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Abstract

This paper introduces 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 accompanies the publication of the quarterly Monetary Policy Report. The dataset also includes factors that allow to disentangle the different dimensions of UK monetary policy. We use the data to provide updated estimates of the causal effects of rate decisions and forward guidance on financial markets and macroeconomic aggregates in the UK, and provide novel insights on how 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 resulting Great Recession, which have seen many central banks resorting to alternative and novel tools to achieve their remits while short-term interest 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 continuously updated.

Second, we use the UKMPD to provide the first comprehensive assessment of the monetary policy of the BOE, and of its effects on financial markets and macroeconomic aggregates. We focus in particular on the effects of conventional monetary policy shocks that operate primarily via changes in the current level of the policy target rate – Bank Rate –, and of the Monetary Policy Committee's (MPC) communication about the future path of policy. We measure these different dimensions of UK monetary policy using the methodology developed in Gürkaynak et al. (2005) and Swanson (2021).

We 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 once a 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.

We show that before the Super Thursdays, Bank Rate announcements contained virtually no 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. And most of this information 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.

We also study the effects of UK monetary policy shocks on macro aggregates, again with a focus on decisions and communication shocks. Our results show that Bank Rate decision shocks lead to the standard type of responses to conventional monetary policy shocks. A one-off increase in Bank Rate leads to an immediate rise in corporate spreads and 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 Sterling. These shocks also lead to a more protracted 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 MPC decisions and communication shocks. Reeves and Sawicki (2005) study 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 leverages 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 in the UK. Section 3 focuses on financial markets and on how they have reacted to and have interpreted the changes in the communication schedule of the Bank of England. Section 4 instead focuses on aggregate responses of the main economic variables. Finally, Section 5 concludes. Additional details are reported in the Appendix.

2 Measuring UK Monetary Policy Surprises

In this section we describe the content of the UKMPD. We start with a primer on the 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.

2.1 The Bank of England's Communication Schedule

The Bank of England (BOE) was granted operational independence over monetary policy in 1997. At its inception, the Monetary Policy Committee (MPC) convened once a month, and used the target policy rate – Bank Rate – to meet its inflation

target.[1] Monetary policy announcements were typically scheduled for 12:00 noon local time, and always included a brief statement that accompanied the monetary policy decision.[2] 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 stance. The minutes of each MPC decision meeting were published two weeks after each announcement, at 9:30 local time.[3]

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, or 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, then 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".

[1] Until 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).

[2] During the winter, local time in the UK is Greenwich Mean Time (GMT, also Western European Time, UTC+00:00). From the last Sunday in March to the last Sunday in October each year, the UK implements daylight saving time, switching to British Summer Time (BST, or Western European Summer Time, UTC+01:00).

[3] Before October 1998, the minutes were published with a six week lag. For further details see Reeves and Sawicki (2005).

The MPC has traditionally conducted monetary policy by setting the desired level of Bank Rate, 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".[4] As Bank 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.

The MPC communicate with the public also through speeches. While these can reveal relevant information around the conduct of monetary policy, or on the perceived outlook and the indicators that are most salient in informing each members' 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.[5]

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 describe each in turn in what follows.

2.2.1 High-Frequency Monetary Policy Surprises

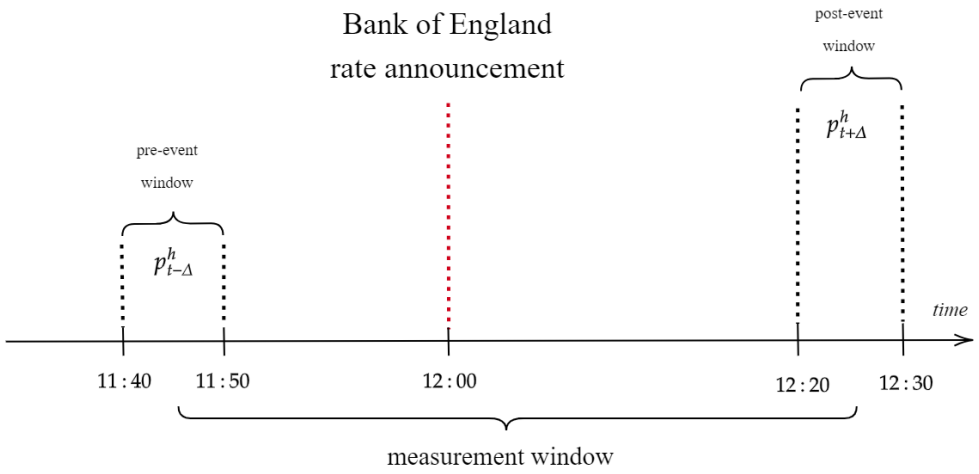
Following Gürkaynak et al. (2005), we define monetary policy surprises as the high-frequency revisions in asset prices around monetary policy events. To ensure that no competing events distort the measurement, monetary policy surprises are calculated over narrow time windows that bracket the announcements,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

For monetary policy decisions we use a 30-minute measurement window, from 10 minutes before to 20 minutes after the announcement. To avoid misquotes, and

[4] See https://www.bankofengland.co.uk/inflation-report/1997/august-1997.

[5] See Mumtaz et al. (2023) for a detailed study of the information content of MPC speeches. And Swanson (2023) for Fed chair speeches.

FIGURE 1: MEASURING MONETARY POLICY SURPRISES



following Altavilla et al. (2019), we define the pre-event price as the median quote in the 11:40-11:50 window, and the post-event price as the median quote in the 12:20-12:30 window (see Figure 1). For the press-conference that follows the release of the IR/MPR, we instead use a longer 90-minute measurement window. The intraday tick data are from Refinitiv Tick History.[6]

Given the unique features of the BOE communication structure that we have discussed previously, we make available two versions of the dataset. The first one only includes surprises calculated around MPC decision announcements. The second adds high-frequency market reactions also around the press conference. Since the first Super Thursday of August 2015, the surprises in the latter version of the dataset are calculated around a 90-minute window that brackets both events.

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 directly. 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 markets allow to gauge how market interpret the monetary policy decisions. For example, an easing surprise in OIS rates – which can result from Bank 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,

[6] https://www.refinitiv.com/en/market-data/data-feeds/tick-history

to the central bank implicitly revealing information about deteriorating conditions ahead.[7]

In order 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. Although 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 have been 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.[8] 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 futures on the FTSE 100 – and in the bilateral exchange rates with the Euro and the US dollar.[9]

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".[10] At its August meeting, the MPC voted to lower Bank Rate by 25bps, to 0.25%, and introduced a package of measures that included a new Term Funding Scheme to reinforce the pass-through of the cut in Bank Rate; 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.[11] While the introduction of further measures had been largely anticipated, the size and

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

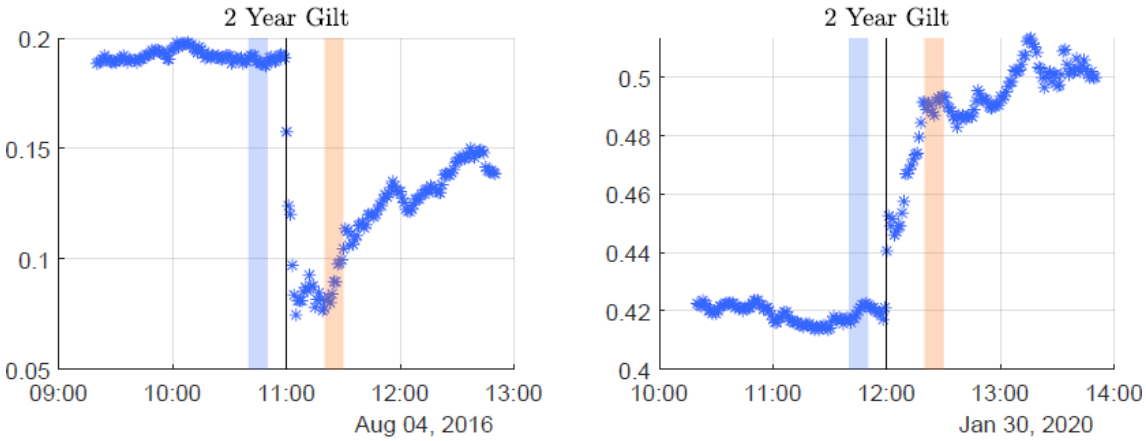
[8] See https://www.ice.com/products/68361266/Three-Month-Sonia-Index-Futures.

[9] A full list of the surprises included in the UKMPD is in Table B.1 in the Appendix.

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

[11] 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. See footnote 2 for details. Source: Refinitiv.

composition of them had not, which resulted in gilt yields declining significantly at the announcements.

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 its January meeting the MPC voted to maintain Bank Rate at its 0.75% level, and to maintain its stock of corporate and UK government bonds at their respective levels. However, while the Committee continued to judge the existing stance of monetary policy to be appropriate, it changed the language around the future path. 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 January, the qualification "at a gradual pace and to a limited extent" was removed, which resulted in gilt yields drifting upwards following the announcement.[12]

2.2.2 High-Frequency Monetary Policy Factors

Increasingly, and particularly since Bank 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

[12] See 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.

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 structure. They identified a Target factor that summarised the immediate policy rate decision, and a Path factor that instead captured information in the announcements about the future path of policy, thus capturing the effects of both implicit and explicit forward guidance. Swanson (2021) used the same intuition to further capture the effects of QE announcements. Intuitively, the factors summarise variation in monetary policy surprises at the short, 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.[13] First, principal components are used to summarise the common variation in the monetary surprises in the seven asset prices.[14] 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.

Figure 3 plots the loadings of the three factors on the contracts used for their estimation, while the factors themselves are plotted in Figure C.1 in the Appendix. The sample used to extract the factors includes all MPC Bank Rate announcements from August 1997 to June 2023. For ease of interpretation, we standardise the factors such that the Target has a unit loading on the first short sterling futures ($\simeq$ 3-month maturity), the Path factor has unit loading on the fourth short sterling futures ($\simeq$ one year), and the QE factor on the 10-year gilt yield.[15]

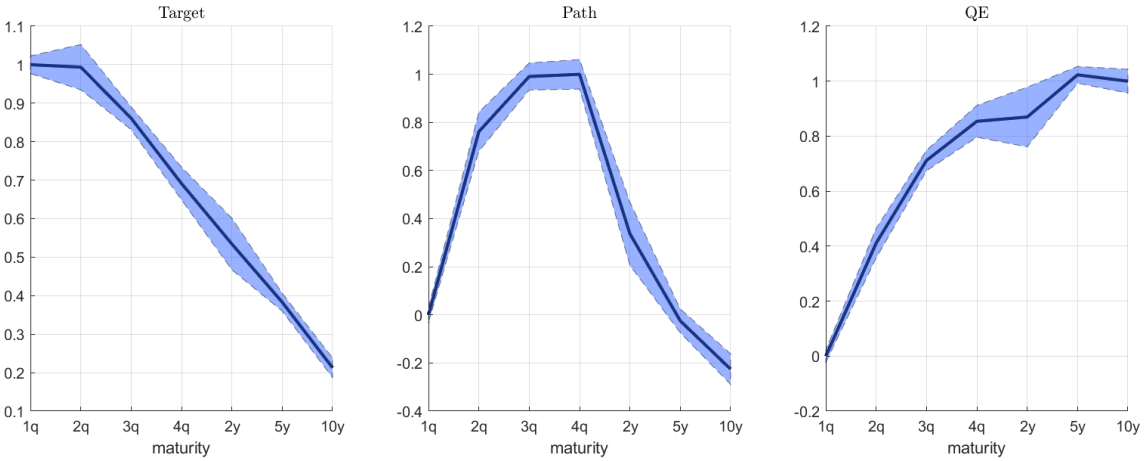
The pattern depicted in Figure 3 is equivalent to what documented for other central banks announcements (see e.g. Miranda-Agrippino and Nenova, 2022). The

[13] For a more detailed description of the estimation procedure see Appendix B.

[14] A 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).

[15] For the labelling of the factors we follow the prevailing literature. However, it is understood that rather than singling out a specific policy tool, the factors summarise variation over a given maturity segment that is potentially obtained through multiple policy tools. For example, variation at medium maturities can be due to both forward guidance and to the signalling channel of QE (see e.g. Krishnamurthy and Vissing-Jorgensen, 2011).

FIGURE 3: ESTIMATED LOADINGS FOR UK MONETARY POLICY FACTORS



Notes: The black line plots the point estimates of a regression of the monetary policy surprises on the Target, Path and QE factor (loadings). The blue shaded area indicate 95% confidence intervals.

loadings of the Target factor peak at the short-end of the yield curve, and decrease monotonically afterwards. The factor can thus be interpreted as summarising conventional Bank Rate policy. Loadings for the Path factor peak at the 1-year horizon. The factor can therefore be interpreted as summarising anticipated monetary policy changes e.g. arising from the MPC's forward guidance (either explicit – post-2013 – or implicit, in the preceding years). Finally, the loadings of the QE factor build up gradually to peak at the 10-year maturity. Therefore, we can think of it as summarising variation due mostly to QE announcements.

Consistently, the Target factor displays substantial variation prior to the financial crisis, with largest surprises e.g. during 2008, and very little variation during the effective lower bound years. The Path factor spikes most significantly in recent times, but shows important variation throughout the sample. The QE factor picks up the most relevant QE announcement dates.[16]

3 The response of UK asset prices to monetary policy news

In this section we study how asset prices react to UK monetary policy news. We focus in particular on the differential effect that Bank Rate decisions elicit on financial markets relative to more forward-looking communication shocks.

[16]See Figure C.1 in the Appendix.

As noted in the previous section, one important piece of information in the communication strategy of the Bank of England's MPC is the Monetary Policy Report (MPR). Following the introduction of the Super Thursday, it is no longer possible to cleanly separate the information content of the MPR from that of the monetary policy decision. This is due to the fact that the MPR is published at the same time as the policy decision itself. The MPR is however a composite publication that includes several chapters and in-focus sections. This makes it unlikely that market participants may digest its full content within the 20 minutes that follow its publication on the Bank's website, and that mark the end of the measurement window for MPC policy decisions. Therefore, there may be still relevant information that is disclosed to the markets during the press conference. This type of information differs potentially from that captured by the Path factor estimated only around MPC announcements, and that summarises information about the future path of policy as implied by the policy decision and the content of the accompanying statement.

In what follows we use the factors estimated around the two set of events to study how financial markets respond to the different pieces of information released by the MPC. In doing so, we also consider different subsamples to study whether and to what extent the change in the communication structure that started with the introduction of the Super Thursday has had an impact on how market process monetary policy news.

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

$$\Delta y_t = \alpha + \beta Target_t + \gamma Path_t + \epsilon_t \ , \tag{1}$$

where Δy_t denotes the daily change in the relevant asset price, and $Target_t$ and $Path_t$ are the monetary policy factors, estimated either around MPC announcements only, or around both the MPC and MPR press conference. The full sample runs from June 1997 to June 2023 and includes a total of 285 monetary policy decisions, and 104 publications of the IR/MPR.

Using a narrow measurement window around the BOE monetary policy communication times guarantees that, absent any other contemporaneous events, the price revisions (and factors estimated on the basis of those high-frequency revisions) 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.

The literature has identified two complementary ways to deal with the consequences of such an effect. Miranda-Agrippino and Ricco (2021) propose to tackle the source of the confounding effect, and explicitly control for central bank official forecasts. Jarociński and Karadi (2020) instead propose to act directly on its consequences, and identify monetary policy news on the basis that they should induce a negative contemporaneous comovement between stock prices and bond yields. The two approaches lead to equivalent results. The latter, while more reduced-form, has the advantage of being very simple to implement, and is the one we follow in this paper. Specifically, we extract the monetary policy component of each event by looking at the high-frequency correlation between the extracted factors and the FTSE All Share index, which corresponds to the 'poor man' approach discussed in Jarociński and Karadi (2020).[17]

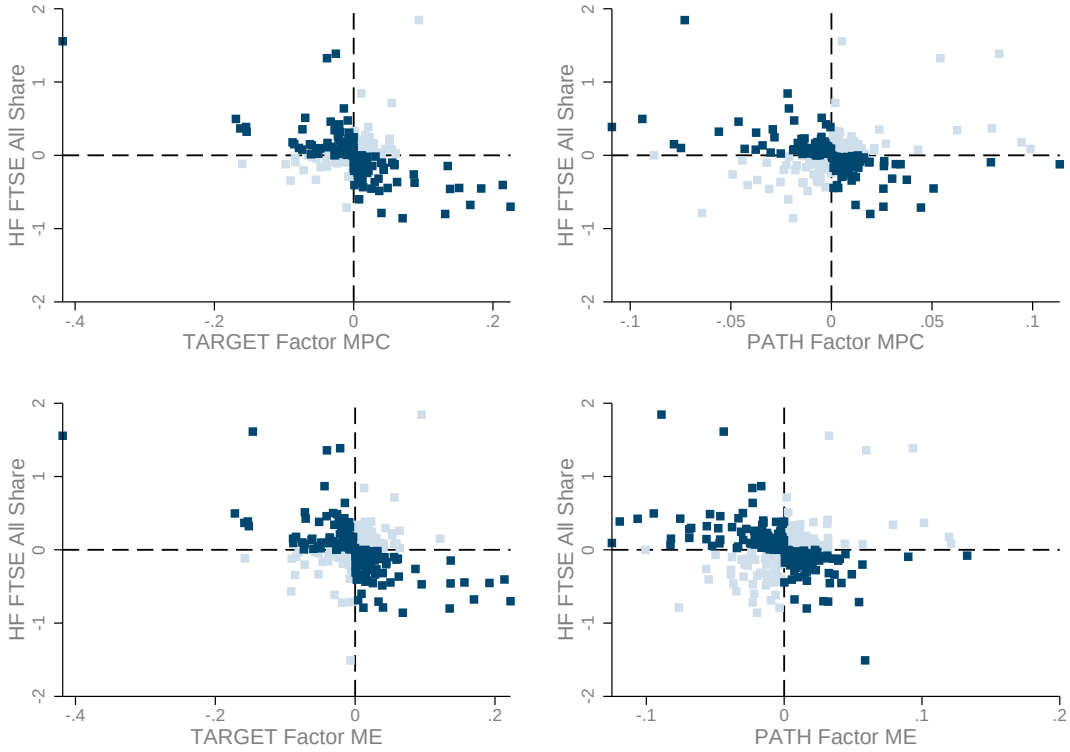
Figure 4 plots the high-frequency comovement between the factors and the stock market index around MPC decisions only (top row) and around all BOE monetary events considered (MPC + IR/MPR). The darker colour is used to highlight the instances in which the high-frequency comovement aligns with the theoretical response to a monetary policy news. We note that it is generally the case that markets interpret short-term Bank Rate news as monetary policy (left panels in the figure). The correlation is negative in most cases, but there exist a non-trivial number of instances in which markets interpret the short rate decision as signalling information about the MPC's reaction function or its arguments. This effect becomes more pronounced when considering the contemporaneous comovement with the Path factor (right panels in the figure). As noted earlier, this factor captures policy communication over a horizon of roughly one to two years. Policy communication around this horizon is more likely to be interpreted by markets as conveying information around the MPC's expected economic outlook. In our results that follow we show how accounting for these confounding effects is especially important for the interpretation of the reaction of financial markets to monetary policy news.

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 1997 to 2023. Panel A uses all the MPC interest rate

[17] 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 4: 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 All Share stock market index. In the top panels the factors are computed around MPC announcements only, in the bottom panel using both MPC and MPR press conference windows. The darker markers denote observations that align with the theoretical responses to monetary policy as in Jarociński and Karadi (2020).

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 MPC Bank Rate announcements and MPR press conference.

Comparing the results in Panels A and B reveals how accounting for information effects is crucial to correctly estimate the responses, particularly for the Path factor. For short-term Bank Rate decisions, the 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 tightening in Bank Rate, 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.[18] 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. Perhaps even more surprisingly, MPC communication over the medium term seems to have essentially no effects on financial markets, except for the short end of the curve. Results in Panel B show that these conclusions are entirely a consequence of the confounding operated by the information effect.

Table 1: Intraday Reactions to BOE Policy Communication

	GBT1Y	GBT2Y	GBT5Y	GBT10Y	EURGBP	GBPUSD	FTSEAS	FTSE250	FTSE100
Panel A: Announcement window									
TARGET	0.627***	0.535***	0.384***	0.213***	-1.387*	1.768**	-2.352***	-2.354**	-2.685***
	(0.071)	(0.070)	(0.051)	(0.045)	(0.754)	(0.697)	(0.465)	(0.923)	(0.529)
	[8.882]	[7.625]	[7.553]	[4.692]	[-1.838]	[2.536]	[-5.062]	[-2.552]	[-5.075]
PATH	0.284*	0.336**	-0.026	-0.226	-0.991	0.466	-0.576	0.627	-0.775
	(0.150)	(0.146)	(0.164)	(0.171)	(0.976)	(0.994)	(1.292)	(1.638)	(1.321)
	[1.886]	[2.310]	[-0.156]	[-1.325]	[-1.016]	[0.469]	[-0.446]	[0.383]	[-0.587]
R^2	0.582	0.520	0.302	0.143	0.062	0.093	0.175	0.154	0.192
N	284	284	284	284	273	285	280	280	280
Panel B: Announcement window, monetary policy news									
TARGET	0.594***	0.435***	0.235**	0.075	-1.010	1.678**	-2.822***	-1.763***	-3.193***
	(0.105)	(0.127)	(0.098)	(0.085)	(0.661)	(0.661)	(0.414)	(0.663)	(0.430)
	[5.655]	[3.425]	[2.396]	[0.879]	[-1.529]	[2.541]	[-6.823]	[-2.661]	[-7.433]
PATH	0.860***	1.001***	0.776***	0.652***	-4.891***	4.044**	-1.400	-0.452	-1.468
	(0.160)	(0.203)	(0.207)	(0.219)	(1.804)	(1.773)	(0.867)	(0.990)	(0.924)
	[5.363]	[4.928]	[3.749]	[2.974]	[-2.711]	[2.281]	[-1.614]	[-0.457]	[-1.588]
R^2	0.840	0.762	0.545	0.352	0.263	0.271	0.590	0.322	0.598
N	81	81	81	81	75	81	76	76	76
Panel C: Announcement & Press Conference window, monetary policy news									
TARGET	0.635***	0.497***	0.260***	0.110	-1.393**	1.481**	-3.159***	-1.957***	-3.532***
	(0.100)	(0.111)	(0.092)	(0.075)	(0.654)	(0.713)	(0.745)	(0.741)	(0.788)
	[6.325]	[4.473]	[2.828]	[1.475]	[-2.132]	[2.078]	[-4.242]	[-2.642]	[-4.483]
PATH	0.732***	0.818***	0.696***	0.461***	-4.597***	4.341***	-2.135**	-1.200	-2.246**
	(0.131)	(0.132)	(0.130)	(0.115)	(1.309)	(1.497)	(0.888)	(0.958)	(0.959)
	[5.612]	[6.200]	[5.375]	[4.002]	[-3.512]	[2.900]	[-2.404]	[-1.252]	[-2.342]
R^2	0.815	0.789	0.617	0.393	0.337	0.319	0.515	0.294	0.513
N	117	117	117	117	112	117	112	112	112

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

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 re-

[18] Note that the bilateral exchange rates with the Euro and US dollar are defined as British pounds per 1 Euro, and US dollars per 1 British pound respectively.

sponse 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 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, while the response of the stock market becomes 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.

Table 2: Intraday Reactions to BOE Policy Communication: Pre-ELB Sample

	GBT1Y	GBT2Y	GBT5Y	GBT10Y	EURGBP	GBPUSD	FTSEAS	FTSE250	FTSE100
Panel A: Announcement window									
TARGET	0.726***	0.578***	0.435***	0.295***	-1.016	2.614***	-3.055***	-1.870**	-3.481***
	(0.119)	(0.167)	(0.103)	(0.067)	(0.882)	(0.725)	(0.472)	(0.860)	(0.496)
	[6.089]	[3.456]	[4.234]	[4.370]	[-1.152]	[3.605]	[-6.466]	[-2.176]	[-7.026]
PATH	0.458*	0.554	-0.002	-0.173	-3.176	-0.613	0.089	0.476	0.271
	(0.251)	(0.450)	(0.264)	(0.172)	(2.671)	(2.435)	(0.987)	(1.764)	(1.065)
	[1.828]	[1.231]	[-0.009]	[-1.004]	[-1.189]	[-0.252]	[0.090]	[0.270]	[0.254]
R^2	0.901	0.823	0.761	0.620	0.264	0.320	0.773	0.397	0.782
N	41	41	41	41	35	41	41	41	41
Panel B: Announcement & Press Conference window									
TARGET	0.719***	0.594***	0.356***	0.214***	-1.612**	1.856**	-3.203***	-2.046**	-3.564***
	(0.102)	(0.109)	(0.089)	(0.048)	(0.635)	(0.719)	(0.808)	(0.827)	(0.852)
	[7.032]	[5.427]	[4.005]	[4.471]	[-2.539]	[2.582]	[-3.967]	[-2.475]	[-4.183]
PATH	0.526***	0.591***	0.390***	0.164*	-2.865**	2.338	-1.668	-0.453	-1.818
	(0.102)	(0.137)	(0.133)	(0.087)	(1.412)	(2.101)	(1.164)	(1.192)	(1.278)
	[5.145]	[4.313]	[2.929]	[1.878]	[-2.030]	[1.112]	[-1.433]	[-0.380]	[-1.423]
R^2	0.896	0.866	0.778	0.642	0.359	0.338	0.545	0.327	0.544
N	68	68	68	68	63	68	68	68	68

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). Sample: June 1997-March 2009. 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 a sample that ends with the financial crisis and Bank Rate reaching its effective lower bound. All the regressions in Table 2 use only the events where monetary policy news was prevalent.

Two interesting patterns emerge. First, over the pre-ELB sample, the Path factor computed around MPC Bank Rate announcements only (Panel A) picks up no relevant variation, whereas it is very informative when computed around the whole set of events (Panel B). This can be effectively interpreted as markets extracting relevant information around the future path of policy from the IR/MPR press conferences, rather than from the Bank Rate decisions, over this sample. This interpretation aligns with the communication strategy of the Bank of England prior to the crisis of 2008. Second, Bank Rate decisions elicit stronger responses of financial markets over this sample than over the full sample. The coefficients associated to the Target factor do not change across the two panels, signalling that the bulk of the information around the current stance of monetary policy was effectively contained within the Bank Rate decision announcements, and no further information was released during the press conferences.

Taken together, these results show that over this initial sample the communication strategy of the MPC was perceived by financial markets to be clearly segmented. MPC Bank Rate announcements contained all the relevant information about the current stance of policy. And all the information around the future policy stance was instead extracted from the press conference scheduled after the release of the Inflation Reports. This is a sample where Bank 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 offered a view into the reaction function of the MPC and the prevalent judgements around the economic outlook. The response of financial markets over this period conform very clearly with this setup.

Finally, in Table 3 we repeat the analysis by focusing on the sample since August 2015, when the first Super Thursday occurred. Again we split the responses by those around MPC announcements only (Panel A) and those around all events (Panel B). 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. This notwithstanding, the results are informative about how market participants now perceive the MPC communication with the public.

With explicit forward guidance becoming much more prominent since 2013, and Bank Rate at its effective lower bound for a good proportion of the sample, the Path factor computed around MPC rate announcements alone becomes the primary source of information about the Bank of England monetary policy stance. Bank

Table 3: Intraday Reactions to BOE Policy Communication: Super Thursday Sample

	GBT1Y	GBT2Y	GBT5Y	GBT10Y	EURGBP	GBPUSD	FTSEAS	FTSE250	FTSE100
Panel A: Announcement window									
TARGET	0.365***	0.200**	0.097	-0.118	-1.818	1.819	-4.004*	-4.779	-3.824*
	(0.067)	(0.083)	(0.110)	(0.090)	(1.291)	(1.574)	(1.949)	(3.485)	(1.989)
	[5.424]	[2.408]	[0.879]	[-1.314]	[-1.409]	[1.156]	[-2.055]	[-1.371]	[-1.923]
PATH	1.015***	1.258***	1.105***	1.019***	-5.809***	6.481***	-0.503	1.245	-0.920
	(0.109)	(0.154)	(0.152)	(0.107)	(1.896)	(2.279)	(0.828)	(1.542)	(0.892)
	[9.314]	[8.162]	[7.287]	[9.489]	[-3.063]	[2.845]	[-0.607]	[0.807]	[-1.031]
R^2	0.845	0.790	0.694	0.666	0.348	0.316	0.176	0.187	0.147
N	24	24	24	24	24	24	19	19	19
Panel B: Announcement & Press Conference window									
TARGET	0.404***	0.234***	0.092	-0.110*	-2.269	2.174	-3.998	-4.599	-4.080
	(0.080)	(0.073)	(0.069)	(0.060)	(1.504)	(1.627)	(3.222)	(4.948)	(3.371)
	[5.048]	[3.200]	[1.332]	[-1.833]	[-1.509]	[1.336]	[-1.241]	[-0.929]	[-1.210]
PATH	1.075***	1.106***	1.053***	0.815***	-5.131*	5.504*	-0.930	0.352	-1.132
	(0.259)	(0.246)	(0.209)	(0.145)	(2.480)	(2.968)	(1.518)	(1.081)	(1.876)
	[4.149]	[4.491]	[5.050]	[5.608]	[-2.069]	[1.854]	[-0.613]	[0.325]	[-0.603]
R^2	0.759	0.775	0.777	0.708	0.369	0.319	0.250	0.146	0.216
N	22	22	22	22	22	22	17	17	17

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). Sample: August 2015 - June 2023. Coefficients are expressed in % points. Announcement Frequency. Robust SE in parentheses, t-stats in square brackets, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Rate announcements are only informative about the very short run, and while the stock market seems to respond strongly to Bank Rate decisions, the estimates are in this case highly uncertain.

Over this sample, financial markets – and the nominal yield curve and exchange rate in particular – react very strongly to medium-term news. Three results in particular are worth highlighting. First, the coefficients of the Path factor 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. Second, the coefficients of the Path factor become much larger and much more homogeneous across the maturity spectrum. This can be interpreted as the Path factor over this sample also capturing important information around the different rounds of QE that the Bank of England engaged with over this period. Third, the coefficients of the Target factor are about half of those estimated over the pre-ELB sample, consistent with monetary policy being conducted with a more diverse set

of tools over the more recent years, and Bank Rate having been maintained at very low levels until the beginning of the most recent tightening cycle.

3.2 Response of market curves on the day

The patterns highlighted in the previous section are broadly unchanged when we extend the response window to the day of the announcement or the day of the press conference. Looking at this response window is however useful as it allows us to also study the response of variables for which we do not have high-frequency data. In all the results that follow the Target and Path factors are computed using high-frequency surprises around all monetary events, that is, around both MPC Bank Rate announcements and IR/MPR press conferences, and are the same as used in the previous section.

Table 4: Daily Reactions Gilts curves

	Nominal Rates			Real Rates		
	GBT2YN	GBT5YN	GBT10YN	GBT2YR	GBT5YR	GBT10YR
Panel A: June 1997 to June 2023						
TARGET	0.504***	0.186	-0.015	-0.020	0.058	0.049
	(0.152)	(0.163)	(0.144)	(0.230)	(0.149)	(0.120)
	[3.316]	[1.141]	[-0.104]	[-0.088]	[0.390]	[0.411]
PATH	0.810***	0.630**	0.356	1.029**	0.676**	0.363
	(0.216)	(0.264)	(0.257)	(0.431)	(0.297)	(0.274)
	[3.749]	[2.386]	[1.382]	[2.386]	[2.275]	[1.327]
R^2	0.402	0.142	0.015	0.114	0.085	0.030
N	117	117	117	61	117	117
Panel B: August 2015 to June 2023						
TARGET	0.008	-0.273	-0.317	-0.388	0.205	-0.025
	(0.371)	(0.367)	(0.348)	(1.185)	(0.440)	(0.386)
	[0.023]	[-0.745]	[-0.911]	[-0.327]	[0.465]	[-0.065]
PATH	1.360***	1.341***	1.098***	2.320***	1.607***	1.158**
	(0.313)	(0.338)	(0.344)	(0.578)	(0.414)	(0.418)
	[4.346]	[3.968]	[3.192]	[4.011]	[3.880]	[2.774]
R^2	0.275	0.207	0.131	0.636	0.287	0.155
N	22	22	22	13	22	22

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 4 reports the response of the nominal and real yield curves at the 2, 5 and 10 year maturities. These curves are estimated on UK government bond (gilt) yields

and available at daily frequency on the Bank of England's website.[19] Nominal and inflation-indexed gilts data are available throughout the sample for longer maturities, whereas the data for the 2-year point start in 1999 for the real rates. Results show that most of the action in nominal and real yields 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. In the most recent sample, and again likely owing to the same type of dynamics discussed in the previous section, interest rates at longer maturities have also become highly responsive.

TABLE 5: DAILY REACTIONS OIS CURVE

	OIS3M	OIS6M	OIS1Y	OIS2Y	OIS3Y	OIS5Y	OIS10Y
Panel A: August 2008 to June 2023							
TARGET	1.143***	1.144***	0.900***	0.468*	0.247	0.072	-0.004
	(0.235)	(0.242)	(0.215)	(0.268)	(0.289)	(0.319)	(0.323)
	[4.874]	[4.728]	[4.193]	[1.748]	[0.856]	[0.225]	[-0.014]
PATH	0.045	0.507**	1.035***	1.308***	1.236***	0.925***	0.411
	(0.194)	(0.217)	(0.183)	(0.226)	(0.278)	(0.323)	(0.347)
	[0.233]	[2.342]	[5.653]	[5.775]	[4.444]	[2.863]	[1.183]
R^2	0.697	0.748	0.711	0.467	0.334	0.161	0.006
N	54	54	54	54	54	54	54
Panel B: August 2015 to June 2023							
TARGET	0.974***	0.920***	0.671***	0.226	0.007	-0.194	-0.290
	(0.096)	(0.097)	(0.175)	(0.255)	(0.284)	(0.316)	(0.295)
	[10.147]	[9.520]	[3.824]	[0.883]	[0.024]	[-0.613]	[-0.983]
PATH	0.472***	0.971***	1.385***	1.505***	1.394***	1.228***	0.939***
	(0.116)	(0.105)	(0.144)	(0.233)	(0.275)	(0.308)	(0.306)
	[4.088]	[9.242]	[9.634]	[6.472]	[5.078]	[3.987]	[3.066]
R^2	0.842	0.866	0.726	0.416	0.291	0.193	0.108
N	22	22	22	22	22	22	22

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

The Bank of England also publishes estimates of the nominal yield curve based on sterling overnight index swap (OIS) rates. These data are available daily since August 2008. Table 5 reports the average daily response of the OIS curve to monetary policy news over the full sample (2008-2023), and the most recent Super Thursday sample (2015-2023). OIS data are available for a broader set of maturities, and allow for a more granular analysis of the responses particularly at the shorter end.

[19] See https://www.bankofengland.co.uk/statistics/yield-curves.

In the table we report responses for OIS rates ranging from a maturity of 3-months to 10-years.

We note again a similar pattern to what discussed earlier. Bank Rate announcements as summarised by the Target factor elicit strong responses in short-term rates. It is worth recalling that this sample was largely characterised by low levels of Bank Rate, which puts the unresponsiveness of longer term rates to MPC announcements into context. MPC communication about the future stance is unsurprisingly much more effective over this period, also for long-term interest rates. We do not detect material differences in the coefficients across the two samples, suggesting that the introduction of the Super Thursday did not in itself alter the way in which markets have reacted to MPC communication and announcements since the financial crisis.

TABLE 6: DAILY REACTIONS SWAP-BASED INFLATION COMPENSATION

	SWAPI2Y	SWAPI5Y	SWAPI5Y5Y	SWAPI10Y
Panel A: October 2004 to June 2023				
TARGET	-0.202	-0.044	-0.200***	-0.122
	(0.283)	(0.229)	(0.071)	(0.103)
	[-0.714]	[-0.193]	[-2.810]	[-1.192]
PATH	0.232	0.052	-0.021	0.016
	(0.329)	(0.281)	(0.124)	(0.161)
	[0.705]	[0.186]	[-0.171]	[0.097]
R^2	-0.017	-0.027	0.009	-0.017
N	74	74	74	74
Panel B: August 2015 to June 2023				
TARGET	-0.684***	-0.467***	-0.147***	-0.307***
	(0.137)	(0.093)	(0.050)	(0.060)
	[-4.982]	[-5.019]	[-2.937]	[-5.129]
PATH	0.209	-0.185	-0.034	-0.109
	(0.134)	(0.123)	(0.142)	(0.124)
	[1.556]	[-1.501]	[-0.238]	[-0.878]
R^2	0.342	0.412	0.029	0.305
N	22	22	22	22

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

Finally, in Table 6 we report the daily responses of market-based inflation compensation derived from inflation swap rates. Data from swap rates become available in October 2004. We consider maturities equal to 2, 5 and 10 years ahead and the 5-year-5-year forward rate, which is a popular and relevant measure of medium-to-long term inflation expectations.

An alternative measure of inflation compensation can be derived from the difference between the nominal gilt yield and index-linked gilt yield that we used in the context of Table 4, and which results in the inflation 'breakeven' rate. In principle, the inflation swap rate and inflation breakeven rate should match. In practice, however, they often differ due to differences in demand and supply between the two markets, and to any market frictions (Hurd and Relleen, 2006; McGrath and Windle, 2006). Both markets are less liquid than the nominal gilt market, and can be affected by particular investor activity, such as pension funds (Hurd and Relleen, 2006; Bahaj, Czech, Ding and Reis, 2023), but the inflation swap market is often considered to be the more liquid of the two, which motivates our choice.

Results over the full available sample (Panel A) show that the coefficients are largely not significant at conventional levels. The apparent lack of responsiveness could be due to heterogeneous effects over the sample. While the usual caveat related to the small number of observations applies, the results over the most recent sample (Panel B) suggest that market participants have significantly responded across the inflation swap curve to news around current monetary policy stance (Target).

4 Aggregate effects of BOE policy shocks

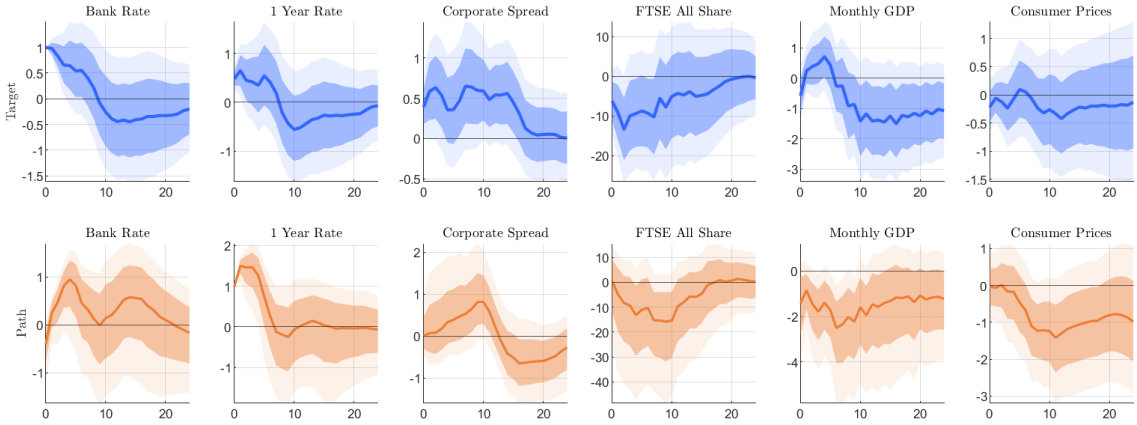
In this section we move to study the effect of UK policy decisions and communication shocks on macroeconomic and financial aggregates. In particular, we use the Target and Path factors estimated in the previous section as instrumental variables to identify policy shocks in a monthly VAR for the UK economy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

The baseline VAR includes Bank Rate, the 1-year gilt yield, investment-grade 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) and the consumer price index. Data are monthly and enter the VAR in log levels unless already expressed in percentage points. The VAR is estimated by ordinary least squares with 12 lags over the sample 1997:01-2019:12.

We use the Target factor to instrument changes in Bank Rate, and the Path factor for the 1-year rate. In our baseline estimates we use the factors estimated around MPC decision announcements only. Results obtained using factors computed also around the press conference, or extracting the monetary policy component of each announcement as in Jarociński and Karadi (2020) are largely equivalent, and we report them in the Appendix.

Figure 5 reports the results in the form of impulse response functions to the identified shocks. The shocks are normalised such that MPC decisions shocks (top row of

FIGURE 5: RESPONSES TO BOE POLICY SHOCKS



Notes: Impulse response functions to a UK Target (top panel) and Path (bottom panel) shock. The factors are extracted around MPC decision announcements only. Shaded areas correspond to 68% and 90% confidence bands. Sample: 1997-2019.

the figure) raise Bank Rate by 1 percentage point on impact, while communication shocks (bottom row of the figure) raise the 1-year rate by 1pp on impact. Shaded areas correspond to 68 and 90% confidence bands.[20]

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 Bank 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 immediate increase in credit costs (see also Gertler and Karadi, 2015), and an equally 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). The response of prices is generally more subdued. There is no price puzzle and the response is negative throughout, but the effects are not significant at conventional levels. This shock also comes with a small and short-lived appreciation of Sterling.[21]

Shocks to the medium-term policy path elicit qualitatively similar types of responses, but we note that in general the responses tend to be stronger and more significant. The shock has no effect on Bank Rate on impact, but it raises it over

[20] Point-wise confidence intervals are computed following the weak-identification robust inference method developed in Montiel Olea, Stock and Watson (2021).

[21] To study the response of the exchange rate we augment the VAR with the nominal effective exchange rate distributed by the BIS. Results are reported in Figure C.5 in the Appendix.

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 about a year after the shock hits. The response of corporate spreads is more subdued initially, but it increases over time. Similarly, and somewhat surprisingly, the stock market index only slowly prices in the shock. The response of output is more pronounced, and output reacts more quickly to these types of shocks compared to standard Bank Rate shocks. Similarly, prices contract in a more pronounced way over the first year. The Sterling appreciation is also more pronounced.

While the VAR allows us to study the effects of these shocks separately, MPC announcements, whether related to Bank Rate decisions, or around the future path of policy, contains 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 changes in a variety of asset prices around the Bank of England's main monetary policy events. Namely, the Monetary Policy Committee's announcements, and the press release that accompanies the publication of the quarterly Monetary Policy Report (previously Inflation Report). The dataset also includes high-frequency structural factors in the spirit of Gürkaynak et al. (2005) and Swanson (2021), that allow to summarise the different components of UK monetary policy.

Assembling and distributing this new dataset constitutes a contribution in its own right, and we expect the UKMPD to become the standard source for analysing the effects of monetary policy in the UK going forward.

We have used the data to study the response of financial markets and macro aggregates to the Bank of England's monetary policy. We have focused in particular on the effects of conventional monetary policy shocks that operate primarily via changes in the current level of Bank Rate, and on MPC communication around the future stance of policy, summarised in a factor that captures both implicit and explicit forward guidance, as well as potentially also signalling effects of QE.

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. Starting from August 2015, the BOE has introduced Super Thursdays. Once every quarter, the monetary policy decisions are released together with the publication

of the Monetary Policy Report. These are then followed by a press conference on the same day. Before the Super Thursdays, Bank Rate announcements contained virtually no information about the future stance of policy. All 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. And most of this information is inferred by markets at the time of the policy announcements. 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.

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A Events

Table A.1 gives a detailed overview of the events that we include. Times are expressed in GMT. During the winter, local time in the UK is Greenwich Mean Time (GMT, also Western European Time, UTC+00:00). From the last Sunday in March to the last Sunday in October each year, the UK implements daylight saving time, switching to British Summer Time (BST, or Western European Summer Time, UTC+01:00).

Rate announcement	Bank Rate	Rate announcement	Bank Rate	IR/MPR publication
06/06/1997 11:00	6.50%	07/05/2009 11:00	0.50%	13/08/1997 09:30
10/07/1997 11:00	6.75%	04/06/2009 11:00	0.50%	12/11/1997 10:30
07/08/1997 11:00	7.00%	09/07/2009 11:00	0.50%	11/02/1998 10:30
11/09/1997 11:00	7.00%	06/08/2009 11:00	0.50%	13/05/1998 09:30
09/10/1997 11:00	7.00%	10/09/2009 11:00	0.50%	13/08/1998 09:30
06/11/1997 12:00	7.25%	08/10/2009 11:00	0.50%	11/11/1998 10:30
04/12/1997 12:00	7.25%	05/11/2009 12:00	0.50%	10/02/1999 10:30
08/01/1998 12:00	7.25%	10/12/2009 12:00	0.50%	12/05/1999 09:30
05/02/1998 12:00	7.25%	07/01/2010 12:00	0.50%	11/08/1999 09:30
05/03/1998 12:00	7.25%	04/02/2010 12:00	0.50%	10/11/1999 10:30
09/04/1998 11:00	7.25%	04/03/2010 12:00	0.50%	17/02/2000 10:30
07/05/1998 11:00	7.25%	08/04/2010 11:00	0.50%	10/05/2000 08:30
04/06/1998 11:00	7.50%	10/05/2010 11:00	0.50%	09/08/2000 08:30
09/07/1998 11:00	7.50%	10/06/2010 11:00	0.50%	16/11/2000 10:30
06/08/1998 11:00	7.50%	08/07/2010 11:00	0.50%	14/02/2001 10:30
10/09/1998 11:00	7.50%	05/08/2010 11:00	0.50%	16/05/2001 09:30
08/10/1998 11:00	7.25%	09/09/2010 11:00	0.50%	08/08/2001 09:30
05/11/1998 12:00	6.75%	07/10/2010 11:00	0.50%	14/11/2001 10:30
10/12/1998 12:00	6.25%	04/11/2010 12:00	0.50%	13/02/2002 10:30
07/01/1999 12:00	6.00%	09/12/2010 12:00	0.50%	15/05/2002 09:30
04/02/1999 12:00	5.50%	13/01/2011 12:00	0.50%	07/08/2002 09:30
03/03/1999 12:00	5.50%	10/02/2011 12:00	0.50%	13/11/2002 10:30
08/04/1999 11:00	5.25%	10/03/2011 12:00	0.50%	12/02/2003 10:30
06/05/1999 11:00	5.25%	07/04/2011 11:00	0.50%	15/05/2003 09:30
10/06/1999 11:00	5.00%	05/05/2011 11:00	0.50%	13/08/2003 09:30
08/07/1999 11:00	5.00%	09/06/2011 11:00	0.50%	12/11/2003 10:30
05/08/1999 11:00	5.00%	07/07/2011 11:00	0.50%	11/02/2004 10:30
08/09/1999 11:00	5.25%	04/08/2011 11:00	0.50%	12/05/2004 09:30
07/10/1999 11:00	5.25%	08/09/2011 11:00	0.50%	11/08/2004 09:30
04/11/1999 12:00	5.50%	06/10/2011 11:00	0.50%	10/11/2004 10:30
09/12/1999 12:00	5.50%	10/11/2011 12:00	0.50%	16/02/2005 10:30
13/01/2000 12:00	5.75%	08/12/2011 12:00	0.50%	11/05/2005 09:30
10/02/2000 12:00	6.00%	12/01/2012 12:00	0.50%	10/08/2005 09:30
09/03/2000 12:00	6.00%	09/02/2012 12:00	0.50%	16/11/2005 10:30

06/04/2000 11:00	6.00%	08/03/2012 12:00	0.50%	15/02/2006 10:30
04/05/2000 11:00	6.00%	05/04/2012 11:00	0.50%	10/05/2006 09:30
07/06/2000 11:00	6.00%	10/05/2012 11:00	0.50%	09/08/2006 09:30
06/07/2000 11:00	6.00%	07/06/2012 11:00	0.50%	15/11/2006 10:30
03/08/2000 11:00	6.00%	05/07/2012 11:00	0.50%	14/02/2007 10:30
07/09/2000 11:00	6.00%	02/08/2012 11:00	0.50%	16/05/2007 09:30
05/10/2000 11:00	6.00%	06/09/2012 11:00	0.50%	08/08/2007 09:30
09/11/2000 12:00	6.00%	04/10/2012 11:00	0.50%	14/11/2007 10:30
07/12/2000 12:00	6.00%	08/11/2012 12:00	0.50%	13/02/2008 10:30
11/01/2001 12:00	6.00%	06/12/2012 12:00	0.50%	14/05/2008 09:30
08/02/2001 12:00	5.75%	10/01/2013 12:00	0.50%	13/08/2008 09:30
08/03/2001 12:00	5.75%	07/02/2013 12:00	0.50%	12/11/2008 10:30
05/04/2001 11:00	5.50%	07/03/2013 12:00	0.50%	11/02/2009 10:30
10/05/2001 11:00	5.25%	04/04/2013 11:00	0.50%	13/05/2009 09:30
06/06/2001 11:00	5.25%	09/05/2013 11:00	0.50%	12/08/2009 09:30
05/07/2001 11:00	5.25%	06/06/2013 11:00	0.50%	11/11/2009 10:30
02/08/2001 11:00	5.00%	04/07/2013 11:00	0.50%	10/02/2010 10:30
06/09/2001 11:00	5.00%	01/08/2013 11:00	0.50%	12/05/2010 09:30
18/09/2001 11:00	4.75%	05/09/2013 11:00	0.50%	11/08/2010 09:30
04/10/2001 11:00	4.50%	10/10/2013 11:00	0.50%	10/11/2010 10:30
08/11/2001 12:00	4.00%	07/11/2013 12:00	0.50%	16/02/2011 10:30
05/12/2001 12:00	4.00%	05/12/2013 12:00	0.50%	11/05/2011 09:30
10/01/2002 12:00	4.00%	09/01/2014 12:00	0.50%	10/08/2011 09:30
07/02/2002 12:00	4.00%	06/02/2014 12:00	0.50%	16/11/2011 10:30
07/03/2002 12:00	4.00%	06/03/2014 12:00	0.50%	15/02/2012 10:30
04/04/2002 11:00	4.00%	10/04/2014 11:00	0.50%	16/05/2012 09:30
09/05/2002 11:00	4.00%	08/05/2014 11:00	0.50%	08/08/2012 09:30
06/06/2002 11:00	4.00%	05/06/2014 11:00	0.50%	14/11/2012 10:30
04/07/2002 11:00	4.00%	10/07/2014 11:00	0.50%	13/02/2013 10:30
01/08/2002 11:00	4.00%	07/08/2014 11:00	0.50%	15/05/2013 09:30
05/09/2002 11:00	4.00%	04/09/2014 11:00	0.50%	07/08/2013 09:30
10/10/2002 11:00	4.00%	09/10/2014 11:00	0.50%	13/11/2013 10:30
07/11/2002 12:00	4.00%	06/11/2014 12:00	0.50%	12/02/2014 10:30
05/12/2002 12:00	4.00%	04/12/2014 12:00	0.50%	14/05/2014 09:30
09/01/2003 12:00	4.00%	08/01/2015 12:00	0.50%	13/08/2014 09:30
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10/07/2003 11:00	3.50%	09/07/2015 11:00	0.50%	04/02/2016 12:00
07/08/2003 11:00	3.50%	06/08/2015 11:00	0.50%	12/05/2016 11:00
04/09/2003 11:00	3.50%	10/09/2015 11:00	0.50%	04/08/2016 11:00
09/10/2003 11:00	3.50%	08/10/2015 11:00	0.50%	03/11/2016 12:00
06/11/2003 12:00	3.75%	05/11/2015 12:00	0.50%	02/02/2017 12:00
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04/03/2004 12:00	4.00%	17/03/2016 12:00	0.50%	08/02/2018 12:00
08/04/2004 11:00	4.00%	14/04/2016 11:00	0.50%	10/05/2018 11:00
06/05/2004 11:00	4.25%	12/05/2016 11:00	0.50%	02/08/2018 11:00
10/06/2004 11:00	4.50%	16/06/2016 11:00	0.50%	01/11/2018 12:00
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09/09/2004 11:00	4.75%	15/09/2016 11:00	0.25%	01/08/2019 11:00
07/10/2004 11:00	4.75%	03/11/2016 12:00	0.25%	07/11/2019 12:00
04/11/2004 12:00	4.75%	15/12/2016 12:00	0.25%	30/01/2020 12:00
09/12/2004 12:00	4.75%	02/02/2017 12:00	0.25%	07/05/2020 11:00
13/01/2005 12:00	4.75%	16/03/2017 12:00	0.25%	06/08/2020 11:00
10/02/2005 12:00	4.75%	11/05/2017 11:00	0.25%	05/11/2020 12:00
10/03/2005 12:00	4.75%	15/06/2017 11:00	0.25%	04/02/2021 12:00
07/04/2005 11:00	4.75%	03/08/2017 11:00	0.25%	06/05/2021 11:00
09/05/2005 11:00	4.75%	14/09/2017 11:00	0.25%	05/08/2021 11:00
09/06/2005 11:00	4.75%	02/11/2017 12:00	0.50%	04/11/2021 12:00
07/07/2005 11:00	4.75%	14/12/2017 12:00	0.50%	03/02/2022 12:00
04/08/2005 11:00	4.50%	08/02/2018 12:00	0.50%	05/05/2022 11:00
08/09/2005 11:00	4.50%	22/03/2018 12:00	0.50%	04/08/2022 11:00
06/10/2005 11:00	4.50%	10/05/2018 11:00	0.50%	03/11/2022 12:00
10/11/2005 12:00	4.50%	21/06/2018 11:00	0.50%	02/02/2023 12:00
08/12/2005 12:00	4.50%	02/08/2018 11:00	0.75%	
12/01/2006 12:00	4.50%	13/09/2018 11:00	0.75%	
09/02/2006 12:00	4.50%	01/11/2018 12:00	0.75%	
09/03/2006 12:00	4.50%	20/12/2018 12:00	0.75%	
06/04/2006 11:00	4.50%	07/02/2019 12:00	0.75%	
04/05/2006 11:00	4.50%	21/03/2019 12:00	0.75%	
08/06/2006 11:00	4.50%	02/05/2019 11:00	0.75%	
06/07/2006 11:00	4.50%	20/06/2019 11:00	0.75%	
03/08/2006 11:00	4.75%	01/08/2019 11:00	0.75%	
07/09/2006 11:00	4.75%	19/09/2019 11:00	0.75%	
05/10/2006 11:00	4.75%	07/11/2019 12:00	0.75%	
09/11/2006 12:00	5.00%	19/12/2019 12:00	0.75%	
07/12/2006 12:00	5.00%	30/01/2020 12:00	0.75%	
11/01/2007 12:00	5.25%	11/03/2020 07:01	0.25%	
08/02/2007 12:00	5.25%	19/03/2020 14:33	0.10%	
08/03/2007 12:00	5.25%	26/03/2020 12:00	0.10%	
05/04/2007 11:00	5.25%	07/05/2020 11:00	0.10%	
10/05/2007 11:00	5.50%	18/06/2020 11:00	0.10%	
07/06/2007 11:00	5.50%	06/08/2020 11:00	0.10%	
05/07/2007 11:00	5.75%	17/09/2020 11:00	0.10%	
02/08/2007 11:00	5.75%	05/11/2020 12:00	0.10%	
06/09/2007 11:00	5.75%	17/12/2020 12:00	0.10%	
04/10/2007 11:00	5.75%	04/02/2021 12:00	0.10%	

08/11/2007 12:00	5.75%	18/03/2021 12:00	0.10%
06/12/2007 12:00	5.50%	06/05/2021 11:00	0.10%
10/01/2008 12:00	5.50%	24/06/2021 11:00	0.10%
07/02/2008 12:00	5.25%	05/08/2021 11:00	0.10%
06/03/2008 12:00	5.25%	23/09/2021 11:00	0.10%
10/04/2008 11:00	5.00%	04/11/2021 12:00	0.10%
08/05/2008 11:00	5.00%	16/12/2021 12:00	0.25%
05/06/2008 11:00	5.00%	03/02/2022 12:00	0.50%
10/07/2008 11:00	5.00%	17/03/2022 12:00	0.75%
07/08/2008 11:00	5.00%	05/05/2022 11:00	1.00%
04/09/2008 11:00	5.00%	16/06/2022 11:00	1.25%
08/10/2008 11:00	4.50%	04/08/2022 11:00	1.75%
06/11/2008 12:00	3.00%	22/09/2022 11:00	2.25%
04/12/2008 12:00	2.00%	03/11/2022 12:00	3.00%
08/01/2009 12:00	1.50%	15/12/2022 12:00	3.50%
05/02/2009 12:00	1.00%	02/02/2023 12:00	4.00%
05/03/2009 12:00	0.50%	23/03/2023 12:00	4.25%
09/04/2009 11:00	0.50%		

TABLE A.1: Bank of England rate announcement and IR/MPR publication dates.

B Details on the construction of the database

B.1 Treatment of raw intraday data

Table B.1 summarises the set of asset prices included in the UKMPD.

To construct the database, we rely on one minute intraday summary bid and ask prices from Refinitiv Tick History. After cleaning the data, monetary policy surprises are computed on the mid price which we define as the mean of the bid and ask price.

In order to shield the calculate surprises from misquotes and outliers we broadly follow the proposed cleaning strategy of Altavilla et al. (2019). This means, the following steps are applied to clean each asset price data at a time:

1. For Sterling Futures, OIS data and Government bond yields we discard entries where either the ask or bid price is larger than 2500 basis points.

2. Delete all entries where either the bisk or the ask price is missing.

3. All entries are deleted where the bid-ask spread is negative.

4. Entries with either the bid or ask price exactly equal to zero are discarded

5. Delete all entries for which the bid-ask spread is more than 50 times the median spread on that day

6. For a rolling window of 50 observations (25 before and after, excluding the observation under consideration), compute the median (mid) quote and the mean absolute deviation thereof. Then, discard all observations where observation under consideration is 10 mean absolute deviations away from the rolling median.

Unfortunately, no data on ask prices was available for UK Government bonds between October 1998 and November 1999. Therefore, during that period we abstain

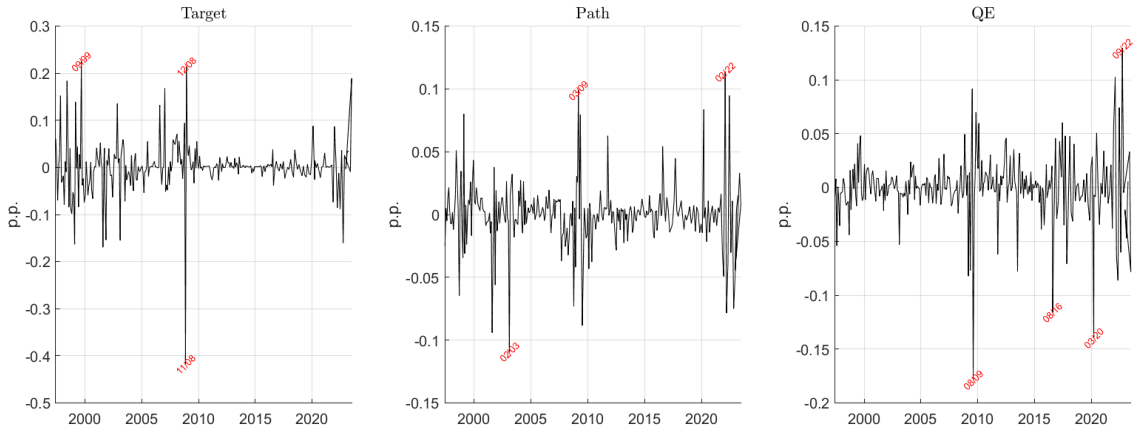
TABLE B.1: Summary of asset prices and transformations

# RIC	Description	Availability	Transformation
	Interest rate Futures		
FSScm1	3M Libor 1st quarterly contract	1997 - 2021	Yield (pp)
FSScm2	3M Libor 2nd quarterly contract	1997 - 2021	Yield (pp)
FSScm3	3M Libor 3rd quarterly contract	1997 - 2021	Yield (pp)
FSScm4	3M Libor 4th quarterly contract	1997 - 2021	Yield (pp)
Son3c1	3M Sonia 1st quarterly contract	Since 2021	Yield (pp)
Son3c2	3M Sonia 2nd quarterly contract	Since 2021	Yield (pp)
Son3c3	3M Sonia 3rd quarterly contract	Since 2021	Yield (pp)
Son3c4	3M Sonia 4th quarterly contract	Since 2021	
	Gilt Yields		
GBP1YT=RR	1 Year Reference Bond	Since 1997	Yield (pp)
GBP2YT=RR	2 Year Reference Bond	Since 1997	Yield (pp)
GBP5YT=RR	5 Year Reference Bond	Since 1997	Yield (pp)
GBP10YT=RR	10 Year Reference Bond	Since 1997	Yield (pp)
	Overnight Indexed Swaps		
GBP1MOIS=RR	1 Month OIS rate	Since 2009	Yield (pp)
GBP2MOIS=RR	2 Month OIS rate	Since 2009	Yield (pp)
GBP3MOIS=RR	3 Month OIS rate	Since 2009	Yield (pp)
GBP1YOIS=RR	1 Year OIS rate	Since 2009	Yield (pp)
GBP2YOIS=RR	2 Year OIS rate	Since 2009	Yield (pp)
	Exchange Rates and Stock Market Indexes		
FFIc1	FTSE100 future first month contract	Since 1997	$100 \times \ln$
.FTSE	FTSE 100 Index	Since 1997	$100 \times \ln$
.FTMC	FTSE 250 Index	Since 1997	$100 \times \ln$
.FTAS	FTSE All Share Index	Since 1997	$100 \times \ln$
EURGBP=	EUR/GBP exchange rate	Since 1998	$100 \times \ln$
GBP=	GBP/USD exchange rate	Since 1997	$100 \times \ln$

from deleting corresponding entries where no ask quote is available, and use the Bid quote instead as a proxy of mid price. Finally, for the Short Sterling Libor Futures (FSScm1-FSScm4) we switch to a 90 minute window for all events up to May 2000. Thereby we intend to compensate for the fact that relatively few and infrequent observations are recorded during this period for those assets, which is further aggravated by discarding observations where neither ask or bid price was available.

C Additional Figures

FIGURE C.1: Estimated Factors

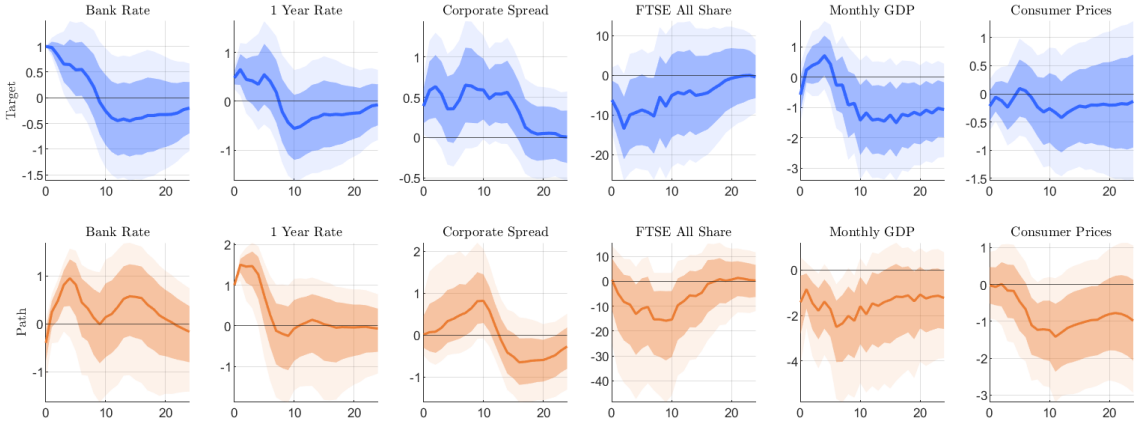


Notes:

FIGURE C.2: RESPONSES TO BOE POLICY SHOCKS, MP COMPONENT

Notes: Impulse response functions to a UK Target (top panel) and Path (bottom panel) shock. The factors are extracted around MPC decision announcements only. Monetary policy news extracted as in Jarociński and Karadi (2020). Shaded areas correspond to 68% and 90% confidence bands. Sample: 1997-2019.

Figure C.3: Responses to BOE Policy Shocks, MPC+MPR window

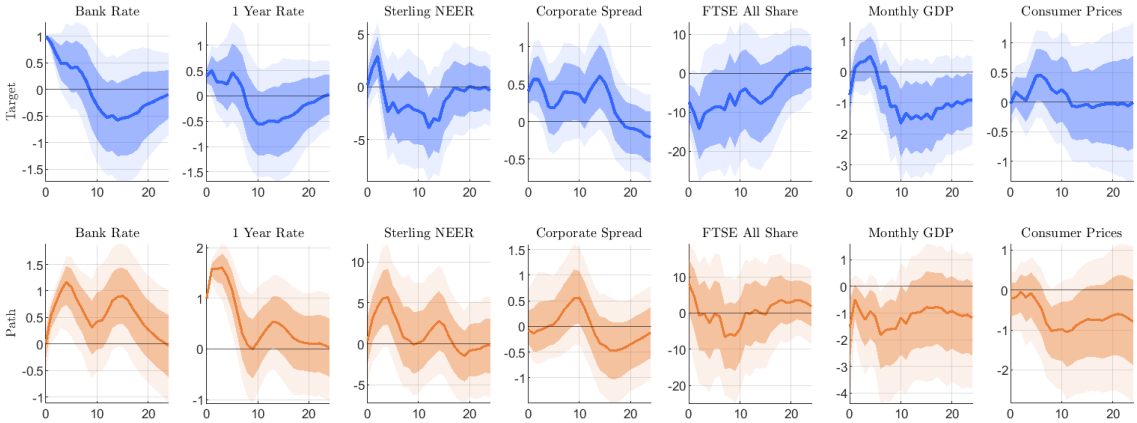


Notes: Impulse response functions to a UK Target (top panel) and Path (bottom panel) shock. The factors are extracted around MPC decision announcements and MPR press conference window. Shaded areas correspond to 68% and 90% confidence bands. Sample: 1997-2019.

Figure C.4: Responses to BOE Policy Shocks, MPC+MPR window, MP component

Notes: Impulse response functions to a UK Target (top panel) and Path (bottom panel) shock. The factors are extracted around MPC decision announcements and MPR press conference window. Monetary policy news extracted as in Jarociński and Karadi (2020). Shaded areas correspond to 68% and 90% confidence bands. Sample: 1997-2019.

Figure C.5: Responses to BOE Policy Shocks



Notes: Impulse response functions to a UK Target (top panel) and Path (bottom panel) shock. The factors are extracted around MPC decision announcements only. Shaded areas correspond to 68% and 90% confidence bands. Sample: 1997-2019.