Monetary Policy Surprises and Central Bank Communication in Canada*

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Abstract

This paper examines non-monetary news in Canadian monetary policy surprises during the fixed announcement schedule. I explore two channels: (i) private information, where the Central Bank and market participants differ in their economic information, and (ii) differences in policy response functions to economic news. I split policy announcements into two types, those with and without an MPR, motivated by institutional differences in the conduct of monetary policy leading into each announcement type, impacting tests for both non-monetary channels. I find no evidence of a private information channel. There is strong evidence of a response to news channel across both announcement types when focusing on the economic news closest to each. An illustrative model and vector autoregression summarize the economic importance of the response to news channel and announcement split.

Keywords: Monetary Policy Surprises, Small Open Economy, High-Frequency Identification, Information Effect, Response to News Effect, Real-Time Data

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1 Introduction

A high-frequency monetary policy surprise can convey more than just monetary news, capturing monetary and non-monetary news. The non-monetary component is especially complex, as it can counteract monetary effects through two distinct channels. The first is a private information channel, where information about the state of the economy differs between the Bank of Canada (BoC) and market participants, for example, through their private market surveys and consultations. The second is a response to news channel, where the policy response function of the BoC differs from the market participants' expectations.[1] To properly identify these non-monetary channels, we must carefully consider the conduct of monetary policy leading into a policy announcement. This is because differences in the monetary process between policy announcements can impact the estimation of non-monetary channels. In Canada, monetary policy announcements follow a systematic difference, leading to two types of policy announcements. Leveraging this institutional difference in monetary policy conduct, I provide new insights in testing for non-monetary news in policy surprises and its economic importance on the effects of a monetary policy shock series.

In this paper, I test for the non-monetary news in monetary policy surprises around Canadian policy announcements from 2002 to 2019. Before testing for the type of non-monetary news, I show that there is a significant non-monetary component across all policy announcements. I then split the policy announcements into two types - those with and without a Monetary Policy Report (MPR). The MPR split is natural, impacting tests for both types of non-monetary news and in line with how Canada conducts monetary policy. First, BoC Staff Forecasts, which are central to test for the private information channel, are regularly only updated for announcements with an MPR.[2] Second, MPR policy announcements occur late in a month while non-MPR policy announcements are very early, changing the economic news closest to either announcement type. The split further impacts the market participant expectations of the BoC policy response function through changes in communication between announcement types. I further test the response to news channel after 2006, when the BoC expands communication of economic and policy expectations to market participants. An illustrative model and a vector autoregression highlight the importance

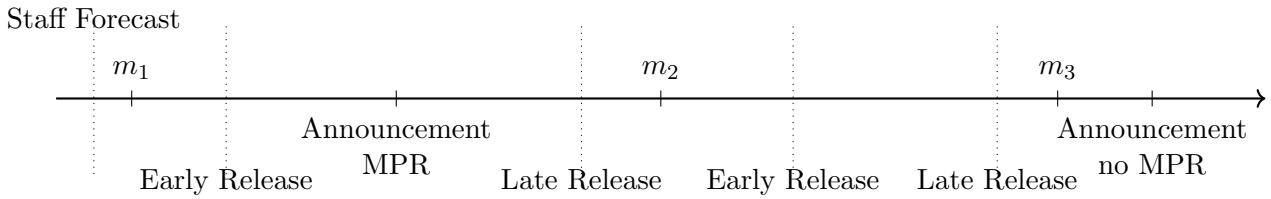
[1] The information effect builds from Romer & Romer (2000) and recently with high-frequency identified policy surprises Campbell et al. (2012), Nakamura & Steinsson (2018), Miranda-Agrippino & Ricco (2021) and others. Response to news effect from Bauer & Swanson (2023*a*), Bauer & Swanson (2023*b*), Sastry (2021).

[2] As Champagne et al. (2018) note, some sub-samples have a Staff Forecast for each policy announcement.

of distinguishing monetary policy announcements based on how policy is conducted, to properly capture monetary effects while accounting for non-monetary news in policy surprises.

The novel contribution of this paper is the separation of monetary announcements into two types, with and without an MPR, while examining the non-monetary news in monetary policy surprises. Previous literature examines non-monetary news equally across all policy announcement.[3] However, as Figure (1) highlights for Canada, there can be substantial differences in information leading to each announcement type. This change between announcements is important for both types of non-monetary news. For example, the Greenbook forecasts, which control for internal information in the US, are given for every policy announcement.[4] However, in Canada, the BoC Staff Forecasts are only regularly made for announcements with an MPR. The response to news channel will also be impacted, as the economic news closest to a policy announcement will vary depending on the announcement type. Communication from the BoC also changes depending on the upcoming announcement type. Thus, to properly account for non-monetary effects within a policy surprise, policy announcements must be separated to account for significant information changes that may impact the non-monetary component.

Figure 1: Timeline Around Back-to-Back Policy Announcements



Note: Representative timeline of events around two policy announcements. Early news sets represent statistical releases that occur earlier in the month on average, including the Labour Force Survey, Merchandise Trade, Productivity. Late news set represents statistical releases that occur late in the month, including SEPH, CPI, GDP, Wholesale trade and Retail Trade.

[3]See, for example, Nakamura & Steinsson (2018), Miranda-Agrippino & Ricco (2021), Bauer & Swanson (2023*a*), Bauer et al. (2024) among others. Alam (2022) tests US announcements with statistical releases near them while I first separate announcements and then examine economic releases near them. Zhu (2021) uses a larger set of statistical releases, not distinguishing between near and far releases.

[4]See, for example, Romer & Romer (2004), Miranda-Agrippino & Ricco (2021), Zhang (2018), Hoesch et al. (2023) among others.

I provide the first evidence of a response to news channel and its importance for empirical monetary policy effects outside the US. The previous non-monetary bias literature largely focuses on the US.[5] Some recent work has expanded beyond the US for the information channel, including the UK (Cesa-Bianchi et al. (2020)) and Sweden (Laséen (2020)). However, as I show in this paper, the non-monetary tests from Cesa-Bianchi et al. (2020) may underestimate the relationship as their proxy of internal information does not update for each policy announcement. In this context, Canada offers an ideal testing ground, as a textbook-style small open economy that is highly connected to the US economy but, through its fixed schedule of policy announcements, has a domestically driven monetary process.[6]

Before testing the non-monetary news channel, I provide evidence of strong non-monetary news across all policy announcements. I show this through Jarociński & Karadi (2020) co-movement with a stock index for all policy announcements, finding that about one-third of all policy surprises since 2002 are non-monetary dominant. This non-monetary bias is consistent across both types of policy announcements. I also show that the economic forecast revisions around these policy announcements display a non-monetary effect consistent with the US work.[7]

I then test for the type of non-monetary bias in the policy surprises for each announcement type. I begin with the response to news channel, finding a relationship between economic news and policy surprises for all announcements, consistent with Bauer & Swanson (2023*a*).[8] This relationship is strongest when I split the policy announcements into two types, allowing me to focus on the closer economic news.[9] This strengthened relationship with close economic news is consistent with Alam (2022) US findings, although he does not split into announcement types. Finally, I

[5]The US literature begins with the work of Cook & Hahn (1989) and Kuttner (2001) with important intraday level data contributions from Gürkaynak et al. (2005) and Piazzesi & Swanson (2008). More recently, applications to monetary policy transmission and its effects with Gertler & Karadi (2015).

[6]The Bank of Canada, in introducing its fixed schedule of policy announcements said as much, "The specific scheduling of the eight dates reflects the flow of data and information that the Bank uses to gauge changing trends in the economy and in inflation pressures. ... In addition, since the Bank's schedule of fixed announcement dates will be different from the fixed-date schedule of the U.S. Federal Reserve System, it will allow more attention to be focused on Canadian economic circumstances in the lead-up to, and following, monetary policy announcements here in Canada." Bank of Canada (2000).

[7]See, for example, Nakamura & Steinsson (2018) and Bauer & Swanson (2023*a*) among others.

[8]In the appendix, I show that the forecast revisions around all policy surprises can flip to a sign consistent with a monetary shock.

[9]The full economic news set contains major statistical releases, including the Labour Force Survey (LFS), CPI, GDP and the Survey of Employment, Payroll and Hours (SEPH), among others.

show that since 2006, the economic news and policy surprises for non-MPR announcements are strongly pro-cyclical.[10] This aligns with the introduction of the short-run GDP forecast in the MPR and the stated goals of the BoC to be more transparent in their communication of policy expectations to market participants. The pro-cyclical effect suggests that the BoC communicates policy rule expectations to market participants, tempering their overreaction to economic changes and adopting the wait-and-see approach that the BoC takes.

I then test the non-monetary bias in policy surprises for a private information channel. I follow the Staff Forecasts Projections method from Miranda-Agrippino & Ricco (2021), using the Champagne & Sekkel (2018) specification for each policy announcement type. A weak relationship in announcements with an MPR suggests a private information channel. Announcements without an MPR display no statistical relationship. However, this relationship disappeared after 2005, and there is no relationship between Staff Forecasts and policy surprises for either announcement.

I place the empirical findings in an illustrative model to highlight the importance of splitting policy announcements and response to news channel. The model deviates from the singular policy announcement timeline model of Bauer & Swanson (2023*b*). In the model, I highlight the influence of close economic news while showing that economic news that is further away can have a small effect. The model also highlights the communication change between announcement types from the BoC in influencing market participants' policy rule expectations. The change in communication between announcement types explains why policy surprises vary for either announcement type. This further highlights the importance of considering institutional differences in how monetary policy is conducted when studying non-monetary news.

I use a Bayesian VAR, with the lessons from the empirical identification, to show the economic importance of properly accounting for the response to news channel in Canadian policy surprises. I apply the recommendations from Bauer & Swanson (2023*b*) and estimate the coefficients for a longer period, from 1991 to 2019. I then applied three separate monetary policy shock instruments for 2004 onwards: unadjusted policy surprises, adjusted for economic news across all policy announcements and adjusted for economic news for each policy announcement. The impulse responses are clear:

[10] Policy announcements with an MPR display a weaker pro-cyclical effect.

adjusting for economic news for *each* policy announcement is essential, and not doing so leads to an initial increase in price and output following the monetary policy shock.

The rest of this paper is organized as follows. In section (2), I review the Bank of Canada timeline around a policy announcement and timing of statistical releases to motivate the empirical work further and data. Section (3) shows that there is a confounding effect in the monetary policy surprise measure. Section (4) splits the policy announcements into two types, examining the response to news effect and information effect and the importance of Central Bank communication. In section (5), I place the empirical findings in an illustrative model to describe how a policy surprise arises in Canada, drawing from the empirical evidence. Section (6) shows the economic importance of properly adjusting for the response to news channel. Section (7) concludes.

Related Literature

High Frequency Identified Monetary Policy Surprises and Non-Monetary News

The non-monetary news in a monetary policy surprise is largely a US-focused topic, with most literature testing for a private information channel.[11] The identification of the information channel includes forecast revisions, such as Campbell et al. (2012) and Nakamura & Steinsson (2018), co-movement with a stock index, Jarociński & Karadi (2020), text-based approaches in Acosta (2022). Another approach applies the Greenbook forecast regressions from Romer & Romer (2004), including recent work from Zhang (2018), Miranda-Agrippino & Ricco (2021) and Hoesch et al. (2023). Recently, some work has found a diminishing information channel in US policy surprises, including Hoesch et al. (2023) and Lunsford (2020). Both find no evidence of an information channel after 2004 in the US. Compared to these previous studies, I examine Canada and split the policy announcements in this paper, finding no evidence of an information channel since 2006.

More recently, a growing literature contrasts the information channel with the response to news channel, where market participants have incomplete information about the policy response function of the Central Banker. This literature begins with Bauer & Swanson (2023*a*), Bauer & Swanson

[11] Some literature expands beyond the US, such as Laséen (2020) for Sweden and Cesa-Bianchi et al. (2020) for the UK.

(2023*b*), Sastry (2021), and recent market participant heterogeneity from Bauer et al. (2024). They find that the relationship between economic news and policy surprises is consistent with this channel across all US policy announcements. I also find a relationship between economic news and policy surprises in this paper for Canada. I also show that not all policy announcements are the same. This is because of how policy is conducted changes between announcement types in Canada. These changes influence the response function expectations of market participants, impacting the response to news channel estimation.

High Frequency Identification and Timeline Changes

In the US, a smaller literature looks at the importance of close economic news to policy announcements. This includes: Lucca & Moench (2015), Alam (2022) and Zhu (2021) among others. Alam (2022) shows that a small set of major statistical releases close to a policy announcement have strong statistical power on monetary policy surprises. Zhu (2021) controls for effects around all economic news releases, eliminating non-monetary news. I show in this paper that close economic news matters in Canada for the response to news channel, while systemically splitting policy announcements into different types to best account for the close news.

Monetary Policy in Canada

This paper contributes to monetary policy in Canada using intraday higher frequency identification, where previous literature is often at the daily level, including Kearns & Manners (2006), Ha & So (2023) and Koeppl et al. (2024). Daily-level data is problematic in identifying non-monetary news because multiple events can occur within a single day. Nsafoah & Dery (2024) and Soosalu (2024) examine monetary policy effects at the intraday level. Nsafoah & Dery (2024), use the Overnight Index Swaps to form their shock series but still observe a price puzzle in Canada. This paper builds on the dataset introduced in Soosalu (2024) using the three-month Bankers Acceptance Rate futures to measure the policy surprises around events. After adjusting for the response to new channel, there is no price or output puzzle.

Another popular specification of policy shock series in Canada are Champagne & Sekkel (2018) narrative shock series. They use the Romer & Romer (2004) and Cloyne & Hürtgen (2016) method with BoC Staff Forecast to control for private information and form a policy shock series. However,

I have shown that there is no information channel to control for in a policy shock series after 2006.

Jain & Sutherland (2020) and Sutherland (2023) examine the importance of the MPR forecasts. They show that the MPR provides a monetary policy signal through its forecasts. Binette & Tchebotarev (2017) further compares the MPR forecasts to private sector forecasts, finding that the MPR forecast performs well in the long run. I use the MPR to split policy announcements and the MPR short-term forecasts changes as a descriptive change in communication of policy expectations from the BoC to market participants.

Xing et al. (2024) and Boehm & Kroner (2023) show the importance of US statistical releases and Canadian bonds and stock prices. I find that US economic news has a limited effect on Canadian monetary policy surprises. This aligns with the goal of the fixed schedule of policy announcements to have policy announcements focus more on the state of the Canadian economy.

2 Background: Bank of Canada Decision Timeline and Data

In this section, I review the timeline around a policy announcement and the steps that occur before a policy announcement in Canada. I then discuss the changes in communication from the BoC for different policy announcement types and the data for the rest of the paper. This section concludes with predictions to guide the empirical section.

2.1 Timeline Around a Policy Announcement in Canada and Data

In late 2000, Canada adopted a schedule of eight fixed policy announcements per year, with 2001 being the first full year of fixed policy announcements.[12] The fixed schedule of announcements marked a significant change in how policy announcements occur, with three possible actions that can occur, including an increase, decrease or no change to the policy rate. Should a need arise, the Bank of Canada can also change the policy rate between these scheduled announcements. There have only been four unscheduled announcements, with the September 2001 change, October 2008 as a coordinated move with other Central Banks in reaction to declining financial and economic

[12]Before 2013, policy announcements were made at 9:00 AM Eastern time. Since 2013, policy announcements now occur at 10:00 AM.

indicators, and twice in March 2020 because of global uncertainty due to Covid.

With eight announcements a year, there are approximately six weeks between announcements. Following the first year of scheduled policy announcements, Macklem (2002) describes the approximate four-stage timeline of events that leads to a policy decision by the BoC, with updates by Murray (2013) and a recent discussion from Vincent (2024). This process includes internal analysis and projections, discussion of recent economic indicators movement and consultation with industry leaders. The four stages are roughly summarized as:

1. In the first stage, about two and a half weeks before the policy announcement, BoC Staff Forecasts are presented to the government council. Staff Forecasts only regularly occur for announcements that include an MPR. When Staff Forecasts are not updated, this stage focuses on previous economic expectations versus recent economic data.[13]

2. About one week before the announcement, major briefings are received, and BoC advisors present revised projections, including Governing Council members' comments and any new economic developments since stage one. The media blackout begins, where Governing Council members will not publicly comment on the economy to avoid misinterpretation and guidance.

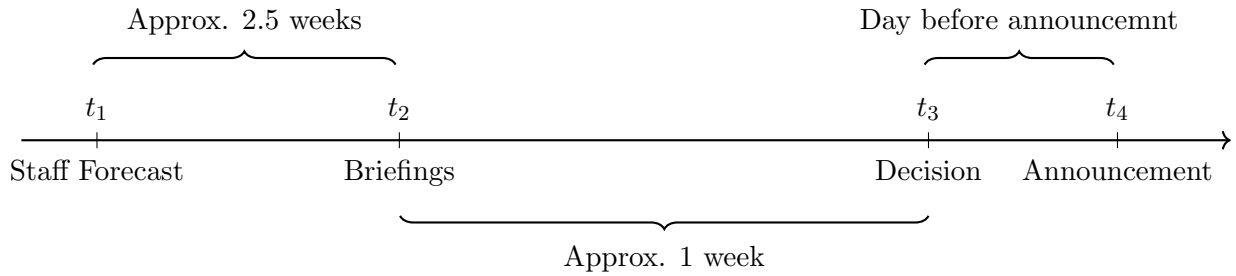
3. The Governing Council will deliberate and form their decision. They then meet the day before the announcement to confirm this decision.

4. The policy announcement is released.

Figure (2) provides a simple visualization of this timeline for each policy announcement. A more in-depth discussion of each stage is in the online appendix. The MPR is available for half of the policy announcements, such that if the announcement includes an MPR, the following policy announcement will not.

[13] See Vincent (2024) for details.

Figure 2: Bank of Canada Timeline around Policy Announcements



Note: Four stage process of policy decisions as outlined above. Each sub-period t represents a stage. Staff Forecast only for announcements with an MPR.

The linear timeline of events that Macklem (2002) and Murray (2013) describe places less focus on the differences between announcements with and without an MPR. However, as Vincent (2024) remarks, the conduct of reaching a monetary policy decision differs between these two announcement types. First, policy announcements with an MPR include revised BoC Staff Forecasts. Second, the MPR information provides a clear path of economic and monetary response expectations from the BoC to market participants in the short run. This information will influence how market participants form their policy expectations of the BoC.[14]

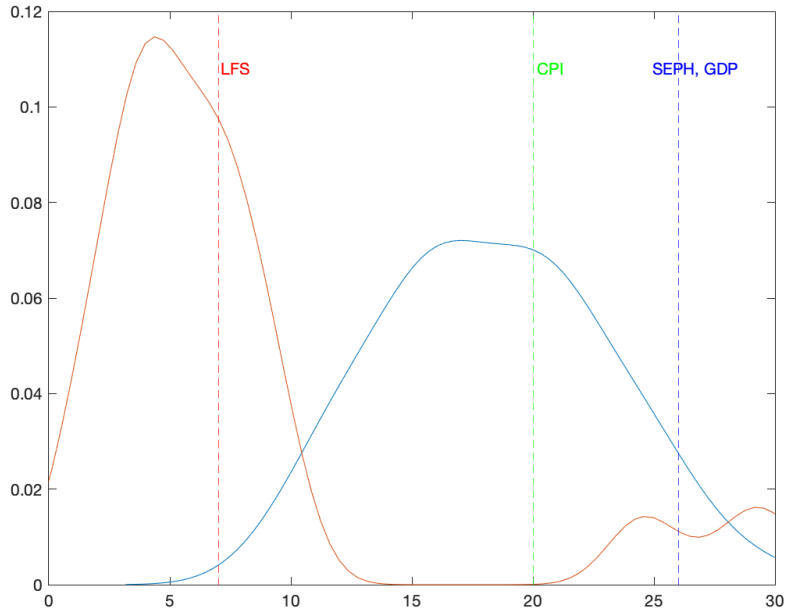
The changes leading into these two policy announcement types impact the identification of both non-monetary channels. First, the BoC Staff Forecasts, an often-used internal information and expectations measure, are only regularly made for announcements with an MPR. Second, the information leading into each announcement type will vary because of when these announcements occur within the month. In Figure (3), I plot the release dates of the two announcement types and important statistical releases. Here, we see that an announcement with an MPR occurs late in the month, on the 18th day, while other announcements occur very early, on about the third day of the month.[15] This timing difference is important for a response to news channel because it will change which economic releases are close to a policy announcement, conditional on which announcement

[14]Since 2013, the MPR release coincides with the policy announcement. However, before this, there was a lag between the policy announcement and the MPR release, up to several days after the announcement. The MPR includes a rich discussion of the current economic activity and the short-run expectations, including limited forecasts of GDP growth rates and inflation. Champagne et al. (2018) shows that although the MPR forecasts include up to a month more of information, they do not add significant value compared to the Staff Forecasts.

[15]Early in the sample, a few announcements occur very late of the previous month.

type it is.[16]

Figure 3: Distribution of Policy Announcement Days



Note: Distribution of policy announcement days within a month. The orange line represents policy announcements that do not include an MPR release, while the blue line includes MPR releases. The average days within the month of four significant statistical releases are represented with vertical lines.

The difference between these announcement types extends to the frequency of communication involving the stance of monetary. Communication from the BoC to market participants can inform market participants of the BoC's policy response function.[17] Communication from the BoC includes public speeches, press conferences, and official releases.[18] In this paper, I refer to these as monetary events. I use the list of events from Koeppl et al. (2024), who provide an extensive list of monetary events since the 1990s. I keep those which they have highlighted to include information on the current stance of monetary policy. The data is at the year-month-day level. To ensure that I only capture the effect of the monetary event, I continue with an intraday-level setting and cross-reference the dataset with Bloomberg Economic Calendars to find exact times. I dropped monetary

[16] Alam (2022) highlights the strong relationship between close economic news and policy surprises in the US.
[17] Communication can also relay private information to market participants.
[18] Recent work in the US highlights the importance of monetary events for the conduct of monetary policy. See, for example, Swanson (2023), Swanson & Jayawickrema (2023) and Bauer & Swanson (2023*a*).

events in 2002 and 2003 because the Bloomberg Economic Calendar started in 2004, leaving me with 351 monetary events between 2004 and 2022.[19]

Table (1) shows the frequency of these monetary events in the second column and the frequency after announcement each type in columns three and four. The corresponding distribution of market effects, which I measure as the BAX price difference around the monetary event is in Figure (4). Across all event types, there are measurable and meaningful changes in interest rate futures, suggesting that policy expectations are changing. Column four shows that following an announcement without an MPR, there is a significant increase in the number of speeches that discuss the stance of monetary policy. The change in speeches is important as it is an opportunity for the Governing Council to guide policy expectations of market participants, particularly when the MPR information is older. Finally, using intraday level data to identify these effects is paramount, as multiple events may occur within a given day. For example, on 12 April 2017, there was a policy announcement, release of the MPR, press conference and testimonial before the House of Commons on the same day.

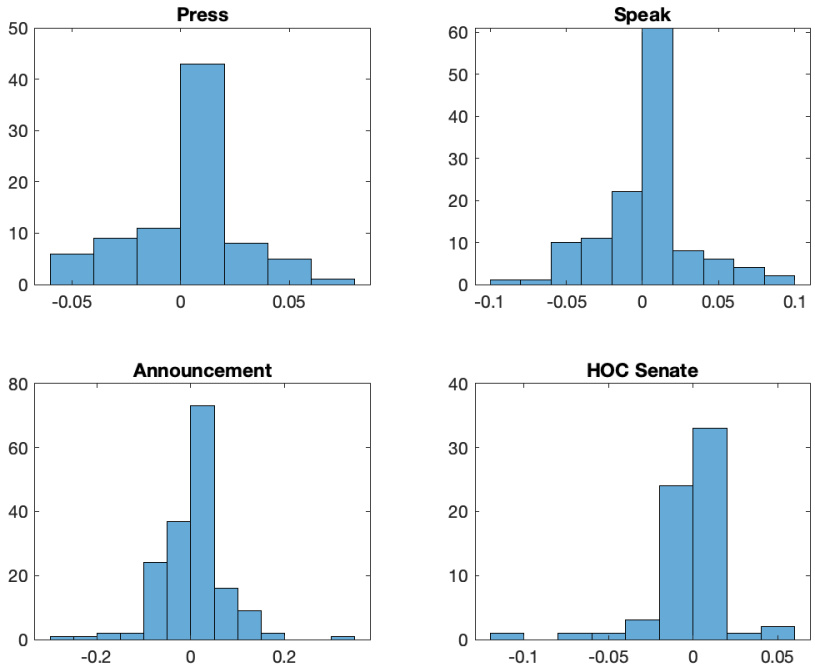
Table 1: Frequency of Monetary Events

Event type	Frequency	After MPR	No MPR
Press	83	75	8
Speeches	126	42	84
Senate	66	61	5
MPR	76	76	0
Announcement	152	76	76
Total	503	330	173

Note: All monetary events from Koeppl et al. (2024) between 2004 and end of 2022 that are listed as monetary policy specific. Column three are events after a policy announcement with an MPR and column four are after announcements without an MPR. These events are cross-listed with Bloomberg calendar to pull the exact time during the day that they begin.

[19]I make a large effort to attach times to every event, but some events do not have a clear start time listed. The current list of monetary events represents 99 percent of those from Koeppl et al. (2024) that discuss monetary policy stance.

Figure 4: Histogram for Monetary Event Surprises



Note: Histograms of policy surprises around difference types of monetary events. The definitions and windows of each monetary event type are described in the text. Y-axis is frequency and x-axis is the surprise measured in percentage points.

I use real-time data releases to examine the information content before the policy announcement. Since Statistics Canada updates their original data releases, I carefully reviewed online archives from Statistics Canada to create a small database of real-time economic data from 2000 until 2020. Table (2) outlines the various statistical releases I focus on, with many variables included in these releases.[20] The table includes the frequency, available sample, and the lag between the reference and publication times. I use the release period of the data to build the current information set before a policy announcement. Financial data collected from other sources are also available. They are generally available at a higher frequency with no time lag.[21] I also use the Bloomberg Economic Calendar to collect a release's expected and actual value. This allows me to calculate the surprise associated with various economic releases, capturing differences between market expectations and

[20] The database represents a small set of important variables discussed in BoC Speeches and the MPR.
[21] An exception is the zero-coupon bond yields with a two-week release lag.

actual releases.[22]

Table 2: Collected Survey's and Real-Time Data

Survey	Frequency	Sample	Rough Time Release Lag
LFS	Monthly	2000:7 - 2020	One month
SEPH, EPH	Monthly	2000:10 - 2020	One month
GDP	Monthly	2000:5 - 2020	One month
Retail Sales	Monthly	2000:1 - 2020	One month
Merchandise Trade	Monthly	2000:1 - 2020	One month
Wholesale Trade	Monthly	2000:4 - 2020	One month
Build Permits Value	Monthly	2000:5 - 2020	One month
Non-Residential Building Investment	Quarterly	2002:Q2 - 2020	One quarter
Balance of Payments Trade	Quarterly	2000:Q1 - 2020	One quarter
Labour Productivity	Quarterly	2000:Q1 - 2020	One quarter
Enterprise Finances	Quarterly	2000:Q2 - 2020	One quarter

Note: List of real-time data surveys from Statistics Canada online archives and *The Daily*. Each survey contains multiple variables, although all variables from each release are not included. Only the original release data has been recorded. Intermediate update data following each release is not included.

2.2 Expectations Drawn from the Timeline

The timeline leading into each policy announcement highlights information differences for either policy announcement type. However, how does this impact the non-monetary bias and the channel type? We can see the influence of these differences in a simple interest rate response function:

$$i_t = f(x_t) + \varepsilon_t. \tag{1}$$

Where i_t is the policy rate, ε_t is an exogenous policy shock, $f(\cdot)$ will be the policy response function, and (x_t) is the state of the economy. Here, the *information channel* implies a different information set on the state of the economy between the market participant and BoC. The *response to news channel* assumes that the information on the economy is similar but that the policy response function expectations of market participants differ from the policy response function of the BoC.

The timeline shows that the announcement type impacts both channels. However, we should still expect non-monetary news in all policy announcements. The private information channel

[22] Further details of the data are in the online appendix.

will vary because the BoC Staff Forecasts, which controls internal information and beliefs, only update for announcements with an MPR. Thus, if present, we expect the information channel to be strongest for announcements with an MPR. For the response to news channel, two changes between announcement type occurs. First, the closest economic news will vary because of changes in when the policy announcement occurs within a month. This change will impact the BoC and market participants' up-to-date information about the economy. The change of monetary events between announcements also impacts expectations of the policy response function. This change suggests that we test each announcement type separately for non-monetary news to account for differences in monetary policy conduct leading to each announcement.

3 Is There Non-Monetary News in Monetary Policy Surprises?

In this section, I present evidence of non-monetary news within the policy surprises across all scheduled policy announcements between 2002 and 2022. I begin with the co-movement test from Jarociński & Karadi (2020) (henceforth called JK). I then examine forecast revisions around a policy announcement, similar to Romer & Romer (2000), Campbell et al. (2012), Nakamura & Steinsson (2018) and Bauer & Swanson (2023*a*), among others.

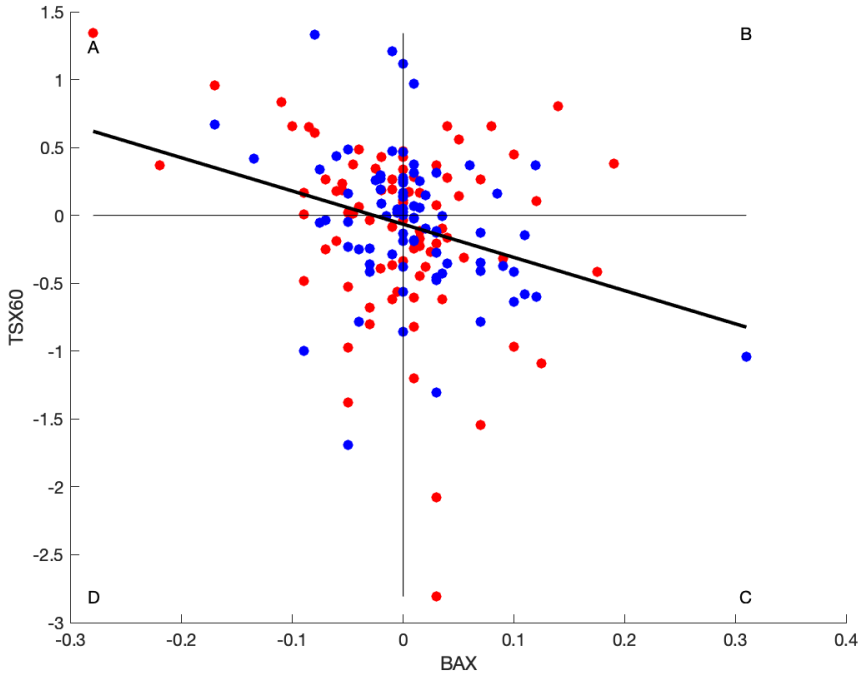
3.1 Co-Movement with a Stock Index

I begin with the JK stock index co-movement test, using the same narrow window to capture the price change in a Canadian stock index. I use the TSX60 as the stock index, and the results are robust to the other Canadian stock indices. The co-movement test follows from monetary economic theory, where following a tightening (loosening) in monetary policy leads to a decrease (increase) in asset prices. Thus, a monetary policy shock should observe a negative co-movement with the stock index, and a positive co-movement captures a non-monetary effect.

Figure (5) presents the event-level scatter plot results, plotting the narrow window price changes of the monetary policy surprise measure and the stock index for 2002 until the end of 2022. The policy surprise measure is the second front contract, but results are consistent across the four nearest contracts. Red dots are announcements with an MPR, while blue are those without. A

monetary shock is in the North-West and South-East quadrants, while a non-monetary shock would be in the North-East and South-West quadrants. Like the JK findings for the US and Eurozone, approximately 32 percent of all policy announcements display a dominant non-monetary shock effect. In these instances, the JK explanation is that the policy announcement and corresponding communication reveal that the BoC has a different view on the current or future state of the economy than the market participants, driving a non-monetary policy response (i.e. an information effect).

Figure 5: Narrow Window Policy Surprise and Stock Index



Note: Narrow window of monetary policy surprises and the same narrow window change of the TSX60 around a policy announcement. Red dots are announcements with an MPR, blue are those without. Black line is the line of best fit for all policy announcements. Second front contract, BAX2, is the monetary policy surprise measure. Monetary dominant effects in quadrants A and C, non-monetary are B and D.

Figure (5) shows significant variation in all four quadrants and is not limited to sub-samples within the full sample. Some bias may exist in this plot due to the noisy nature of the stock market, but the plotted responses are similar to those of the US. However, the JK co-movement exercise only shows a potential non-monetary effect within the policy surprise measure, not the exact type of bias. Acosta (2022) argues that the JK approach only presents evidence if the information effect

is the only effect, and Cieslak & Schrimpf (2019) finds that the information bias in JK's design is limited to only a few significant instances. Finally, the JK test mat further under-identify the level of confounding effects because the co-movement approach only *set* identifies an effect. By set-identifying the effect as monetary or information-driven, we miss that many announcements may contain both a monetary and non-monetary effect.

For these reasons, the JK co-movement exercise supports that there may be some non-monetary news in the monetary policy surprise measure, but the type, frequency and size are unknown. It is possible that the "wrong" signed responses are not because of the information difference but a differing response to the interpretation of the current state of the economy. Thus, across both announcement types, there appears to be some non-monetary bias, but we are not sure *why* or *what* the bias is, warranting further study.

3.2 Forecast Revisions Around a Policy Announcement

Now, I regress the forecast revisions around a policy announcement on the policy surprises. Similar to the co-movement with a stock index, the signs of forecast revisions following a monetary policy shock are well established in economic theory. Following a monetary tightening, we should expect inflation and GDP forecasts to be revised downward while the unemployment forecast should be revised upward. An opposite signed effect is evidence of a non-monetary effect.[23]

I used the forecast revision from Bloomberg, representing up to 20 different forecasts from private banks, economic firms, and other private firms. These are a daily series from 2008 until the end of 2019. In order to follow a similar timing path as the US literature, which uses the Bluechip monthly forecasts, I form a window of 15 days before and after a policy announcement to be similar to monthly forecasts. I then aggregate the average of the forecast revisions from the nowcast to three quarters ahead. The forecast revision around a policy announcement regression takes the following form:

$$PF_{rev_t} = \alpha + \beta BAX_t + \upsilon_t. \tag{2}$$

[23]See, for example, Campbell et al. (2012), Nakamura & Steinsson (2018), Bauer & Swanson (2023*a*), among others

Where PF_{rev} is the average forecast revision of the private forecasts up to three quarters ahead, t denotes the BoC policy announcement and BAX_t the unadjusted Soosalu (2024) monetary policy surprise for meeting t. Robust standard errors are presented in the parenthesis below the estimate.

Table (3) presents the coefficients from equation (2). Here, the coefficients are similar to those of the US and are generally opposite to a monetary consistent effect. It is only the second front contract for GDP that has the expected negative coefficient, and no coefficient is statistically significant other than inflation. Although outliers may be a concern given the sample, removing outlier effects decreases statistical significance slightly, but the signs remain.[24]

Table 3: Monetary Policy Surprises and Forecast Revisions Around Policy Announcements

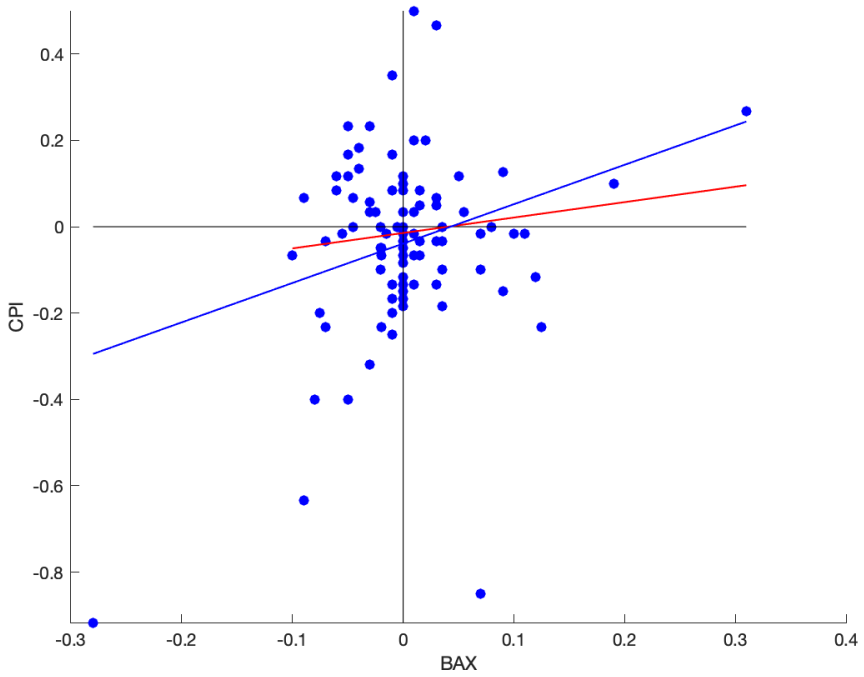
Instrument	CPI Forecast	GDP Forecast	Unemployment Forecast
BAX1	1.32**	0.203	-0.36
	(0.6)	(0.45)	(0.296)
BAX2	0.912*	-0.128	-0.301
	(0.517)	(0.389)	(0.272)
BAX3	0.932**	0.019	-0.355
	(0.435)	(0.296)	(0.269)
BAX4	0.94**	0.177	-0.423
	(0.411)	(0.286)	(0.287)
Observations	97	97	97

Note: Forecasts revisions around a policy announcement regressed on each policy surprise measure. Robust standard error in parentheses. Constants are omitted from the results. Sample is from 2007:10 to end of 2019. Forecast revisions from Bloomberg. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The issue of outliers is clear through the scatter plots of each policy announcement surprise and forecast revision pair in Figure (6).[25] We can see several observations that appear as outliers. It is important to note that these outliers exist across the sample and are not only attributed to the Global Financial Crisis period. For example, the January 2015 policy announcement observes a large policy surprise and a large forecast revision. The largest effects on inflation align with Canada being a single mandate inflation targeting regime. Of course, the Bank of Canada will also be aware of other economic conditions when making a policy decision.

[24] A table with these coefficients is available in the additional appendix.
[25] GDP and unemployment forecasts are in the additional appendix.

Figure 6: Policy Surprises and CPI Forecast Revision



Note: Consumer Price Index inflation (CPI-Inflation) median forecast revisions over next three quarters around a policy announcement and the preferred monetary policy surprise measure. Blue line represents all data, red line removes outliers. Forecast from Bloomberg Economic Calendar, median of all forecasters. All units are percentage points. Sample is 2009 to 2019.

Prior to the response to news channel, these "wrong" signed forecast revisions were attributed to an information channel (Campbell et al. (2012) and Nakamura & Steinsson (2018) among others). However, the work of Bauer & Swanson (2023*a*) challenges this interpretation and shows that this is an example of an omitted variable bias problem. Here, the economic news relates to policy surprises and forecast revisions and flips the sign of these revisions around a policy announcement. Therefore, across both the forecast revision and the JK co-movement exercises, there appears to be non-monetary news in the policy surprises, warranting further investigation to determine its channel: information versus response to news.

4 Response to News Channel and Information Channel

In this section, I test the relationship between policy surprises and economic news for each announcement type. I then examine the growing role of Central Bank communication and its influence on the response to news channel. Next, I test for the private information channel in explaining the non-monetary news in policy surprises. I conclude this section with a discussion of the results.[26]

4.1 Response to News Channel and Asymmetric News

I test the relationship between the policy surprises and economic news for both policy announcement types. A relationship between the economic news and policy surprise suggests that market participants did not fully incorporate all information into their interest rate expectations, indicative of a response to news channel. This holds under the assumption that market participants are full information rational expectations (FIRE) agents. The specification takes the following form:

$$BAX_t = \alpha + \beta news_t + \epsilon_t. \tag{3}$$

Where BAX_t is the policy surprise measure around a policy announcement t, $news_t$ represents a vector of economic and financial news, and their corresponding surprises before a policy announcement. The timeline spans from 2002 to 2019 and includes all scheduled policy announcements. Robust standard errors are reported.

The economic and financial news dataset consists of important economic releases, surprises and financial data. All economic and financial data is publicly available before the policy announcement.[27] The news set includes surprise components for CPI, GDP, employment, wholesale, labour productivity, building permits and US non-farm payroll.[28] Financial data includes (all as natural log changes) the three-month change in the TSX60, the three-month change in the yield curve, the one-month change in the Canadian US exchange rate and the three-month change in WTI oil

[26] In the appendix, I show that the forecast revision signs flip to a monetary shock consistent response with a small set of economic news, in line with the Bauer & Swanson (2023*a*) response to news channel.

[27] The current news selection represents a sub-selection of the total economic news choice variable available, with a strong and intuitive relationship with the policy surprises.

[28] A surprise measure is the actual release value minus the survey expected value from Bloomberg, which is then multiplied by 100.

prices. Finally, economic data includes 3-month changes in CPI, LFS data - unemployment rate, unemployment level and private employment, merchandise trade exports, SEPH - total employment, and total retail sales and inventory changes. Economic changes are logged differences and multiplied by 100. Monetary policy surprises are in percentage points.

Table (4) present the coefficients from equation (3). Here, I split the announcements into those with and without an MPR. The news set for each announcement type changes to focus on close economic releases. It allows the most up-to-date information about the economy to enter the policy response functions.[29] I focus on the shorter-term economic changes as these are the updates that Vincent (2024) highlights in the policy decision process.

The first column of Table (4) are announcements with an MPR, and the second column is without an MPR. The two news sets overlap only for financial data. First, announcements with an MPR observe a largely pro-cyclical relationship between economic news and monetary policy surprises. The yield curve is a statistically significant counter-cyclical effect example. The effects are intuitive in size, where, for example, a one percent surprise increase in GDP leads to a seven basis point surprise monetary tightening. A one percent increase in the one-month change to private employment leads to a surprise monetary tightening of just under one basis point. The US influence is also evident, where a one percent payroll surprise leads to a 2.4 basis point surprise monetary tightening. Overall, the relationship between close economic news and the MPR policy announcements is strong and statistically meaningful in explaining variation. It is also larger than any effects of the previous regressions for all announcement types.

The second column of Table (4) are policy surprises and the news set of close economic releases for announcements without an MPR. Here, the CPI, SEPH and retail releases are important. Again, the close economic news has a strong, largely pro-cyclical effect with the policy surprises. For example, a 10 percent increase in the stock index leads to an almost three basis point surprise monetary tightening, and a surprise increase of one percentage point in the CPI-inflation rate leads to a 5.5 basis point surprise tightening. A one percent increase in retail inventory leads to a one

[29] For example, announcements with an MPR have a news set focusing on the LFS and merchandise trade, two major statistical releases close to these announcements.

Table 4: Monetary Policy Surprises and Economic News Across Policy Announcement Types

	MPR	No MPR	All Ann.
US Nonfarm Pay Surprise	0.024**		0.018**
	(0.009)		(0.007)
US Durable Goods Surprise	0.0073		
	(0.0052)		
GDP Surprise	0.074*		0.034
	(0.042)		(0.035)
Δ Private Employment 1mo.	0.007***		
	(0.001)		
Δ Labour Force 3mo.	0.007		
	(0.008)		
Δ Merchant Exports 3mo.	0.0035**		0.0008
	(0.0017)		(0.0009)
Building Permit Surprise	0.0014*		0.0014*
	(0.0008)		(0.0008)
Δ Yield Slope 3mo.	0.037*	-0.007	
	(0.020)	(0.025)	
Δ Oil, WTI 3mo.	0.041	-0.006	0.068
	(0.074)	(0.065)	(0.059)
Δ USD Exchange Rate 1mo.	-0.275	-0.325	-0.319
	(0.225)	(0.344)	(0.194)
Δ CPI 3mo.		0.02	
		(0.012)	
CPI Surprise		0.056*	0.051*
		(0.033)	(0.028)
Δ Total Employment 12mo.		0.009	
		(0.007)	
Δ Retail Sales 1mo.		0.0098***	0.0076*
		(0.0037)	(0.004)
Δ Inven. Retail 1mo.		-0.011*	-0.01*
		(0.0057)	(0.005)
Labour Productivity Surprise		-0.038	-0.033*
		(0.031)	(0.020)
Δ TSX60 3mo.		0.273	0.012
		(0.204)	(0.135)
R^2	0.293	0.267	0.191
R^2 adj.	0.177	0.145	0.122
Observations	72	71	142

Note: Monetary policy surprises from ll scheduled policy announcements regressed on economic news. Split for each policy announcement type and for all policy announcements together. Economic news set varies for each column, with a focus on economic news closest to each policy announcement type. Sample from 2002 to end of 2019. Labour productivity data omits the first observation. Robust standard errors. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

basis point surprise monetary loosening. Although the yield curve slope change is pro-cyclical, changes in oil prices are counter-cyclical, albeit not statistically different than zero.

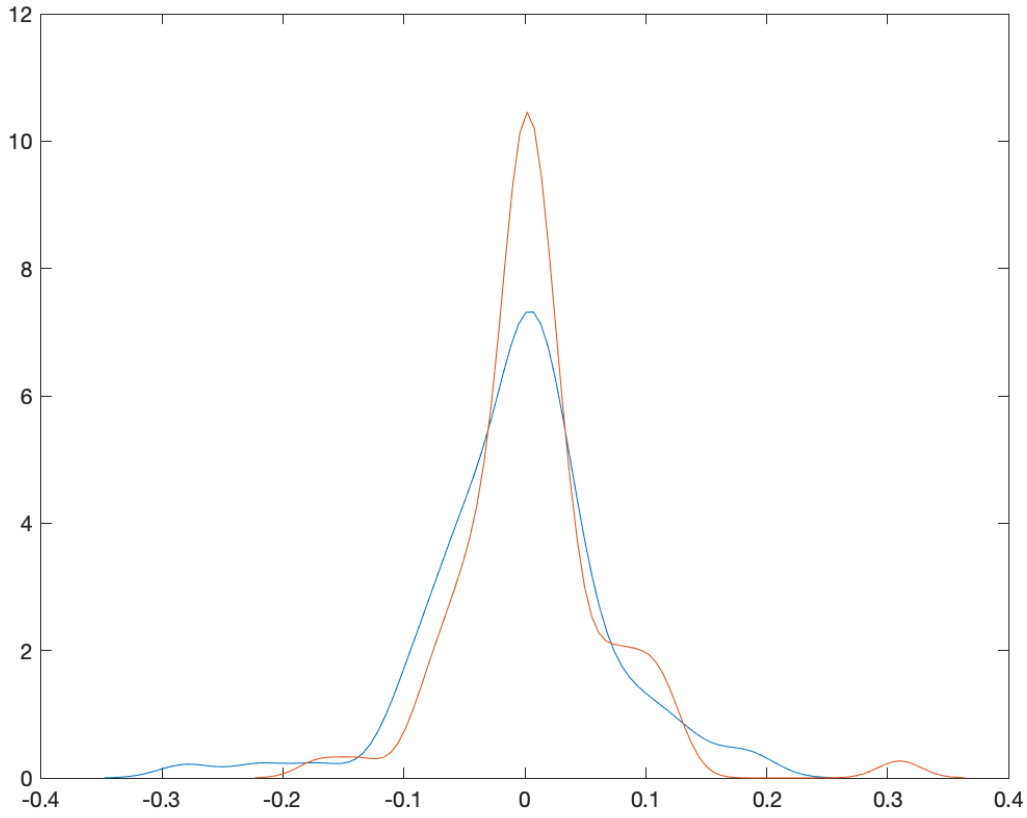
Finally, column three presents a subset of these two economic news sets that display a strong relationship with policy surprises across all policy announcements. A key difference between the split announcement coefficients and those for all policy announcements is the reduced effect for most coefficients. This is unsurprising; if an economic news set is older, it is more likely to have been included in the policy expectations of the market participant. However, older economic news can still be impactful if it takes time to fully incorporate all information (Coibion & Gorodnichenko (2015)). This reduction in the estimated relationship between economic news and policy surprises highlights the importance of splitting the policy announcements into either type.

Splitting the policy announcements into two types highlights the importance of near-term statistical releases and their prediction power on policy surprises. The changing news set also shows how the policy rule expectations, as Bauer & Swanson (2023*b*) describes for private agents, can take time to incorporate all economic information effectively. The relationship is understated when estimating the relationship between economic news and policy surprises across all policy announcements. This understated relationship is directly from not splitting policy announcements into either type. The following subsection explores the importance of communication from the BoC to guide market participants' policy expectations.

4.2 Communication - Policy Rule Learning

Market participants form their expectations of the BoC policy rule from policy announcements and other monetary events. Section (2) shows that the events leading to each announcement type vary, which impacts the market participant policy rule expectations relative to the BoC. If the non-monetary bias in policy surprises differs between announcement types, we should observe a change in the policy surprises between these two types. Figure (7) shows this, where policy announcements with an MPR have a larger distribution. Changes in policy surprises for different announcements under a response to a news channel would suggest an underlying difference in the formation of policy rule expectations for market participants for either announcement type.

Figure 7: Distribution of Monetary Policy Surprises for Both Announcement Types



Note: Distributions of the monetary policy surprise measure around the two policy announcement types. X-axis is in percentage points. Announcements without an MPR are orange, while announcements with an MPR are blue. Sample is 2002 to 2022.

Monetary events, such as BoC speeches and official releases, can change the market participants' policy rate expectations as they partially reveal the BoC's response function to public information. The monetary events in this paper are those relating to the current stance on monetary policy and from Koeppl et al. (2024).[30] Beyond identifying these events, we must also see if the market participant update their policy expectations from these events. Figure (4) shows that market participants react to this new information on the BoC's policy response function across all events.

[30]The window for these events is announcements - 20 minutes after, 10 minutes before, Speaking events - 120 minutes after 15 minutes before, HOC and Senate - 180 minutes after 15 minutes before, Press - 120 minutes after 15 minutes before, and Monetary Policy Report (Releases) - 100 minutes after 10 minutes before.

Next, Table (1) in section (2) highlights the changing frequency of these monetary events following different policy announcements. In particular, speeches increase following a policy announcement without an MPR. This change can result from the BoC recognizing that there is less policy response function information to the market participants in these cases. This would be because the MPR information is no longer up-to-date for short-run expectations. Figure (8) also highlights that the market participants react to this change in information flow. Here, the cumulative effect across different monetary event types is shown. Following announcements without an MPR, the cumulative effect of speeches event surprises is as large as the MPR before 2013.[31] We also observe that during times of greater economic uncertainty, such as during the Global Financial Crisis and COVID-19, the size of changes from speeches grows. Finally, after the introduction of the MPR GDP forecasts in July 2005, there was a sharp increase in the policy surprise changes to all monetary events.

The response to news channel depends on a policy rule from the BoC that is clear and understandable for market participants. Monetary events allow greater learning of the policy rule and allow market participants to update their beliefs about the BoC's policy response function. The noted differences in monetary events and the response of market participants suggest that market participants lean on these uneven monetary events to guide their expectations of the BoC's policy rule. In the next section, I examine the impact of growing information about the policy rule on monetary policy surprises for announcements without an MPR.

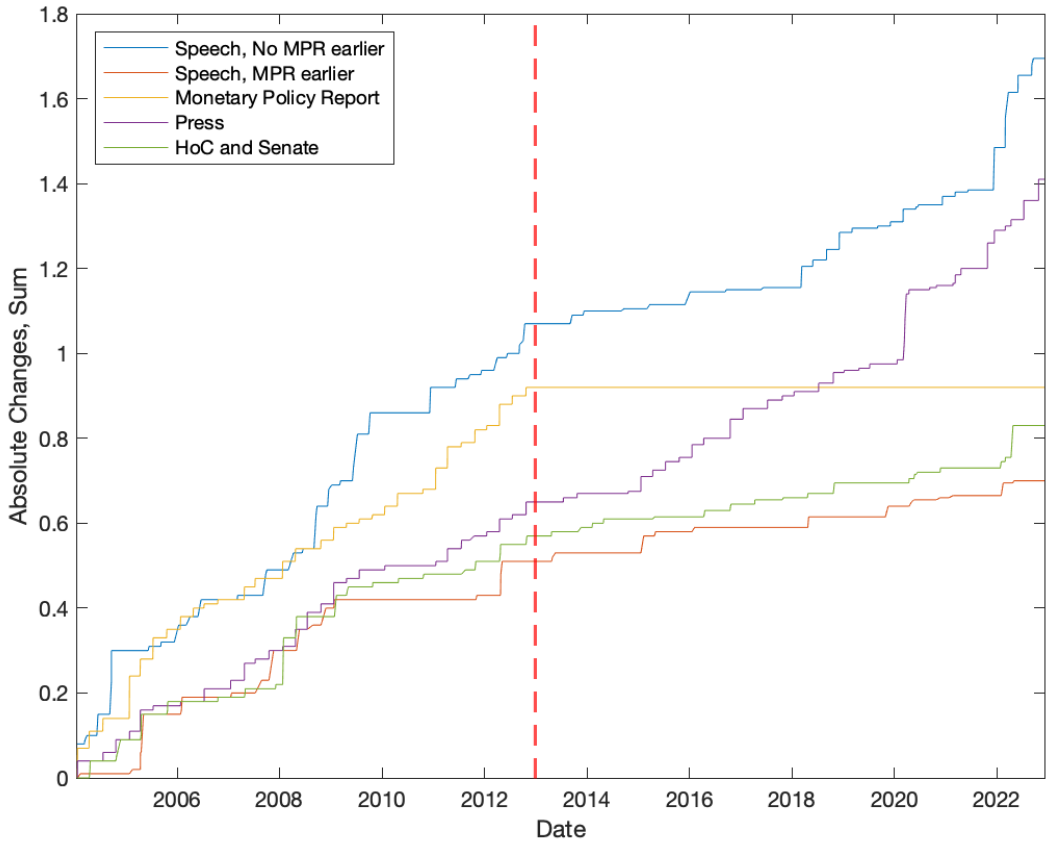
4.3 Economics News and Policy Surprises After Increased Communication

Here, I examine the relationship between economic news and monetary policy surprises following the inclusion of GDP forecasts in the MPR in July 2005. Including short-term forecasts for GDP and inflation allows market participants to improve their expectations of the BoC policy rule. This is clear if we consider a simple Taylor Rule, where interest rate determination follows from a relationship between output and inflation.[32] Further, the inclusion of output and inflation forecast

[31] The MPR surprise effects are not plotted after 2012. This is because they are then released simultaneously with the policy announcements.

[32] The Taylor Rule interpretation aligns with Vincent (2024) non-MPR announcements, where policy discussion focuses on recent economic expectations relative to *expectation*.

Figure 8: Cumulated Absolute Policy Surprises for Monetary Events



Note: The absolute sum of policy surprises over the sample period for all monetary events, excluding policy announcements. Speeches are further split between those after a policy announcement with an MPR and those after a policy announcement without an MPR. Y-axis is in percentage points. MPR events are no longer measured after 2012 (vertical red line), as they are then released at the same time as policy announcements. Sample is 2004 to 2019.

provides a measure of forward guidance to guide economic path expectations of market participants relative to the BoC. Sutherland (2023) shows that forecasters, including in Canada, adjust interest rate expectations in the proper direction following a change in forward guidance.

First, I examine the importance of these MPR forecasts by regressing these near-term forecasts on the two announcement types for each horizon h. Table (5) shows these coefficients for 2004 onwards. Here, the pro-cyclical relationship for each horizon h is strongest for GDP forecasts for announcements without an MPR, although the relationship is weak. Further, and consistent with

Table 5: Monetary Policy Surprises and MPR Forecasts 2006 - 2019

	No MPR	MPR	No MPR	MPR	No MPR	MPR
MPR GDP Forecast h = -1	0.010*	-0.007				
	(0.005)	(0.009)				
MPR CPI Forecast h = -1	-0.010	0.007				
	(0.009)	(0.013)				
MPR GDP Forecast h = 0			0.005	-0.005		
			(0.006)	(0.009)		
MPR CPI Forecast h = 0			-0.003	0.019		
			(0.013)	(0.018)		
MPR GDP Forecast h = 1					-0.000	0.000
					(0.008)	(0.009)
MPR CPI Forecast h = 1					0.008	0.012
					(0.015)	(0.020)
R^2	0.047	0.017	0.010	0.034	0.010	0.024
F-Stat (p-value)	0.14	0.77	0.60	0.56	0.70	0.6701
Observations	54	57	54	57	54	57

Note: Monetary policy surprises regressed on the MPR forecast for given horizon h. Announcements split between those with and without an MPR. Announcements without an MPR use the MPR forecast of the previous announcement. Sample runs from 2006 to 2019. 50,000 non-parametric bootstrap standard errors. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

no information channel, the MPR forecast does not provide meaningful effects for announcements with an MPR.

I test the relationship between a smaller economic news set and the policy surprises, including these MPR forecasts. In Table (6), I repeat the regression form of (3), for announcements without an MPR using the previous MPR GDP forecasts and a growing set of economic news. The relationship between economic releases and policy surprises is pro-cyclical for each growing economic news set. The GDP forecast values, as a sum, are consistently positive. Furthermore, as we move along the news sets, the sum of these forecasts decreases, staying pro-cyclical. This shows that while the economic news decreases the total effect, the MPR forecast can guide the market participant expectations for the policy rate.[33]

Across the increasing news sets, the size of the effects also aligns with expectations. For example, a 10 percent increase in the TSX60 index leads to a 1.6 basis point surprise monetary tightening. The change in oil prices has a smaller effect between 0.5 and 0.9 basis points. A 1 percent increase in

[33]The effects and statistical significance for the economic news set increases when the one-quarter ahead forecast is dropped. These results are available in the external appendix.

Table 6: Monetary Policy Surprise and Economic News: Post 2006

	(1)	(2)	(3)	(4)	(5)
MPR Forecast GDP h = -1	0.031	0.038**	0.037**	0.036*	0.036**
	(0.019)	(0.018)	(0.018)	(0.019)	(0.018)
MPR Forecast GDP h = 0	-0.036	-0.052*	-0.048*	-0.046*	-0.048*
	(0.028)	(0.027)	(0.026)	(0.027)	(0.028)
MPR Forecast GDP h = 1	0.014	0.017	0.014	0.013	0.017
	(0.015)	(0.014)	(0.014)	(0.014)	(0.016)
Δ Oil, WTI 3mo.		0.088	0.043	0.072	0.058
		(0.084)	(0.080)	(0.073)	(0.070)
Δ Yield Curve Slope 3mo.		-0.089**	-0.071*	-0.054	-0.044
		(0.039)	(0.036)	(0.040)	(0.039)
Δ TSX60 3mo.		0.082	0.133	0.145	0.160
		(0.183)	(0.198)	(0.196)	(0.204)
Δ USD-CAD Exch. Rate 3mo.		-0.395	-0.414	-0.472	-0.451
		(0.501)	(0.490)	(0.490)	(0.487)
Δ CPI 3mo.			0.022	0.018	0.023
			(0.014)	(0.013)	(0.016)
Δ Retail Sales 1mo.				.001	0.01
				(0.006)	(0.007)
Labour Prod. Surprise					-0.038
					(0.035)
R^2	0.077	0.266	0.316	0.349	0.388
R^2_{adj}	0.021	0.154	0.194	0.215	0.246
Observations	54	54	54	54	54

Note: Monetary policy surprises regressed on MPR forecast for given horizon h, and an increasing small set of economic news. Policy announcements are only those without an MPR release. Sample runs 2006 to 2019. 50,000 non-parametric bootstrap standard errors in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

retail sales leads to a 1 basis point surprise tightening. The joint GDP forecasts' effect varies from 3 to 9 basis points. This effect is similar to the forward guidance effects on interest rate expectations estimated in Sutherland (2023). As the news set increases, the explained variation increases and is larger than the previous effects. We observe the highest adjusted explained variation across the smallest economic news set that is entirely pro-cyclical. This suggests that well-communicated economic and policy rule expectations prevent market participants from overreacting to economic changes, aligning their expectations more in line with the BoC.

Through this subsection and the previous two, the relationship between economic news and policy surprises is strong. I present supporting evidence of the response to news channel and the importance of splitting policy announcements in two ways. First, close economic news strongly predicts policy surprises for either announcement type. Second, communication changes from the BoC act to further adjust market participants' expectations, resulting in a need to split policy announcements to further account for the information changes from the BoC to market participants. In particular, market participants no longer overreact to economic changes for announcements without an MPR after 2006. Next, I contrast this strong evidence of a response to news channel and examine the information channel during the same period.

4.4 Information Effect Across Policy Announcement Types

I now test for the information channel to explain the non-monetary bias, using the BoC Staff Forecasts, which control for the BoC internal information and economic outlook. The procedure follows from Miranda-Agrippino & Ricco (2021) projections of Staff forecasts on the monetary policy surprises.[34] These forecasts are presented to the Governing Council and should reasonably incorporate all information available to the BoC at the time and the expectations moving forward. The specification I apply is the same as Champagne & Sekkel (2018), split between the two announcement types, those with and without an MPR. This includes the Staff Forecasts, forecasts revisions and a small news set as follows:

[34]The Staff Forecasts are the Canadian equivalent of the Greenbook forecasts in the US. Staff Forecasts have a 5-year publication lag.

$$
\begin{aligned}
BAX_t = \alpha + \beta_1 i_{t-d14} + \sum_{h=1}^{3} \rho_h u_{t-h} + \sum_{j=-1}^{2} \gamma_j \hat{y}^f_{m,j} + \sum_{j=-1}^{2} \delta_j \pi^f_{m,j} \\
+ \sum_{j=-1}^{2} \theta_j (\hat{y}^f_{m,j} - \hat{y}^f_{m-1,j}) + \sum_{j=-1}^{2} \phi_j (\pi^f_{m,j} - \pi^f_{m_-1,j}) \\
+ \beta_2 FFR_{t-d14} + \beta_3 ER_{t-d14} + \beta_4 \Delta FFR_{m-m_{-1}} + \beta_5 \Delta ER_{m-m_{-1}} + \epsilon_m.
\end{aligned} \tag{4}
$$

Here, variables with superscript f are the forecasted values of output and inflation for a given horizon j. The second line represents the revisions of these forecasts between meetings. Here, i_t is the Canadian overnight rate, FFR_t is the US Federal funds rate, ER_t is the Canada-US exchange rate, u_t is the real-time unemployment rate with h lags, and BAX_t is the high-frequency monetary policy surprise around the announcement. The subscripts $m - m_{-1}$ and $t - d14$ are differences between the current and previous announcements and two weeks before the announcement, respectively.[35] Standard errors are non-parametric bootstraps.

Table (7) presents the coefficients of the projections regression split across policy announcement types. Columns one and three are announcements with an MPR, which align with the updated Staff Forecasts. Here, we can see that there is a weakly pro-cyclical relationship. The relationship between the Staff Forecast and policy surprises is stronger when I remove the small economic news set. Columns two and four are announcements without an MPR. Here, the relationship is strongly insignificant, and the signs are not consistent pro or counter-cyclical. This suggests that if a private information channel is present, it is weakly observable only for announcements with an MPR.[36]

The previous section highlighted that the response to news channel was stronger after introducing the GDP forecast in the MPR and with an increase in the communication of policy expectations. In Table (8), I repeat a similar procedure for the private information channel to test if we still observe a relationship between the BoC Staff Forecast and the policy surprises. I do this using equation 4 and moving the sample's start to 2006.

[35] Vincent (2024) discusses the importance of including economic news as announcements without an MPR focus on these economic changes relative to expectations.

[36] Table (12) in the appendix regresses each forecast horizon on the policy surprises, as a control of multicollinearity. Here, no statistical relationship exists for either announcement for any given forecast horizon.

Table 7: Monetary Policy Surprises and Bank of Canada Staff Forecasts each Announcement Type

	MPR	No MPR	MPR	No MPR
GDP Forecast				
h=-1	−0.027	−0.005	−0.025	−0.010
	(0.067)	(0.062)	(0.040)	(0.051)
h=0	−0.117	0.030	−0.084	0.033
	(0.137)	(0.174)	(0.096)	(0.124)
h=1	−0.086	0.051	−0.070	0.006
	(0.194)	(0.215)	(0.142)	(0.170)
h=2	0.195	−0.147	0.209*	−0.100
	(0.164)	(0.226)	(0.107)	(0.164)
CPI Forecast				
h=-1	−0.055	0.007	−0.058	0.007
	(0.080)	(0.084)	(0.062)	(0.062)
h=0	−0.003	−0.151	−0.042	−0.117
	(0.119)	(0.145)	(0.082)	(0.122)
h=1	0.189	0.041	0.213*	0.065
	(0.158)	(0.204)	(0.114)	(0.178)
h=2	−0.048	−0.006	−0.093	0.044
	(0.197)	(0.261)	(0.139)	(0.184)
GDP Forecast Revision				
h=-1	0.041	−0.002	0.055*	−0.013
	(0.067)	(0.075)	(0.045)	(0.055)
h=0	0.049	−0.038	0.030	−0.038
	(0.123)	(0.174)	(0.086)	(0.112)
h=1	0.327*	−0.063	0.302**	−0.036
	(0.189)	(0.151)	(0.123)	(0.124)
h=2	−0.373**	0.106	−0.318**	0.086
	(0.178)	(0.178)	(0.135)	(0.140)
CPI Forecast Revision				
h=-1	0.108	−0.057	0.118*	−0.044
	(0.082)	(0.090)	(0.065)	(0.066)
h=0	−0.038	0.192	−0.009	0.164
	(0.139)	(0.166)	(0.096)	(0.125)
h=1	−0.006	−0.049	−0.012	−0.034
	(0.218)	(0.252)	(0.143)	(0.201)
h=2	0.139	0.047	0.180	0.003
	(0.336)	(0.286)	(0.251)	(0.191)
C.S. Economic News	✓	✓		
R^2	0.361	0.210	0.307	0.133
R^2 adj.	0.027	−0.203	0.089	−0.139
F-Stat (p-value)	0.799	0.999	0.062	0.992
Observations	68	68	68	68

Note: Monetary policy surprises regressed on BoC Staff Forecasts, split between announcement types. First two columns include Champagne & Sekkel (2018) economic news set (C.S. economic news). 50,000 non-parametric bootstrap standard errors in brackets. Sample from 2002 to 2018. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

We now observe that there is no statistical relationship across both announcement types in Table (8). Furthermore, the inclusion of Champagne & Sekkel (2018) economic news set crowds out the largest statistical significance of different Staff Forecasts. The relationship between the Staff Forecasts is almost entirely counter-cyclical, further suggesting that a private information channel does not explain the non-monetary news in policy surprises. This diminishing effect of an information channel is unsurprising given the previous section results, but also aligns with Lunsford (2020) and Hoesch et al. (2023), who find no evidence of an information effect in the US after 2004. The totality of this section suggests that there is no private information channel in Canadian policy surprises and that the non-monetary bias is due to a response to news channel.

4.5 Separated Timelines - Response to News or Information Channel?

After splitting policy announcements into two types I find a strong relationship between economic news and policy surprises for both announcement types, consistent with a response to news channel. The split into policy announcement types allows a focus on close economic news for either type, strengthening the relationship. The relationship is entirely pro-cyclical after introducing GDP forecasts in the MPR and maintaining varying economic news sets for each announcement type.

The BoC Staff Forecast display a relationship with policy surprises for announcements with an MPR. However, the relationship decreased significantly as the BoC increased communication of policy and economic expectations through the early 2000s. After 2006, there was no relationship between the Staff Forecasts and policy surprises for either announcement type, consistent with the increasing relationship between economic news and the response to news channel dominance.

The increase in BoC communication enhances market participants' policy expectations to ensure they are not overreacting to economic changes. This is clear after 2006 for announcements without an MPR. However, it also demonstrates a need for improvement in communication, leading to announcements with an MPR, as financial news is weakly counter-cyclical. This could be because less communication and guidance causes market participants to overreact to economic changes or because the dominant information for each announcement type is not known, leading to market participants' misspecification and over-reliance on news that the BoC uses in their decision process.

Table 8: Monetary Policy Surprises and Bank of Canada Staff Forecasts: Post 2006

	MPR	No MPR	MPR	No MPR
GDP Forecast				
h = -1	−0.022	−0.011	−0.013	0.001
	(0.151)	(0.156)	(0.061)	(0.072)
h = 0	−0.110	0.096	−0.064	0.019
	(0.279)	(0.713)	(0.139)	(0.202)
h = 1	−0.002	0.080	−0.061	0.073
	(0.565)	(0.843)	(0.206)	(0.247)
h = 2	0.135	−0.281	0.186	−0.225
	(0.473)	(0.835)	(0.171)	(0.238)
Inf. Forecast				
h = -1	−0.010	0.113	0.001	0.112
	(0.261)	(0.269)	(0.107)	(0.140)
h = 0	0.002	−0.185	−0.015	−0.154
	(0.402)	(0.391)	(0.111)	(0.187)
h = 1	0.121	0.028	0.205	0.027
	(0.435)	(0.501)	(0.159)	(0.282)
h = 2	0.009	−0.073	0.014	0.001
	(0.584)	(0.706)	(0.192)	(0.300)
GDP Fore. Rev.				
h = -1	0.027	0.016	0.034	−0.003
	(0.189)	(0.175)	(0.065)	(0.074)
h = 0	0.003	−0.140	0.004	−0.043
	(0.261)	(0.712)	(0.116)	(0.198)
h = 1	0.184	−0.077	0.169	−0.091
	(0.428)	(0.552)	(0.191)	(0.180)
h = 2	−0.348	0.264	−0.279	0.240
	(0.481)	(0.774)	(0.219)	(0.211)
Inf. Fore. Rev.				
h = -1	0.040	−0.123	0.014	−0.131
	(0.239)	(0.265)	(0.102)	(0.140)
h = 0	−0.017	0.293	−0.094	0.260
	(0.520)	(0.387)	(0.181)	(0.173)
h = 1	0.027	0.037	−0.098	0.041
	(0.607)	(0.647)	(0.208)	(0.318)
h = 2	−0.013	0.016	0.025	−0.053
	(0.777)	(0.879)	(0.348)	(0.300)
C.S. Economic News	✓	✓		
R^2 adj.	−0.313	−0.263	−0.170	−0.151
Observations	48	48	48	48

Note: Monetary policy surprises regressed on BoC Staff Forecasts, split between announcement types. First two columns include Champagne & Sekkel (2018) economic news set (C.S. economic news). 50,000 non-parametric bootstrap standard errors in brackets. Sample from 2007 to 2018. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

These results may explain why Siklos & Neuenkirch (2015) finds an overestimation of the output gap in a Taylor Rule for the C.D. Howe shadow committee policy recommendation and the BoC actual policy change.

The split into different announcement types differs from previous literature, but it is a necessity in Canada to identify non-monetary news in policy surprises. If not accounting for this difference, the non-monetary bias estimation may be underestimated, as shown in Table (4). Improvement in communication also leads to market participants not overreacting to short-term economic fluctuations, being more in line with the BoC policy rule. This is expected because the BoC is cautious, smooths its interest rate decisions, and does not overreact to temporary economic changes. Finally, it offers further areas of study to examine the communication strategy to better guide policy expectations, with a text-based approach, following approaches in Hansen et al. (2019) and Acosta (2022).

5 An Illustrative Model

This section outlines an illustrative model, highlighting the previous empirical results and the adjustment for the response to news channel. The model is in the spirit of the response to news models from Bauer & Swanson (2023*a*), Bauer & Swanson (2023*b*) and Bauer et al. (2024). However, I show that announcements must be split into two types to account for information flow differences between the announcement types.

The model has two types of agents: the private agent (the market participants and the general private sector) and the Central Bank (specifically the Governing Council of the Bank of Canada).[37] The state of the economy is described with a singular variable x_t, which is assumed to be pro-cyclical and is negatively impacted by the previous policy rate i_t. The economy evolves in a backward-looking linear process,

$$x_t = \rho x_{t-1} - \theta i_{t-1} + \nu_t. \tag{5}$$

[37]The private agent comprises a wide array of market participants with heterogeneity in ability and economic beliefs.

Where time is discrete, ρ is less than one, θ is non-negative, and ν_t is an exogenous IID normal process, with mean zero and standard deviation σ_ν^2. Information related to the state of the economy from official sources occurs twice a month, early and late in a given month, around the first week and third week. Thus, each x_t includes two release types for each time t,

$$x_t = [\bar{x}_t, \underline{x}_t]. \tag{6}$$

For simplicity in the model, I relate these releases relative to the policy announcement: $\bar{x}_t$ are statistical releases close to an announcement, and $\underline{x}_t$ are those further away. Because the policy announcements vary within a month, the makeup of $\bar{x}_t$ and $\underline{x}_t$ will vary between announcement types.

The Governing Council sets the policy rate after observing the full set of x_t. They determine the interest rate following a policy rule,

$$i_t = \alpha_t x_t + \varepsilon_t. \tag{7}$$

Where α_t defines the responsiveness to the state of the economy, and ϵ_t is an exogenous monetary policy shock IID normal process. The responsiveness to the state of the economy evolves following an AR(1) process,

$$\alpha_t = \alpha_{t-1} + \mu_t, \tag{8}$$

where μ_t is mean zero and standard deviation σ_μ^2. For concreteness, the responsiveness to the economy of the BoC does not change due to the economic release. Instead, the closest economic releases provide an updated sense of the current state of the economy. However, in setting its policy rate, the Governing Council is cautious about economic releases, wanting to smooth changes and not overreact to short-term economic fluctuations.[38] Finally, the policy is not set as a one-off and

[38] "While very helpful, high-frequency data must be handled with care. These data are extremely volatile, partly because of sampling errors and, more importantly, because of very temporary special factors such as labour disruptions, unusual weather, and special promotions such as sales or financing incentives. Thus, a key challenge is to figure

is thus forward-looking. This is clearly observed if we forward-iterate equation (5).

The Governing Council knows the full model and observes all parameters and variables. The private agent will observe all variables except those related to the Governing Council's responsiveness to news α_t and the exogenous monetary policy shock ϵ_t. In forming their expectation of the upcoming interest rate, market participants will use all available information to form their beliefs about α_t. This information set for market participants will include statistical releases and monetary events from the BoC. Before the policy announcement and statistical releases, I define this information set as $\mathcal{I}_t$, where,

$$\mathcal{I}_t = [x_{t-h}, i_{t-h}, M_{t-h}]. \tag{9}$$

Here, M_{t-h} are monetary events, and h indicates the entire history, although the market participants place more weight on recent innovations. Monetary events are important because the type of monetary event and frequency vary between announcement types. I include monetary events directly in the information set of the market participants because they help guide policy expectations. Market participants form their initial policy rule expectations, a_t, given this history $\mathcal{I}_{t-1}$ prior to the new revelations of x_t, M_t and i_t.

The private agent will first observe statistical releases and monetary events far from the policy announcement, which leads to an update in their policy expectations and their interest rate expectations,

$$E[i_t|\underline{\mathrm{x}}_t, M_t, \mathcal{I}_t] = \hat{a}_t \underline{\mathrm{x}}_t. \tag{10}$$

Where $\hat{a}_t$ is the market participants' responsiveness to economic news release $\underline{\mathrm{x}}_t$ and monetary events M_t that occur up to $\underline{\mathrm{x}}_t$, following this, further monetary events occur, which leads to the adjustment in $\hat{a}_t$ and will result in updates to interest rate expectations. Finally, the close economic releases occur, the blackout of communication is in effect, and market participants form their final interest rate expectations,

out whether the latest movement in the data simply reflects short-term volatility or is indicative of the direction in which economic activity and prices are headed." Macklem (2002).

$$E[i_t|\bar{x}_t, \underline{\mathrm{x}}_t, M_t, \mathcal{I}_t] = \hat{a}_t \underline{\mathrm{x}}_t + \check{a}_t \bar{x}_t. \tag{11}$$

Where $\check{a}_t$ is the response to economic news that includes the economic releases closest to the policy announcement and all monetary events. The Governing Council will then set their actual policy rate, leading to a monetary policy surprise

$$\begin{aligned} mps_t &= i_t - E[i_t|\bar{x}_t, \underline{\mathrm{x}}_t, M_t, \mathcal{I}_t] && (12)\\ &= \alpha_t(\underline{\mathrm{x}}_t + \bar{x}_t) - \hat{a}_t \underline{\mathrm{x}}_t - \check{a}_t \bar{x}_t + \varepsilon_t && (13)\\ &= (\alpha_t - \hat{a}_t)\underline{\mathrm{x}}_t + (\alpha_t - \check{a}_t)\bar{x}_t + \varepsilon_t && (14)\\ &= (\alpha_t - \check{a}_t)\bar{x}_t + \varepsilon_t. && (15) \end{aligned}$$

The policy surprise may be due to either an exogenous policy shock ε_t or to imperfect information about the policy rule, i.e. how to respond to the current state of the economy.

We arrive at the final equation assuming that the responsiveness reaction is approximately equal for news further away from the policy announcement.[39] The empirical section supports this, where the older economic news had little relationship with policy surprises. Policy expectations update after the policy announcement in line with Bauer & Swanson (2023*b*).

The model highlights the key differences from the aggregate timeline of policy announcements and its influence on monetary policy surprises. First, because policy announcements occur at different times, we must treat them separately, or the relationship between economic news and policy surprises will be biased. This is clear if we compare an announcement type with an MPR versus a policy surprise across all policy announcements. Here, the response to news of market participants for all announcements, a_t, would understate the relationship because close economic news changes depending on which announcement type it is. Thus, we would underestimate the relationship between policy surprises, mps_t, and news x_t. Empirically, we observe this in Table (4),

[39] If the information takes a long time to incorporate, there can still be a difference in opinion for responsiveness (Coibion & Gorodnichenko (2015)).

where coefficients of the news set across all policy announcements are smaller and less significant than when applied to the proper policy announcement type. They also explain less variation.

Second, the policy surprises can differ between announcement types. This difference arises because of the difference in monetary events, M_t, between announcement types. The type and frequency of monetary events can produce noisier signals for market participants to form their policy response expectations of the BoC. For example, the MPR provides clear information about the short-run path for market participants, whereas speeches are more open to interpretation and, thus, a noisier signal. This can cause market participants to be less sure of their expectations of the BoC's policy response function. The increase in speeches after an announcement without an MPR suggests the BoC is looking to resolve this loss of information for market participants. Figure (7) highlights the differences between policy surprises for either announcement type, where policy surprises are larger for announcements with an MPR. The larger distribution for MPR announcements is unsurprising. Suppose speeches are a noisier signal for market participants. Increasing the number of speech instances will not bridge the information gap for market participants in forming their interest rate expectations from close economic news, $\check{a}_t\bar{x}_t$.

Clear communication from the BoC can also help market participants align with their wait-and-see approach to short-term economic fluctuations. Empirically, announcements without an MPR after 2006 are entirely pro-cyclical. This suggests that market participants underestimate the BoC response to the economy, $corr(x_t, mps_t) > 0$. However, the relationship is not strongly pro-cyclical in announcements with an MPR, where there is a noisier signal from the BoC. This can arise from an unclear policy response rule for market participants wanting to get ahead of the economic changes, even if they are still on a similar interest rate path. In the additional appendix, I provide narrative evidence of this through the C.D. Howe Policy recommendations, where although the recommendation may suggest a change, they are still on a similar interest rate expectation as the BoC as the next announcement they are more likely to be aligned.

The model highlights the empirical findings and the importance of announcement types in identifying non-monetary news for Canadian policy surprises. The model highlights the importance of clear communication to ensure market participants do not overreact to economic fluctuations.

Further, it highlights the importance of clear communication to ensure market participants do not overreact to short-term economic fluctuations. The importance of close news aligns with Alam (2022) US work. A policy implication here is that communication for announcements with an MPR may be improved to ensure that market participants do not overreact to economic changes. Finally, as the proceeding section highlights, one must account for economic news and splitting of policy announcements to use monetary policy surprises as a monetary policy shock.

6 Empirical Effects of a Monetary Policy Shock

In this section, I form a monetary policy shock series that controls for the response to news channel. Consistent with the model and empirical identification section, I then show the economic importance of adjusting for economic news across policy announcement types through a Bayesian VAR. I then perform an event study of the high-frequency policy shock effects on asset prices.

6.1 Monetary Policy Shocks: Adjusted for Economic News

The empirical section and model highlight a relationship between economic news before a policy announcement and the policy surprises. To use the policy surprises as a monetary policy shock, it must be exogenous to economic news. To clean the policy surprises of this relationship to economic news before the policy announcement, I regress the policy surprise on economic news before the policy announcement and keep the residual. The residual measure is orthogonal to economic news and does not violate the exogeneity assumption. This procedure follows from the one outlined in Bauer & Swanson (2023*b*). I form two new instruments to test the importance of splitting policy announcements into two types to account for the non-monetary news. I take the following regression form:

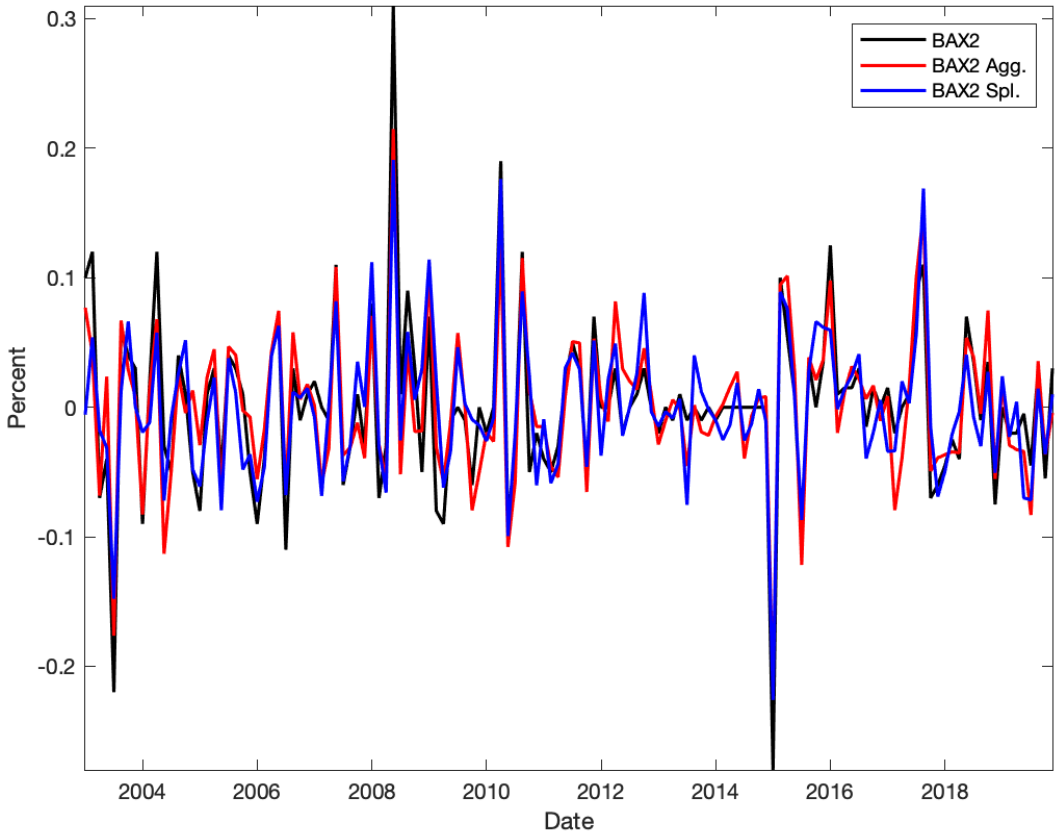
$$BAX2_t = \alpha + \beta X_t + mps_t, \tag{16}$$

where $BAX2_t$ is the unadjusted monetary policy surprise around a policy announcement t, X_t is a vector of economic news, and mps_t is the residual from the regression. The three instruments will

be the unadjusted measure, BAX_t, the residual of equation (16) across all policy announcements called BAX2 agg. and BAX2 spl., which splits the announcements into either type and uses a different economic news set to form the residual for these announcement types. I combine the two announcement-type residuals into a single series of policy shocks across all monetary policy announcements. Months without a policy announcement are zero. The specific economic news choice for each is the variables in Table (4).

Figure (9) plots these three instruments. The instruments follow similar patterns, maintaining variation after removing economic news. The largest shocks in the GFC and in January 2015 are still large but smaller. Further, in times of no policy rate change removing economic news increases the variation.

Figure 9: Monetary Policy Surprise Instruments 2003 to 2019



Note: Monetary Policy Surprise instruments. Black are unadjusted policy surprises, red are adjusted for economic news across all policy announcements and blue are adjusted for either policy announcement announcement type. Samplr is 2003 to 2019. See text for further details.

6.2 Economic Effects in a VAR

I now test the economic effects of these adjusted instruments with a Bayesian SVAR. The Bayesian SVAR I use is the same as Miranda-Agrippino & Ricco (2021) and Hoesch et al. (2023). Bauer & Swanson (2023*b*) also shows that their monetary policy instruments are robust under this setting. The VAR is estimated with standard Bayesian Normal Inverse-Wishart priors, and the tightness of the prior is set as in Giannone et al. (2015). This is consistent with Miranda-Agrippino & Ricco (2021) and Hoesch et al. (2023).

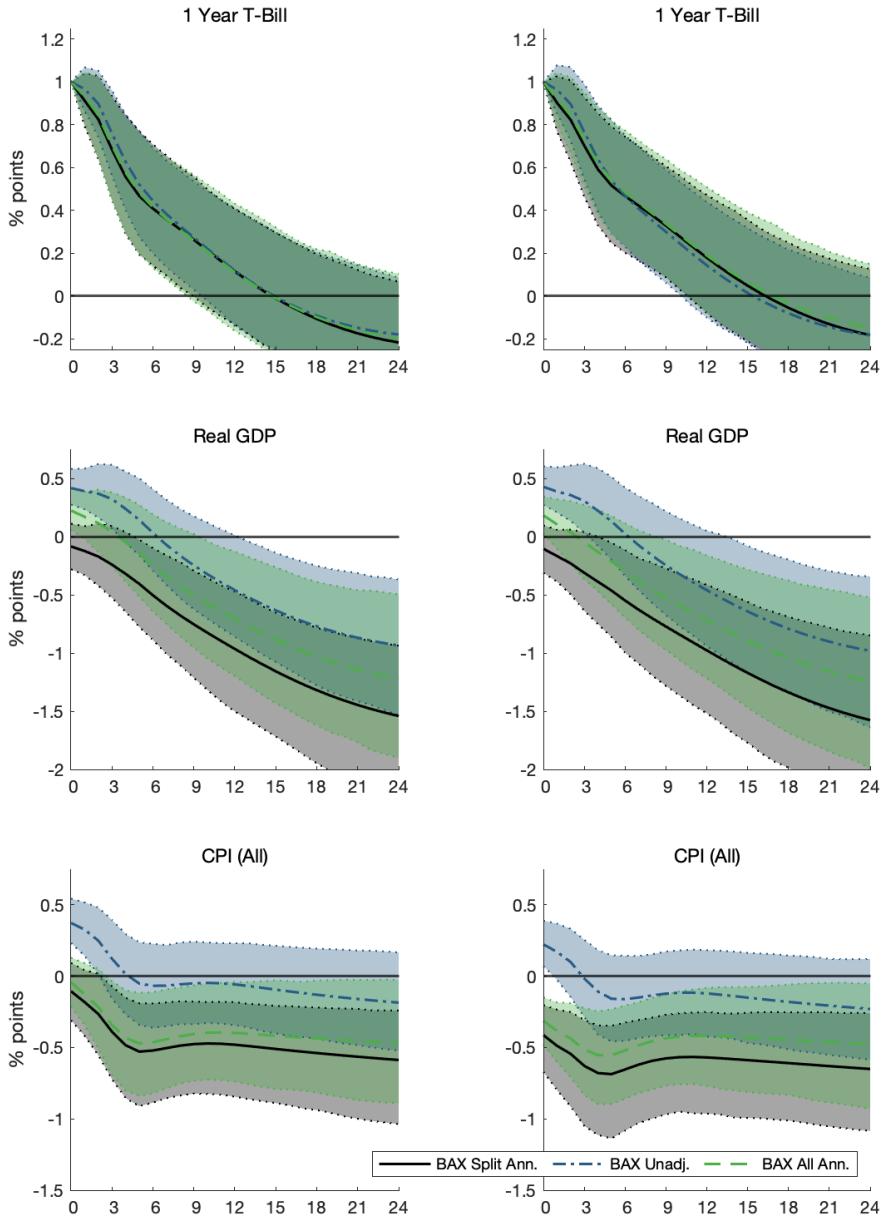
The SVAR baseline includes the same seven variables as Soosalu (2024) and is robust to multiple

specification changes. The seven variables include the one-year treasury bill rate, log real GDP, log CPI, a composite exchange rate index, a corporate spread, a mortgage spread and a US spread for international financial conditions. All data is monthly, from January 1991 to December 2019, and I use six lags in the SVAR.[40] The instruments are from 2004 to 2019 and from 2006 to 2019 to align with the increase in communication of policy expectations. By orthogonalizing to economic news and using a longer period for coefficient estimates of the SVAR, I take seriously the recommendations from Bauer & Swanson (2023*b*) who recommend using a longer period for coefficient estimates to have a more precise estimation of the policy shock effects. I also account for the important institutional differences highlighted by the empirical identification section in the instrument construction.

Figure (10) shows the impulse responses for the one-year treasury bill, CPI, and GDP from the Bayesian SVAR instrumented with the three different instruments. In the left column, the sample for all instruments is from 2004 to 2019, and in the right column, from 2006 to 2019. First, the importance of adjusting the instrument for the response to news channel is evident. The unadjusted instrument, in blue, observes an initial increase in both output and price level. Even the instrument adjusted across all policy announcements, in green, observes an increase in output. Adjusting for economic news close to each announcement type increases the response of economic variables and does not display either a price or output puzzle. Finally, the second column, with an instrument starting in 2006, highlights the need to adjust for announcement type. Here, the price level response is larger when adjusted for announcement type. The adjusted instruments also impact the peak effects for output and price level. This suggests that future instruments adjusting for non-monetary bias must account for these announcement-type differences.

[40] At the start of 1991, Canada became an inflation-targeting regime.

Figure 10: Macroeconomic Effects of a Monetary Policy Shock



Note: Impulse responses from seven variable Bayesian SVAR with standard macroeconomic priors and external instrument identification. Instrument descriptions in text. VAR sample is 1991:1 to 2019:1. Instrument sample left column is 2004:1 to 2019:12 right column is 2006:1 to 2019:12. Shaded areas are 90% credible intervals.

6.3 Event Study: Asset Effects

An important consequence of the model and that of Bauer & Swanson (2023*b*) is that asset effects around the policy announcement should not be impacted by the instrument adjustment. I test the three instruments on all policy announcements and then split them across either announcement type. This event study asset effects follows the work of Cook & Hahn (1989), Kuttner (2001), Nakamura & Steinsson (2018), Bauer & Swanson (2023*b*) and others.

First, I examine the effect of monetary policy surprises on asset effects for all policy announcements. I do this with intraday changes in asset prices, including the TSX, TSX60, US-Canada exchange rate and a TSX60 future. Stock prices and exchange rate differences are measured in percentage differences. The window I use is the same size as the monetary policy surprises around the scheduled announcements. I also include changes for different interest rates at the daily level.[41] The regression follows the following form:

$$y_t = \alpha + \beta MPS_t + \epsilon_t, \tag{17}$$

where, y_t represents the given asset, MPS_t is the monetary policy surprise measure for a given announcement t.[42] The sample is of all scheduled policy announcements from 2002 to the end of 2022, unless otherwise specified. Robust standard errors are applied.

Table (9) presents the coefficient estimates of equation (17) for the three instruments. Here, we see that the relationship between the policy surprise around a policy announcement and the change in financial assets is statistically significant. All assets move in their expected direction following a monetary policy shock. Interest rates also increase, with the largest increases occurring in the targeted interest rates, the one-year and two-year government bonds. The estimated effect decreases as the bond maturity increases, as longer horizons will focus on effects beyond the policy announcements. The effects are similar for each instrument type, and all coefficient standard errors overlap.

[41] The daily level effects should be similar, but as Nakamura & Steinsson (2018) show, the effects may understate the effect and contain a non-monetary bias.

[42] It is important to be clear that the price difference taken here is after minus before, which represents the same price difference taken of the policy surprises given the implied interest rates.

Table 9: Event Study Asset Effects: All Policy Announcements

	BAX2	BAX2 Agg. Adj.	BAX2 Spl. Adj.
Gov. Bond 2y	0.931***	0.934***	0.907***
	(0.053)	(0.086)	(0.096)
R^2	0.735	0.622	0.535
Gov. Bond 5y	0.631***	0.666***	0.625***
	(0.075)	(0.092)	(0.084)
R^2	0.408	0.366	0.299
Gov. Bond 10y	0.281***	0.298***	0.288***
	(0.079)	(0.084)	(0.080)
R^2	0.146	0.138	0.120
T-bill 1m	0.594***	0.474***	0.471***
	(0.104)	(0.095)	(0.100)
R^2	0.317	0.310	0.265
T-bill 3m	0.670***	0.657***	0.658***
	(0.077)	(0.108)	(0.119)
R^2	0.486	0.434	0.383
T-bill 1y	0.962***	0.982***	0.972***
	(0.072)	(0.123)	(0.138)
R^2	0.735	0.625	0.551
TSX-future (SXF)	-2.870***	-2.646***	-2.942***
	(0.629)	(0.959)	(0.888)
R^2	0.107	0.065	0.074
TSX	-2.208***	-1.845**	-2.116**
	(0.577)	(0.789)	(0.888)
R^2	0.080	0.040	0.049
TSX60	-2.446***	-2.076***	-2.276**
	(0.646)	(0.881)	(1.010)
R^2	0.082	0.042	0.047
Exchange Rate	2.036***	1.902***	2.074**
	(0.623)	(0.759)	(0.802)
R^2	0.220	0.137	0.151
Observations	167	142	142

Note: All scheduled policy announcements from 2002 to 2022. Sample for news adjusted instruments is 2004 to 2022. Interest rates are daily level, all other data at the intraday level using the same 30-minute window. Heteroskedastic standard errors. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 10: Event Study Asset Effects: Split by Announcement Type

	BAX2 MPR	BAX2 no MPR	BAX2 Spl. MPR	BAX2 Spl. No MPR
Gov. Bond 2y	0.948***	0.896***	0.899***	0.917***
	(0.071)	(0.078)	(0.101)	(0.166)
	$R^2 = 0.754$	$R^2 = 0.704$	$R^2 = 0.558$	$R^2 = 0.529$
Gov. Bond 5y	0.589***	0.662***	0.559***	0.712***
	(0.107)	(0.094)	(0.114)	(0.115)
	$R^2 = 0.435$	$R^2 = 0.378$	$R^2 = 0.31$	$R^2 = 0.313$
Gov. Bond 10y	0.205*	0.366***	0.182	0.427***
	(0.118)	(0.068)	(0.112)	(0.089)
	$R^2 = 0.085$	$R^2 = 0.229$	$R^2 = 0.055$	$R^2 = 0.235$
T-Bill 1m	0.578***	0.626***	0.560***	0.355***
	(0.137)	(0.171)	(0.156)	(0.094)
	$R^2 = 0.362$	$R^2 = 0.280$	$R^2 = 0.363$	$R^2 = 0.156$
T-Bill 3m	0.704***	0.637***	0.745***	0.544***
	(0.128)	(0.068)	(0.169)	(0.158)
	$R^2 = 0.471$	$R^2 = 0.531$	$R^2 = 0.412$	$R^2 = 0.348$
T-Bill 1y	0.955***	0.978***	0.967***	0.978***
	(0.090)	(0.122)	(0.165)	(0.234)
	$R^2 = 0.726$	$R^2 = 0.748$	$R^2 = 0.556$	$R^2 = 0.546$
TSX60 Future (SXF)	-3.342***	-2.338***	-3.175*	-2.634**
	(1.023)	(0.751)	(1.717)	(1.119)
	$R^2 = 0.119$	$R^2 = 0.100$	$R^2 = 0.071$	$R^2 = 0.085$
TSX	-2.291**	-2.216***	-1.718	-2.639**
	(0.921)	(0.708)	(1.413)	(1.002)
	$R^2 = 0.079$	$R^2 = 0.090$	$R^2 = 0.03$	$R^2 = 0.085$
TSX60	-2.394**	-2.628***	-1.766	-2.946***
	(1.031)	(0.780)	(1.623)	(1.078)
	$R^2 = 0.073$	$R^2 = 0.106$	$R^2 = 0.026$	$R^2 = 0.088$
Exchange Rate	1.920**	2.128***	2.507**	1.505**
	(0.920)	(0.795)	(1.197)	(0.703)
	$R^2 = 0.227$	$R^2 = 0.203$	$R^2 = 0.261$	$R^2 = 0.068$
Observations	83	84	71	71

Note: All scheduled policy announcements from 2002 to 2022, split for announcement type. Sample for news adjusted instrument is 2004 to 2022. Interest rates are daily level, all other data at the intraday level using the same 30-minute window. Heteroskedastic standard errors. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

I repeat the same exercise in Table (10) but now split policy announcements into two types. The first and third columns show the effects of MPR announcements. Similar to the previous table for all announcements, the size of the effects is similar. The smaller sample does influence the effects, with more variation between the two effects. However, error bands still cross for the two instrument types. Columns two and four are announcements without an MPR. The effects with different instrument types are similar. The key takeaway is the difference between announcements

with and without an MPR. Here, the variation is larger. This could be driven by the variation policy surprises for either announcement type, driving a variation in the asset effects. The results suggest that asset effects across all policy announcements are similar, although the split announcement effects should also be reported.[43]

7 Conclusion

In this paper, I examine the non-monetary news within monetary policy surprises in Canada. I show that the policy surprises exhibit non-monetary bias across all policy announcements. I exploit differences in the conduct of monetary policy leading into a policy announcement to split policy announcements into two types - those with and without an MPR. This split is motivated by events leading into each policy announcement type, impacting tests of non-monetary bias for both channels. The BoC Staff Forecasts, which test for the private information channel, only occur for announcements with an MPR. The two policy announcements occur at different times in the month, leading to different economic news sets closest to each announcement that guide the policy response function expectations. Finally, communication between these two announcements differs, further driving a wedge in market participant expectations of the BoC policy response function.

The response to news channel is dominant for both policy announcement types. The relationship between economic news and policy surprises is strongest when considering economic news closest to each announcement type. Choosing the closer economic news allows the most up-to-date news to enter the expectations of the policy response function. Furthermore, after 2006, with the introduction of short-term GDP forecasts in the MPR, the relationship between policy surprises and economic news is strongly pro-cyclical for announcements without an MPR. Announcements with an MPR are also weakly pro-cyclical in this period. These effects highlight the importance of effectively communicating economic and monetary policy expectations to help market participants avoid overreacting to economic changes. Finally, there is no evidence of a private information effect for either policy announcement type.

This paper provides the first evidence of a response to news channel outside the US while

[43]The online appendix includes asset effects for monetary events.

highlighting the need to consider institutional differences to account for the non-monetary bias in monetary policy shocks. The data and findings in this paper should benefit future Canadian monetary policy research. Future areas may include exploring the influence of international factors and the non-linear effects of the state of the economy on policy surprises and the formation of policy expectations. Lastly, studying the effects and effectiveness of monetary policy under changing levels of communication is an important direction for future work.

References

Acosta, M. (2022), 'The perceived causes of monetary policy surprises', *Published Manuscript* .

Alam, Z. (2022), 'Learning about Fed policy from macro announcements: A tale of two FOMC days', *Available at SSRN 4065084* .

Bank of Canada (2000), 'A new system of fixed dates for announcing changes to the bank rate'. Bank of Canada Note.

Bauer, M. D., Pflueger, C. E. & Sunderam, A. (2024), 'Perceptions about monetary policy', *The Quarterly Journal of Economics* **139**(4), 2227–2278.

Bauer, M. D. & Swanson, E. T. (2023*a*), 'An alternative explanation for the "Fed information effect"', *American Economic Review* **113**(3), 664–700.

Bauer, M. D. & Swanson, E. T. (2023*b*), 'A reassessment of monetary policy surprises and high-frequency identification', *NBER Macroeconomics Annual* **37**(1), 87–155.

Binette, A. & Tchebotarev, D. (2017), Evaluating real GDP growth forecasts in the Bank of Canada Monetary Policy Report, Bank of Canada Working Paper 2017-21, Bank of Canada.

Boehm, C. E. & Kroner, T. N. (2023), The US, economic news, and the global financial cycle, NBER Working Paper (No. w30994), National Bureau of Economic Research.

Campbell, J. R., Evans, C. L., Fisher, J. D., Justiniano, A., Calomiris, C. W. & Woodford, M. (2012), 'Macroeconomic effects of Federal Reserve forward guidance', *Brookings papers on economic activity* pp. 1–80.

Cesa-Bianchi, A., Thwaites, G. & Vicondoa, A. (2020), 'Monetary policy transmission in the United Kingdom: A high frequency identification approach', *European Economic Review* **123**, 103375.

Champagne, J., Bellisle, G.-P. & Sekkel, R. (2018), Evaluating the Bank of Canada staff economic projections using a new database of real-time data and forecasts, Bank of Canada working paper 2018-52, Bank of Canada.

Champagne, J. & Sekkel, R. (2018), 'Changes in monetary regimes and the identification of monetary policy shocks: Narrative evidence from Canada', *Journal of Monetary Economics* **99**, 72–87.

Cieslak, A. & Schrimpf, A. (2019), 'Non-monetary news in central bank communication', *Journal of International Economics* **118**, 293–315.

Cloyne, J. & Hürtgen, P. (2016), 'The macroeconomic effects of monetary policy: A new measure for the United Kingdom', *American Economic Journal: Macroeconomics* **8**(4), 75–102.

Coibion, O. & Gorodnichenko, Y. (2015), 'Information rigidity and the expectations formation process: A simple framework and new facts', *American Economic Review* **105**(8), 2644–2678.

Cook, T. & Hahn, T. (1989), 'The effect of changes in the Federal funds rate target on market interest rates in the 1970s', *Journal of monetary economics* **24**(3), 331–351.

Gertler, M. & Karadi, P. (2015), 'Monetary policy surprises, credit costs, and economic activity', *American Economic Journal: Macroeconomics* **7**(1), 44–76.

Giannone, D., Lenza, M. & Primiceri, G. E. (2015), 'Prior selection for vector autoregressions', *Review of Economics and Statistics* **97**(2), 436–451.

Gürkaynak, R. S., Sack, B. P. & Swanson, E. T. (2005), 'Do actions speak louder than words? The response of asset prices to monetary policy actions and statements', *International Journal of Central Banking* .

Ha, J. & So, I. (2023), 'Which monetary shocks matter in small open economies? Evidence from Canada', *International Journal of Central Banking* **19**(2), 389–472.

Hansen, S., McMahon, M. & Tong, M. (2019), 'The long-run information effect of central bank communication', *Journal of Monetary Economics* **108**, 185–202.

Hoesch, L., Rossi, B. & Sekhposyan, T. (2023), 'Has the information channel of monetary policy disappeared? Revisiting the empirical evidence', *American Economic Journal: Macroeconomics* **15**(3), 355–387.

Jain, M. & Sutherland, C. (2020), 'How do central bank projections and forward guidance influence private-sector forecasts?', *International Journal of Central Banking* **16**(5), 179–218.

Jarociński, M. & Karadi, P. (2020), 'Deconstructing monetary policy surprises—The role of information shocks', *American Economic Journal: Macroeconomics* **12**(2), 1–43.

Kearns, J. & Manners, P. (2006), 'The impact of monetary policy on the exchange rate: A study using intraday data', *International Journal of Central Banking* (2), 157–183.

Koeppl, T. V., Kronick, J. M. & McNeil, J. (2024), 'Using functional shocks to assess conventional and unconventional monetary policy in Canada', *Canadian Journal of Economics, Accepted* .

Kuttner, K. N. (2001), 'Monetary policy surprises and interest rates: Evidence from the Fed funds futures market', *Journal of monetary economics* **47**(3), 523–544.

Laséen, S. (2020), 'Monetary policy surprises, central bank information shocks, and economic activity in a small open economy', Working Paper 396, Sveriges Riksbank.

Lucca, D. O. & Moench, E. (2015), 'The pre-FOMC announcement drift', *The Journal of finance* **70**(1), 329–371.

Lunsford, K. G. (2020), 'Policy language and information effects in the early days of Federal Reserve forward guidance', *American Economic Review* **110**(9), 2899–2934.

Macklem, T. (2002), 'Information and analysis for monetary policy: Coming to a decision', *Bank of Canada Review* **2002**(Summer), 11–18.

Miranda-Agrippino, S. & Ricco, G. (2021), 'The transmission of monetary policy shocks', *American Economic Journal: Macroeconomics* **13**(3), 74–107.

Murray, J. (2013), 'Monetary policy decision making at the Bank of Canada', *Bank of Canada Review* **2013**(Autumn), 1–9.

Nakamura, E. & Steinsson, J. (2018), 'High-frequency identification of monetary non-neutrality: The information effect', *The Quarterly Journal of Economics* **133**(3), 1283–1330.

Nsafoah, D. & Dery, C. (2024), 'Effect of conventional and unconventional monetary policy shocks on housing prices in Canada', *Journal of Housing Economics* **64**, 101993.

Piazzesi, M. & Swanson, E. T. (2008), 'Futures prices as risk-adjusted forecasts of monetary policy', *Journal of Monetary Economics* **55**(4), 677–691.

Romer, C. D. & Romer, D. H. (2000), 'Federal Reserve information and the behavior of interest rates', *American economic review* **90**(3), 429–457.

Romer, C. D. & Romer, D. H. (2004), 'A new measure of monetary shocks: Derivation and implications', *American Economic Review* **94**(4), 1055–1084.

Sastry, K. (2021), 'Disagreement about monetary policy', *Available at SSRN 3421723* .

Siklos, P. & Neuenkirch, M. (2015), 'How monetary policy is made: Two Canadian tales', *International Journal of Central Banking* **11**(1), 225–250.

Soosalu, M. (2024), 'Monetary policy transmission in Canada - A high frequency identification approach', *Accepted, The B.E. Journal of Macroeconomics* .

Sutherland, C. S. (2023), 'Forward guidance and expectation formation: A narrative approach', *Journal of Applied Econometrics* **38**(2), 222–241.

Swanson, E. & Jayawickrema, V. (2023), 'Speeches by the Fed chair are more important than FOMC announcements: An improved high-frequency measure of US monetary policy shocks', *Unpublished Manuscript* .

Swanson, E. T. (2023), The importance of Fed chair speeches as a monetary policy tool, *in* 'AEA Papers and Proceedings', Vol. 113, pp. 394–400.

Vincent, N. (2024), 'Remarks by Nicolas Vincent'.

Xing, B. A., Feunou, B., Nongni-Donfack, M. & Sekkel, R. (2024), 'US macroeconomic news and low-frequency changes in small open economies' bond yields', *Journal of Banking & Finance* **168**, 107270.

Zhang, X. (2018), 'A new measure of monetary policy shocks', *Available at SSRN 3296110* .

Zhu, L. (2021), 'Let the market speak: Using interest rates to identify the Fed information effect', *Available at SSRN 4035869* .

A Appendix: Additional Tables

Table 11: Forecast Revisions on Economic News and Policy Surprises

	GDP	CPI	Unemployment Rate
Δ Yield Slope 3mo.	-0.08	0.052	0.066
	(0.07)	(0.066)	(0.045)
Δ USD Exch. 1mo.	1.99**	-0.1	-0.135
	(0.88)	(1.08)	(0.67)
Δ Oil 3mo.	0.431***	0.78***	-0.148
	(0.146)	(0.15)	(0.1)
Δ TSX60 3mo.	-0.216	-0.77**	-0.195
	(0.39)	(0.35)	(0.288)
Δ CPI	0.019**	0.024***	-0.016**
	(0.0085)	(0.007)	(0.007)
CPI Surprise	-0.006	0.079	-0.032
	(0.09)	(0.08)	(0.054)
GDP Surprise	-0.31**	0.12	-0.07
	(0.127)	(0.146)	(0.098)
US Non Farm Payroll Surp.	-0.0037	0.027	-0.017
	(0.032)	(0.025)	(0.019)
House Start Surp.	-0.048***	-0.0017	0.0091
	(0.011)	(0.012)	(0.011)
Labour Prod. Surp.	0.116	-0.093	-0.006
	(0.096)	(0.057)	(0.06)
Δ Unemployment Rate 1mo.		-0.37**	
		(0.15)	
Δ Unemployment Level 6mo.		0.38	
		(0.37)	
Δ Private Emp. 3mo.		-0.0103***	
		(0.003)	
Δ Merch. Exp. 6mo		0.913***	
		(0.261)	
Δ Merch. Imp. 6mo		0.021	
		(0.052)	
Whole Sale Surp.		0.034**	
		(0.0157)	
Δ Total Employ. 6mo (SEPH)			-0.082*
			(0.0439)
Δ Earning (SEPH) 12mo.			1.5
			(1.44)
Δ Retail Sales 6mo.			-0.02***
			(0.007)
Employ. Surprise			-0.008*
			(0.004)
Δ Weekly Wages 3mo.			3.81
			(2.32)
BAX2	-0.323	-0.126	0.11
	(0.323)	(0.304)	(0.176)
R^2	0.545	0.580	0.49
F-stat (p-val.)	0.000	0.000	0.02
Observations	96	96	96

Note: Forecast revisions around policy announcements regressed on economic news and a monetary policy surprise (BAX2). Sample 2009:1 to 2019:12. Forecasts revisions of previous announcement and a time variable excluded from table results. Forecast revisions are the median forecast from Bloomberg Terminal. Robust standard errors in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 12: Monetary Policy Surprises and Individual Bank of Canada Staff Forecasts

	MPR	No MPR	MPR	No MPR	MPR	No MPR	MPR	No MPR
GDP forecast								
$h = -1$	−0.016	0.003						
	(0.024)	(0.028)						
$h = 0$			−0.012	0.011				
			(0.052)	(0.059)				
$h = 1$					0.023	−0.021		
					(0.068)	(0.052)		
$h = 2$							0.083	−0.038
							(0.086)	(0.068)
GDP fore. Rev.								
$h = -1$	0.073*	−0.026						
	(0.043)	(0.031)						
$h = 0$			0.013	−0.015				
			(0.069)	(0.053)				
$h = 1$					0.008	0.012		
					(0.089)	(0.084)		
$h = 2$							−0.084	0.028
							(0.068)	(0.061)
Inflation Forecast								
$h = -1$	−0.052	−0.013						
	(0.048)	(0.051)						
$h = 0$			−0.060	−0.077				
			(0.073)	(0.067)				
$h = 1$					0.117	0.085		
					(0.107)	(0.115)		
$h = 2$							0.008	0.100
							(0.112)	(0.095)
Inf. fore. Rev.								
$h = -1$	0.082	−0.033						
	(0.064)	(0.052)						
$h = 0$			0.053	0.117*				
			(0.086)	(0.064)				
$h = 1$					0.102	−0.072		
					(0.067)	(0.040)		
$h = 2$							0.086	−0.024
							(0.186)	(0.137)
$R^2_{adj.}$	0.027	−0.016	−0.051	−0.028	−0.002	−0.043	−0.018	−0.024
F-Stat. (p-value)	0.311	0.501	0.931	0.5	0.32	0.846	0.682	0.467
Observations	68	68	68	68	68	68	68	68

Note: Individual h horizon BoC Staff Forecast regressed on the monetary policy surprise, split between announcements with and without an MPR. 50,000 Non-Parametric bootstrap standard errors in brackets. Sample from 2002 to 2018. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.