{array}$	5.066^{***} (1.540) [3.290]	5.631^{***} (1.432) [3.932]	-4.200** (1.577) [-2.663]	-4.236** (1.738) [-2.437]	-4.124^{**} (1.646) [-2.505]		
Dissent	$\begin{array}{c} 0.457^{***} \\ (0.140) \\ [3.273] \end{array}$	$\begin{array}{c} 0.535^{***} \\ (0.148) \\ [3.623] \end{array}$	$\begin{array}{c} 0.538^{***} \\ (0.150) \\ [3.584] \end{array}$	$\begin{array}{c} 0.429^{**} \\ (0.169) \\ [2.547] \end{array}$	$2.987^{**} \\ (1.239) \\ [2.411]$	$\begin{array}{c} 2.913^{**} \\ (1.150) \\ [2.534] \end{array}$	-1.269 (1.141) [-1.112]	-2.269* (1.223) [-1.856]	-2.064^{*} (1.115) [-1.851]		
$TARGET \times Dissent$	-2.456 (1.933) [-1.271]	-1.417 (1.940) [-0.731]	-1.259 (2.269) [-0.555]	-0.354 (2.183) [-0.162]	$\begin{array}{c} 14.929 \\ (13.213) \\ [1.130] \end{array}$	$19.510 \\ (12.707) \\ [1.535]$	-7.549 (11.597) [-0.651]	-5.889 (12.721) [-0.463]	-5.858 (12.157) [-0.482]		
R^2 N	$\begin{array}{c} 0.256 \\ 44 \end{array}$	$\begin{array}{c} 0.229 \\ 44 \end{array}$	$\begin{array}{c} 0.144 \\ 44 \end{array}$	$\begin{array}{c} 0.055\\ 44 \end{array}$	$\begin{array}{c} 0.177 \\ 44 \end{array}$	$\begin{array}{c} 0.232 \\ 44 \end{array}$	$0.145 \\ 43$	$\begin{array}{c} 0.128 \\ 43 \end{array}$	$\begin{array}{c} 0.141 \\ 43 \end{array}$		

TABLE 4: MPC DISSENT AND RESPONSE TO BANK RATE NEWS

Notes: All regressions include a constant. The monetary policy news is extracted as in Jarociński and Karadi (2020). Dissent measured as in Gerlach-Kristen (2004). Coefficients are expressed in % points. Sample: August 2015 to December 2023. Announcement Frequency. Robust SE in parentheses, t-stats in square brackets, * p < 0.1, ** p < 0.05, *** p < 0.01.

2015. Accordingly, to analyse the role of dissent we estimate the following regression at announcement frequency over the Super Thursday sample

$$\Delta y_t = \alpha + \beta Target_t + \gamma Dissent_t + \delta Target_t \times Dissent_t + \epsilon_t . \tag{2}$$

Table 4 reports the results. The negative interaction term suggests that, in general, policy decisions tend to be less powerful the higher the dissent amongst Committee members. This is however not significant at conventional levels. Conversely, dissent in and of itself appears as a significant source of information for financial markets, conditional on no policy surprises. In this sample, dissent is much more likely to signal a preference of some MPC members for an earlier liftoff or a faster pace of tightening (see Figure 4). Accordingly, dissent is perceived by financial markets as signalling higher Bank Rate levels going forward, which leads to higher interest rates across the maturity spectrum, an appreciation of the pound, and somewhat lower stock market. Medium to long term rates loading strongly and significantly on dissent reinforces this interpretation.

3.2 Daily Reactions

We complete this section by studying the daily responses of other asset prices for which we do not have high-frequency data. In particular, we focus on the differential response of the nominal and real gilt curves, and of inflation compensations as implied by swap rates. In all the results that follow we use the monetary event window, thus combining Bank Rate announcements with IR/MPR press conferences.

	GBT3YN	Nominal Rate GBT5YN	es GBT10YN	GBT3YB	Real Rates GBT5YB	GBT10YB							
	021011	0.010111	GBII0III	0.010110	0.010110	0.00110110							
Panel A:	Panel A: June 1997 to June 2023												
TARGET	0.498***	0.315**	0.057	0.068	0.066	0.042							
	(0.131) [3.798]	(0.136) [2.312]	(0.134) [0.429]	(0.135) [0.501]	(0.120) [0.553]	(0.111) [0.380]							
РАТН	0.564***	0 479**	0.312	0.819***	0.724***	0.507**							
1 /11 11	(0.169)	(0.191)	(0.210)	(0.261)	(0.241)	(0.223)							
	[3.347]	[2.508]	[1.486]	[3.141]	[3.003]	[2.277]							
R^2	0.424	0.239	0.043	0.145	0.133	0.083							
N	113	113	113	105	113	113							
Panel B: A	August 2015	to June 2023											
TARGET	1.488***	1.282^{**}	0.676	1.572**	1.291^{*}	0.701							
	(0.432)	(0.491)	(0.579)	(0.741)	(0.715)	(0.663)							
	[3.443]	[2.609]	[1.167]	[2.123]	[1.805]	[1.058]							
PATH	0.652^{***}	0.616^{***}	0.584^{**}	1.026^{***}	0.987^{***}	0.840^{***}							
	(0.132)	(0.169)	(0.209)	(0.166)	(0.203)	(0.246)							
	[4.937]	[3.655]	[2.797]	[6.170]	[4.871]	[3.419]							
R^2	0.567	0.414	0.217	0.524	0.416	0.277							
N	25	25	25	24	25	25							
Panel C: 1	March 2009 t	o June 2023											
QE	1.010***	1.078***	0.968***	1.098***	1.090***	0.886***							
	(0.182)	(0.194)	(0.230)	(0.188)	(0.203)	(0.218)							
	[5.542]	[5.571]	[4.212]	[5.850]	[5.366]	[4.076]							
R^2	0.295	0.323	0.258	0.336	0.329	0.281							
Ν	186	186	186	169	186	186							

TABLE 5: DAILY REACTIONS GILTS CURVES

Notes: All regressions include a constant and use only the monetary policy news of each factor. The monetary policy news is extracted as in Jarociński and Karadi (2020). The measurement window includes both MPC announcements and MPR Press Conference in all regressions. Coefficients are expressed in % points. Announcement Frequency. Robust SE in parentheses, t-stats in square brackets, * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 5 reports the response of nominal and real rates at the 3-, 5- and 10year maturities. These curves are estimated on UK government bond (gilt) yields and available at daily frequency on the Bank of England's website.²² Nominal and inflation-indexed gilts data are available throughout the sample for longer maturities, whereas the data for the 3-year point start in 1998 for the real rates. Panels A and B of the table report results for Bank Rate and communication surprises across different samples, while Panel C reports the effect of QE announcements. Focusing on the first two panels, results show that most of the action in nominal and real yields

²²See https://www.bankofengland.co.uk/statistics/yield-curves.

is picked up by the information summarised in the Path factor, and particularly so over the most recent sample. MPC communication about the monetary policy path elicits strong responses in both nominal and real interest rates at medium and long maturities. It is also worth noting that, for given maturity, the coefficient associated with real yields is significantly larger, suggesting that MPC communication about tighter policy is successful at curbing inflation expectations as implied by inflation 'breakeven' rates.

QE announcements are similarly powerful (Panel C). The nominal and real gilt curves respond strongly to these types of announcements, and we note how in this case the response of longer maturities is as strong and significant as that at the shorter end. Nominal and real rates respond almost one to one to QE announcements, suggesting a more muted response of inflation expectations in this case.

These results are confirmed when using market-based inflation compensation derived from inflation swap rates (see online Supplementary Material).²³ In line with what noted earlier, results show that over the most recent sample market participants have significantly reassessed their view of medium-term inflation following MPC communication news, while responses are largely muted following QE announcements.

4 Aggregate effects of BOE policy shocks

In this section we move to study the effect of UK policy decisions and communication shocks on macroeconomic and financial aggregates. In particular, we use the Target and Path factors estimated in the previous section as instrumental variables to identify policy shocks in a monthly VAR for the UK economy (Mertens and Ravn, 2013; Stock and Watson, 2018).²⁴

The baseline VAR includes the policy rate, the 1-year gilt yield, investmentgrade non-financial corporate bond spreads from BofA Merrill Lynch, the FTSE All Share index, a measure of monthly GDP distributed by the UK's Office of National Statistics (ONS), the consumer price index, and the nominal sterling exchange rate index. Data are monthly and enter the VAR in log levels unless already expressed in percentage points. Our baseline specification is estimated by ordinary least squares with 12 lags over the sample 1997:01-2019:12. In a second specification we include

²³Inflation swap rates are an alternative to inflation breakeven rates derived from gilt yields. Differences in these markets can arise due to market frictions (Hurd and Relleen, 2006; McGrath and Windle, 2006), and particular investor activity, such as e.g. pension funds (Hurd and Relleen, 2006; Bahaj, Czech, Ding and Reis, 2023).

²⁴Results for the QE factor are less clear cut and reported in the online supplementary material.



FIGURE 5: RESPONSES TO BOE POLICY SHOCKS

Notes: Impulse response functions to a UK Target (top panel) and Path (bottom panel) shock. Shaded areas correspond to 68% and 90% confidence bands. Sample: 1997-2019 (solid line), and 1997-2023 (dashed line).

data up until December 2023. To avoid over-fitting outliers during the pandemic, we use a series of dummies from March 2020 to August $2022.^{25}$

We use the Target factor as an instrument for conventional monetary policy shocks, and the Path factor as an instrument for policy communication shocks. In our baseline estimates we use the factors estimated using the standard identification scheme described in Section 2.2^{6}

Figure 5 reports our baseline results in the form of impulse response functions to conventional policy shocks (top row) and communication shocks (bottom row). The solid line gives IRFs estimated over the pre-pandemic sample, while the dashed line includes observations up until December 2023. The shock size is normalised to unit standard deviation, and shaded areas correspond to 68 and 90% confidence bands.²⁷

Response functions are estimated with a large degree of uncertainty, likely due to the relatively short sample that is available for the estimation. With this caveat in mind, we can however highlight a few insights. The responses to a conventional contractionary monetary policy shock in the UK are in many ways standard. The shock is short-lived, and the policy rate returns to its pre-shock level in the span of two to three quarters. The 1-year rate raises less than proportionally, and the response dies out very quickly. The monetary policy tightening leads to an increase

²⁵While most of the pandemic-induced volatility fades out around the summer of 2021, we include dummies for one additional year to avoid taking signal from the volatile observation for lagged coefficients of the VAR.

²⁶Results obtained using factors identified by minimising the variance of the Target factor during the press conference are largely equivalent, and reported in the online supplementary material.

²⁷Point-wise confidence intervals are computed following the weak-identification robust inference method developed in Montiel Olea, Stock and Watson (2021), adjusted to yield confidence sets to shocks of unit standard deviation.

in credit costs (see also Gertler and Karadi, 2015), and a sudden repricing in the stock market, that severely contracts on impact. The response of output is more delayed, and reaches its peak a year after the shock hits. The magnitude of the peak adjustment is also in line with previous estimates for other countries (see e.g. Miranda-Agrippino and Ricco, 2021). This shock also comes with a small and short-lived appreciation of sterling, while the response of prices is generally more subdued and not significant at conventional levels. The price response is sensitive to the inclusion of the exchange rate in the VAR. Removing sterling eliminates the initial price puzzle and makes the response negative throughout.

Shocks to the medium-term policy path elicit qualitatively similar types of responses. The shock has no effect on the policy rate on impact, but it raises it over time, consistent with the notion that the shock captures movements in expected future rates. Conversely, and consistently, the 1-year rate raises on impact and remains elevated for a few quarters after the shock hits. Corporate spreads respond little over the first year, but somewhat surprisingly are estimated to decline thereafter.²⁸ The stock market index responds more strongly to communication shocks, and the effect is more persistent. Output reacts more quickly to these types of shocks compared to standard Bank Rate shocks, but the effect also dissipates more quickly. The response of prices is significantly stronger, more long lasting, and more precisely estimated. The sterling appreciation is also more pronounced and long-lived.

While the VAR allows us to study the effects of these shocks separately, MPC announcements — whether related to Bank Rate decisions or the future path of policy — contain elements of both. Thus, in general, the overall effect of monetary policy shocks on UK macro aggregates will be a combination of the responses just discussed.

5 Conclusions

In this paper we have introduced the UK Monetary Policy Event-Study Database, or UKMPD, a novel dataset that collects high-frequency surprises in a variety of asset prices around the Bank of England's main monetary policy events. The dataset also includes structural factors that summarise the different components of UK monetary policy. Assembling and distributing the UKMPD constitutes a contribution in its own right, and we expect it to become the standard source for analysing the effects of monetary policy in the UK going forward.

 $^{^{28}}$ IRFs identified by the alternative identification scheme as described in Section 2 show a more significant initial increase in spreads after a communication shock (see online supplementary material).

We have used the data to study the response of financial markets and macro aggregates to the Bank of England's monetary policy, distinguishing Bank Rate shocks from MPC communication about the future path of policy and QE announcements. We show that QE has been very successful in steering financial markets while the policy rate was at the ELB. And that dissent amongst MPC members about the appropriate Bank Rate level is a powerful source of medium-term monetary policy news for financial markets.

We have provided novel evidence on how financial markets have interpreted and have reacted to the changes in the communication strategy of the Bank of England that started with the introduction of Super Thursdays in 2015. Prior to that point, Bank Rate announcements contained little information about the future stance of policy. This was then revealed on the day of the publication of the Report, during the press conference. Conversely, since 2015, the bulk of monetary policy news has been more concentrated around the medium-term policy stance. And most of this information is inferred by markets at the time of the policy announcements. The press conference is now a relatively less dominant source of short-term monetary policy news, while still providing the public with important information around the prevailing judgements on the evolution of the UK economic outlook.

References

- Altavilla, Carlo, Luca Brugnolini, Refet S Gürkaynak, Roberto Motto, and Giuseppe Ragusa (2019) "Measuring euro area monetary policy," *Journal of Monetary Economics*, Vol. 108, pp. 162–179.
- Bahaj, Saleem, Robert Czech, Sitong Ding, and Ricardo Reis (2023) "The market for inflation risk," Staff Working Papers 1028, Bank of England.
- Bauer, Michael D. and Eric T. Swanson (2023) "An Alternative Explanation for the "Fed Information Effect"," American Economic Review, Vol. 113, No. 3, pp. 664–700, March.
- Cesa-Bianchi, Ambrogio, Gregory Thwaites, and Alejandro Vicondoa (2020) "Monetary policy transmission in the United Kingdom: A high frequency identification approach," *European Economic Review*, Vol. 123, No. C.
- Cloyne, James and Patrick Hürtgen (2016) "The Macroeconomic Effects of Monetary Policy: A New Measure for the United Kingdom," American Economic Journal: Macroeconomics, Vol. 8, No. 4, pp. 75–102, October.
- Gerko, Elena and Hélène Rey (2017) "Monetary Policy in the Capitals of Capital," Journal of the European Economic Association, Vol. 15, No. 4, pp. 721–745, 08.
- Gerlach-Kristen, Petra (2004) "Is the MPC's Voting Record Informative about Future UK Monetary Policy?," Scandinavian Journal of Economics, Vol. 106, No. 2, pp. 299–313, June.
- Gertler, Mark and Peter Karadi (2015) "Monetary Policy Surprises, Credit Costs, and Economic Activity," American Economic Journal: Macroeconomics, Vol. 7, No. 1, pp. 44–76.
- Gürkaynak, Refet S, Brian Sack, and Eric Swanson (2005) "Do Actions Speak Louder Than Words? The Response of Asset Prices to Monetary Policy Actions and Statements," *International Journal of Central Banking*, Vol. 1, No. 1, May.
- Hanson, Samuel G. and Jeremy C. Stein (2015) "Monetary policy and long-term real rates," *Journal of Financial Economics*, Vol. 115, No. 3, pp. 429–448.
- Hurd, Matthew and Jon Relleen (2006) "New information from inflation swaps and index-linked bonds," quarterly bulletin, Bank of England.
- Jarociński, Marek (2020) "Central bank information effects and transatlantic spillovers," Working Paper Series 2482, European Central Bank.

- Jarociński, Marek and Peter Karadi (2020) "Deconstructing Monetary Policy Surprises—The Role of Information Shocks," American Economic Journal: Macroeconomics, Vol. 12, No. 2, pp. 1–43, April.
- Joyce, Michael, Jonathan Relleen, and Steffen Sorensen (2008) "Measuring monetary policy expectations from financial market instruments," Bank of England working papers 356, Bank of England.
- Kaminska, Iryna and Haroon Mumtaz (2022) "Monetary policy transmission during QE times: role of expectations and term premia channel," Bank of England working papers 978, Bank of England.
- Kaminska, Iryna, Haroon Mumtaz, and Roman Å ustek (2021) "Monetary policy surprises and their transmission through term premia and expected interest rates," *Journal of Monetary Economics*, Vol. 124, pp. 48–65.
- Kuttner, Kenneth N (2001) "Monetary policy surprises and interest rates: Evidence from the Fed funds futures market," *Journal of Monetary Economics*, Vol. 47, No. 3, pp. 523–544.
- McGrath, Grellan and Robin Windle (2006) "Recent developments in sterling inflation-linked markets," quarterly bulletin, Bank of England.
- Melosi, Leonardo (2017) "Signalling Effects of Monetary Policy," Review of Economic Studies, Vol. 84, No. 2, pp. 853–884.
- Mertens, Karel and Morten O. Ravn (2013) "The Dynamic Effects of Personal and Corporate Income Tax Changes in the United States," *American Economic Re*view, Vol. 103, No. 4, pp. 1212–47, June.
- Miranda-Agrippino, Silvia (2016) "Unsurprising shocks: information, premia, and the monetary transmission," Bank of England working papers 626, Bank of England.
- Miranda-Agrippino, Silvia and Tsvetelina Nenova (2022) "A tale of two global monetary policies," *Journal of International Economics*, Vol. 136, p. 103606.
- Miranda-Agrippino, Silvia and Giovanni Ricco (2021) "The Transmission of Monetary Policy Shocks," American Economic Journal: Macroeconomics, Vol. 13, No. 3, pp. 74–107, July.
- Montiel Olea, José L, James H Stock, and Mark W Watson (2021) "Inference in structural vector autoregressions identified with an external instrument," *Journal of Econometrics*, Vol. 225, No. 1, pp. 74–87.

- Mumtaz, Haroon, Jumana Saleheen, and Roxane Spitznagel (2023) "Keep it Simple: Central Bank Communication and Asset Prices," Working Papers 960, Queen Mary University of London, School of Economics and Finance.
- Nakamura, Emi and Jón Steinsson (2018) "High Frequency Identification of Monetary Non-Neutrality," *The Quarterly Journal of Economics*, Vol. 133, No. 3, pp. 1283–1330.
- Reeves, Rachel and Michael Sawicki (2005) "Do Financial Markets React to Bank of England Communication?," Discussion Papers 15, Bank of England, External MPC Unit.
- Riboni, Alessandro and Francisco Ruge-Murcia (2014) "Dissent in monetary policy decisions," *Journal of Monetary Economics*, Vol. 66, pp. 137–154.
- Stock, James H. and Mark W. Watson (2018) "Identification and Estimation of Dynamic Causal Effects in Macroeconomics Using External Instruments," *The Economic Journal*, Vol. 128, No. 610, pp. 917–948.
- Swanson, Eric T (2021) "Measuring the effects of federal reserve forward guidance and asset purchases on financial markets," *Journal of Monetary Economics*, Vol. 118, pp. 32–53.