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# Deciphering Central Bank Communication: Evidence from High-Frequency Data in Korea*

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*This paper studies central bank communication in Korea using a high-frequency identification approach. We measure the monetary surprises by combining two sources: the policy rate announcement and the press conference. The monetary surprises contain two types of monetary news—the policy rate announcement and the future path of monetary policy, especially as conveyed during the press conference—along with the central bank's assessment of the economic outlook. We deconstruct the monetary surprises into the current policy target shocks, the future policy path shocks, and the central bank information shocks. Our identification approach uses high-frequency comovement of interest rates and stock prices, along with monotonicity restrictions assuming different responses of long-term and short-term interest rates to each type of monetary news. We find that the future policy path shocks have greater impacts on the economy than the current policy target shocks. These two monetary policy shocks occasionally have opposite directions.*

JEL Classification: E43, E52, E58
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# I. Introduction

Central bank communication has become increasingly significant, with financial markets placing greater importance on interpreting central bank messages. Due to greater transparency in monetary policy, financial markets are rarely surprised by the policy rate announcements, as the current policy rate has become more predictable (Swanson, 2006). Meanwhile, news about the future path of monetary policy has become more influential than the policy rate announcement. Moreover, a growing number of central banks have been actively communicating with the financial markets about future monetary policy through various channels such as the press conference. In this context, numerous studies have highlighted the importance of central bank communication (Gürkaynak et al., 2005; Blinder et al., 2008; Cieslak and Schrimpf, 2019; Andrade and Ferroni, 2021; Swanson, 2021; Gorodnichenko et al., 2023; Swanson, 2023; Swanson and Jayawickrema, 2024).

In line with these studies, we analyze central bank communication in Korea using a high-frequency identification approach. The Bank of Korea (BOK) has enhanced its communication strategy to improve the transparency and effectiveness of monetary policy (Bae, 2014; Bank of Korea, 2017).[1] Korean financial markets now respond less strongly to the policy rate announcements, suggesting that information about the future path of monetary policy has become more important than the current policy rate decision itself.[2] Our study finds that the 3-year Korea Treasury Bond (KTB) futures yield tends to respond more significantly to the BOK Governor's press conferences than the BOK base rate announcements. Furthermore, the trading volume of 3-year KTB futures increases significantly during the BOK Governor's press conferences, as noted by Ahn et al. (2021).

We measure the monetary surprises, which reflect the influence of central bank communication, by summing two surprises: one from the policy rate announcement and the other from the press conference. Many previous studies using a high-frequency identification approach focus on central bank announcements, thereby limiting their ability to account for significant aspects of monetary policy, such as speeches and press conferences. We address these challenges by explicitly including the influence of the press conferences to measure the monetary surprises. Our methodology is in line with studies that highlight the importance of central bank communication beyond the policy rate announcement in understanding monetary policy (Bauer and Swanson, 2023; Swanson, 2023; Swanson and Jayawickrema, 2024).

[1] See Bank of Korea (2017) for more details.

[2] Out of the 144 monetary policy decisions analyzed in this paper, expert forecasts (Yonhap Infomax Consensus) match actual policy decisions in 76 cases (52.8%). When including cases where expert forecasts differed by three basis points or less, this figure increases to 105 cases (72.9%).

The main distinction of our study from previous research lies in our approach of decomposing the monetary policy shocks into two types—the current policy target shocks and the future policy path shocks—based on the source of monetary policy. The monetary surprises consist of two distinct types of monetary news and the central bank's assessment of the economic outlook. Monetary news includes the policy rate announcement and information about future monetary policy, especially as conveyed during the press conference. We deconstruct the monetary surprises into the current policy target shocks, the future policy path shocks, and the central bank information shocks. Our identification approach exploits high-frequency comovement of interest rates and stock prices, along with monotonicity restrictions, following Cieslak and Schrimpf (2019) and Jarociński and Karadi (2020). We assume that the current policy target shocks have more significant effects on short-term interest rates than the future policy path shocks. In contrast, the future policy path shocks have more significant effects on long-term interest rates than the current policy target shock.

Our study contributes to provide evidence that monetary policy in Korea should not be considered as a single factor, which contrasts with findings from previous studies such as Ahn et al. (2021). We find that the impact of central bank communication on the economy may differ from the current policy rate decision. The interest rate hike, driven by both the current policy target shocks and the future policy path shocks, leads to a contractionary effect on the economy, which aligns with the typical influence of monetary policy. However, the impact of the future policy path shock on financial markets and the real economy is more significant and persistent than that of the current policy target shock. Furthermore, we demonstrate that these two types of monetary policy shocks may sometimes occur in different directions. These results suggest that central bank communication about the future path of monetary policy may have a different impact compared to the current policy rate decision. Meanwhile, the interest rate hike, which results from the positive central bank information shocks, has an expansionary effect on the economy.

Our study is in line with previous literature on monetary policy and the central bank information effect. One of the main challenges in identifying monetary policy shocks lies in resolving the endogeneity problem. In order to address this problem, an increasing number of studies have used high-frequency identification methods to identify exogenous monetary policy shocks (Kuttner, 2001; Cochrane and Piazzesi, 2002; Bernanke and Kuttner, 2005; Gürkaynak et al., 2005; Brand et al., 2010; Gertler and Karadi, 2015; Nakamura and Steinsson, 2018; Jarociński and Karadi, 2020). These studies isolate monetary surprises from non-monetary news by focusing on changes in financial variables within narrow time windows around monetary policy events. The key assumption of high-frequency identification approach is that all publicly available information prior to monetary policy events is already reflected in financial market prices. For this reason, the changes in financial variables within narrow time windows around monetary policy events can be interpreted as the monetary surprises. Meanwhile, a growing body of literature has addressed the importance of the information channel of monetary policy (Romer and Romer, 2000; Campbell et al., 2012; Nakamura and Steinsson, 2018; Cieslak and Schrimpf, 2019; Jarociński and Karadi, 2020; Andrade and Ferroni, 2021; Miranda-Agrippino and Ricco, 2021; Kerssenfischer, 2022; Laumer and Santos, 2024). These studies argue that monetary surprises measured within narrow time windows contain not only information about monetary policy decisions but also information about the central bank's assessment of the economic outlook. For example, Jarociński and Karadi (2020) and Miranda-Agrippino and Ricco (2021) show that ignoring the central bank information effect can lead to the misidentification of monetary shocks. In the context of Korea, Ahn et al. (2021), following the methodology of Jarociński and Karadi (2020), provide the empirical evidence for the presence of the information channel of monetary policy.

Our study also relates to several strands of literature that demonstrate the multi-dimensional nature of monetary policy (Gürkaynak et al., 2005; Brand et al., 2010; Altavilla et al., 2019; Andrade and Ferroni, 2021; Swanson, 2021; Jarociński, 2024; Swanson and Jayawickrema, 2024). Gürkaynak et al. (2005) argue that two factors—the current federal funds rate target and the future path of policy—are required to understand the effects of U.S. monetary policy. Swanson (2021) extends the methods of Gürkaynak et al. (2005) to identify three components of FOMC announcements: the federal funds rate, forward guidance, and large-scale asset purchase. Swanson and Jayawickrema (2024) apply the methods of Swanson (2021) to the five types of monetary policy announcements: FOMC announcements, press conferences, speeches by the Fed Chair and Vice Chair, and FOMC meeting minutes releases. Altavilla et al. (2019) explain the multi-dimensional aspects of monetary policy in the euro area with four factors: policy target, forward guidance, quantitative easing, and timing. Andrade and Ferroni (2021) identify the target and path factor from monetary surprises, decomposing the path factor into news on future macroeconomic conditions and future monetary policy shocks.

Our research highlights the importance of carefully managing central bank communication to align market expectations with policy objectives. Recently, an increasing number of central banks have communicated their future monetary policy through various channels, such as press conferences. For example, since 2022, the BOK has shared forecasts of the Monetary Policy Board (MPB) members on the expected BOK base rates for the next three months during the press conferences. Our study provides central banks with analytic tools to assess the impact of communication about future monetary policy.

The remainder of this paper is structured as follows. Section 2 describes the construction of monetary surprises and the identification strategy. Section 3 discusses the identified structural shocks and analyzes their impact on financial markets and the real economy. Section 4 shows the robustness of our analysis, and Section 5 concludes.

# II. Identification Strategy

## 2.1. Measuring monetary surprises and the role of press conference

To accurately identify the components of monetary policy, we use high-frequency data to prevent other economic events from contaminating the analysis. Thereby, we measure the monetary surprise of the policy rate announcement ($S_{1,t}$) as the change in the market price of the financial variables from -10 minutes to +20 minutes around the policy rate announcement, as shown in Equation 1.[3] We use the 3-month Interest Rate Swaps (IRS), the 3-year Korea Treasury Bond (KTB) futures, and KOSPI200 futures on the basis of the availability of the data and their relevant characteristics. The 3-month IRS rate, which is the shortest-term instrument available, serves as a measure of the market's expectation about the BOK base rate in the short term. The 3-year KTB futures yield, which serves as a benchmark indicator of yields in Korea, captures expectations of the future path of the policy rate.

$$S_{1,t} = P_{t,\tau_1+20} - P_{t,\tau_1-10} \tag{1}$$

$P_{t,h}$ = The market price of the financial variable at time $h$ on the MPB's policy-setting meeting day($t$) ($\tau_1$ : Time of policy rate announcement)

In general, the future path of expected short-term interest rates determines m-period zero-coupon government bond yields, as shown in Equation 2.

$$i_t^m = E_t\left(\frac{1}{m}\sum_{j=0}^{m-1} i_{t+j}^1\right) + \phi_t^m \tag{2}$$

$i_t^m$ = The interest rate on a m-period government bond at time $t$
$\phi_t^m$ = Risk premium at time $t$ for m-period government bond yield

If financial markets expect monetary policy to tighten (or loosen) on both the long and short horizons, $i_{t+j}^1$ will rise (or fall) for every $j$, causing $i_t^m$ to move in the same direction. However, short-term and long-term interest rates sometimes move in different directions. For example, although the central bank raises the

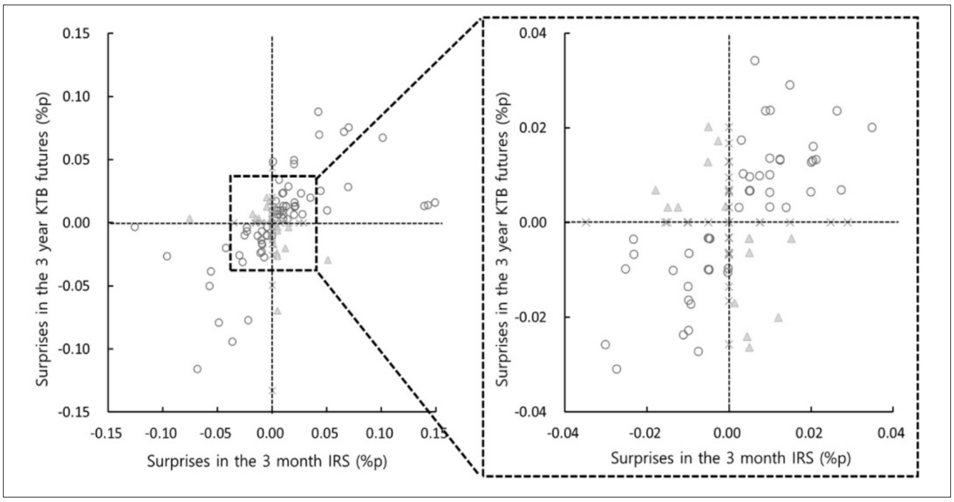
[3] We refer to the first news articles from the Yonhap News Agency to determine the time of the policy rate announcements. See Appendix B for more details.

policy rate, long-term interest rates may decrease if financial markets anticipate that the tightening of monetary policy will not be sustained over the long term ($i_t^1 \uparrow$ but $i_{t+j}^1 \downarrow$, for $j > 0$). The other component that comprises long-term interest rates is risk premium ($\phi_t^m$), which, if not considered, may be mistakenly interpreted as the future path of short-term interest rates.

We use the 3-month IRS surprises as unexpected changes in short-term interest rates and the 3-year KTB futures surprises as unexpected changes in long-term interest rates. Meanwhile, Ahn et al. (2021) show that the impact of risk premiums is limited in the 3-year KTB futures surprises related to the policy rate announcements. Figure 1 shows a scatter plot of $S_1$ in the 3-month IRS and the 3-year KTB futures from January 2009 to December 2022. The O-shaped dots highlight the data point when the 3-month IRS and the 3-year KTB futures move in the same direction, while the $\Delta$-shaped dots indicate the opposite. The $\Delta$-shaped dots suggest that there may exist a discrepancy between the financial markets' perception of the current monetary policy decision and their expectations for future monetary policy.

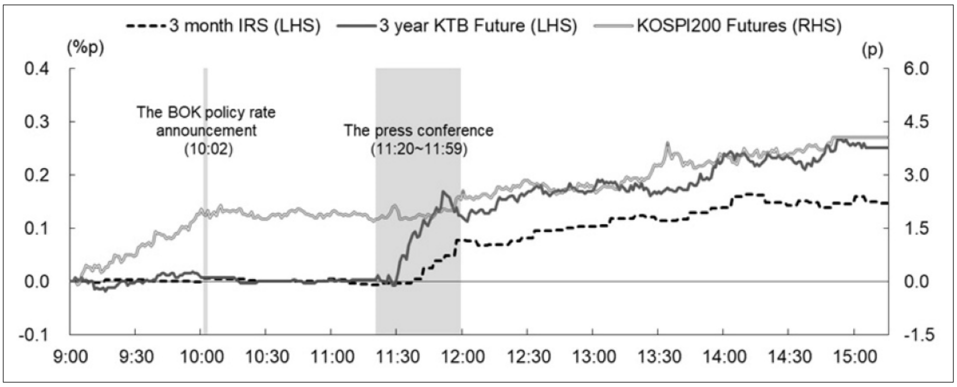
It is worth noting the importance of the press conferences as it may provide hints about the future path of monetary policy. In light of these considerations, we find two significant points in the financial market during the press conferences. First, the trading volume of 3-year KTB futures increases significantly on the policy-setting

**[Figure 1]** Scatter Plot of 3-month IRS and 3-year KTB Futures Surprises: Announcement




Note: The sample consists of 144 monetary surprises from the regularly scheduled MPB's policy-setting meetings held from January 2009 to December 2022. The $\Delta$-shaped dots represent the data points where both surprises move in opposite directions, while the O-shaped dots move in the same direction. The X-shaped dots means the data point where at least one of two surprises has zero value. See Appendices A and B for more details on the data sources and explanations.

**[Figure 2]** Intraday Movements of the Financial Markets on September 10, 2009




Note: The vertical axis is the change from the market price(or yield) at September 10, 2009, 09:01.

meeting days of the MPB, particularly during the press conferences (Ahn et al., 2021). Second, the trading patterns in the financial markets often change during the press conferences. Figure 2 shows the intraday movements of the market price of the financial variables on September 10, 2009, when the MPB decided to leave the policy rate unchanged. The 3-month IRS, the 3-year KTB futures, and the KOSPI200 futures do not react significantly to the policy rate announcement as the decision was almost in line with market expectation.[4] However, their movements change significantly during the press conference.[5] This example indicates that the press conference can significantly influence the financial market expectation about the future path of monetary policy.

Considering the two points discussed above, we define the monetary policy surprise resulting from the press conferences, as shown in Equation 3. The start time of the press conference is determined according to the BOK's weekly press schedule, and its duration is derived from the playback time of the video available on the BOK's website.

$$S_{2,t} = P_{t,\tau_3} - P_{t,\tau_2} \tag{3}$$

$P_{t,h}$ = The market price of the financial variable at time $h$ on the MPB's policy-setting meeting day($t$) ($\tau_2$, $\tau_3$: Start/End time of the press conference)

Figure 3 shows a scatter plot of $S_{2,t}$ in the 3-month IRS and the 3-year KTB futures from January 2009 to December 2022. It reveals a greater number of $\Delta$-shaped dots compared and SKTB to Figure 1. This indicates that $S_{2,t}^{IRS}$ and $S_{2,t}^{KTB}$

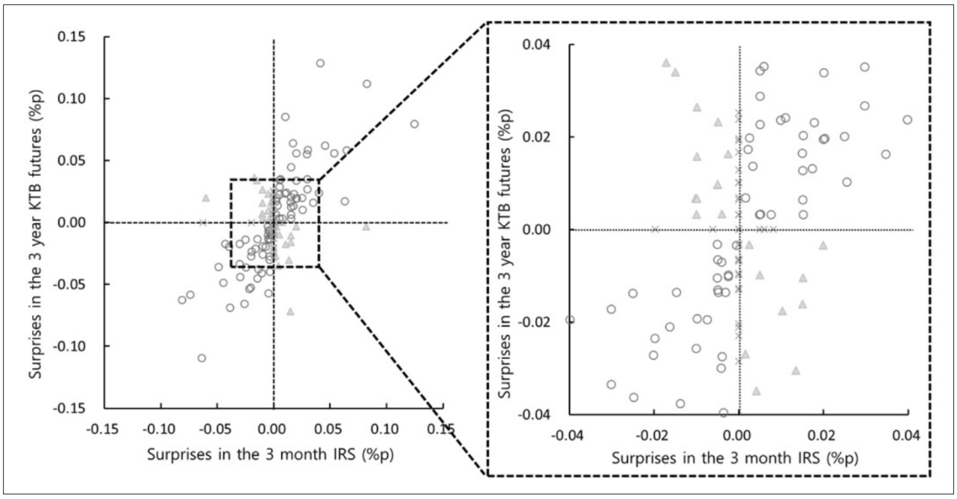
[4] The Yonhap Infomax Consensus predicted the policy rate would be hold as 2.00%.

[5] Financial market participants seem to interpret the BOK Governor's message that raising the policy rate would not mean a tightening of monetary policy as hawkish than expected.

are more frequently observed to move in opposite directions. In addition, Figure 4 shows that the absolute values of $S_{2,t}$ tend to be larger than those of $S_{1,t}$ in the 3-year KTB futures. These two features suggest that the information conveyed during the press conferences may differ from that implied by the policy rate announcement.

Given these points, we measure the monetary surprises (St) by summing $S_{1,t}$ and $S_{2,t}$, as shown in Equation 4. We use the 3-month IRS rate, the 3-year KTB futures yield, and the KOSPI200 futures prices to measure three types of monetary surprises.[6] For the 3-year KTB futures surprises, we use the 3-year KTB futures yield that is derived from the futures price.[7] Meanwhile, the risk premium appears to have no effect on the monetary surprises in the 3-year KTB futures.[8] We use the KOSPI200 futures index to measure the KOSPI200 futures surprises. We analyze the regularly scheduled MPB's policy-setting meetings held from January 2009 to December 2022. The monetary surprises have a value of zero in months when the

**[Figure 3]** Scatter Plot of 3-month IRS and 3-year KTB Futures Surprises: Press Conferences



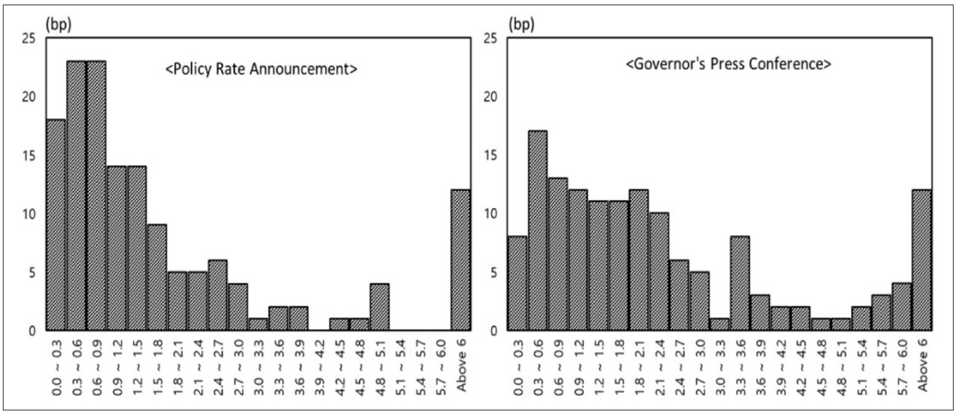

Note: The sample consists of 144 monetary surprises from the regularly scheduled MPB's policy-setting meetings held from January 2009 to December 2022. The Δ -shaped dots represent the data points where both surprises move in opposite directions, while the O-shaped dots move in the same direction. The X-shaped dots mean the data point where at least one of two surprises has zero value. See Appendices A and B for more details on the data sources and explanations.

[6] The 3-year KTB futures and the KOSPI200 futures data, used in this paper, maintain the continuity of the time series by linking the most recent month with the least remaining maturity. Since futures market transactions are concentrated in the most recent month, in our view, the linked future price can reflect financial market expectations.

[7] See Bank of Korea (2021) for more details.

[8] See Appendix C for more details.

**[Figure 4]** Histogram of Absolute Values of 3-year KTB Futures Surprises




Note: The sample consists of 144 monetary surprises from the regularly scheduled MPB's policy-setting meetings held from January 2009 to December 2022. See Appendices A and B for more details on the data sources and explanations.

MPB's policy-setting meeting was not held.[9] Figure 5 shows the whole series of the monetary surprises in the 3-month IRS, the 3-year KTB futures, and the KOSPI200 futures.

$$S_t = S_{1,t} + S_{2,t} \tag{4}$$

$S_{1,t}$ = Surprises at the announcement of the BOK policy rate

$S_{2,t}$ = Surprises during the press conference

For all three surprises, the correlation coefficients between $S_{1,t}$ and $S_{2,t}$ are close to zero: -0.12 for the 3-month IRS, 0.03 for the 3-year KTB futures, and -0.13 for the KOSPI200 futures. The volatility of surprises in all three variables increases when the press conference is included.[10] Furthermore, $S_2$ often has a different sign from $S_1$; 44.7% for the 3-month IRS, 45.0% for the 3-year KTB futures, and 43.7% for the KOSPI200 futures.[11] These results suggest that the press conference has a significant impact on financial markets and, therefore, should be considered when measuring monetary surprises.

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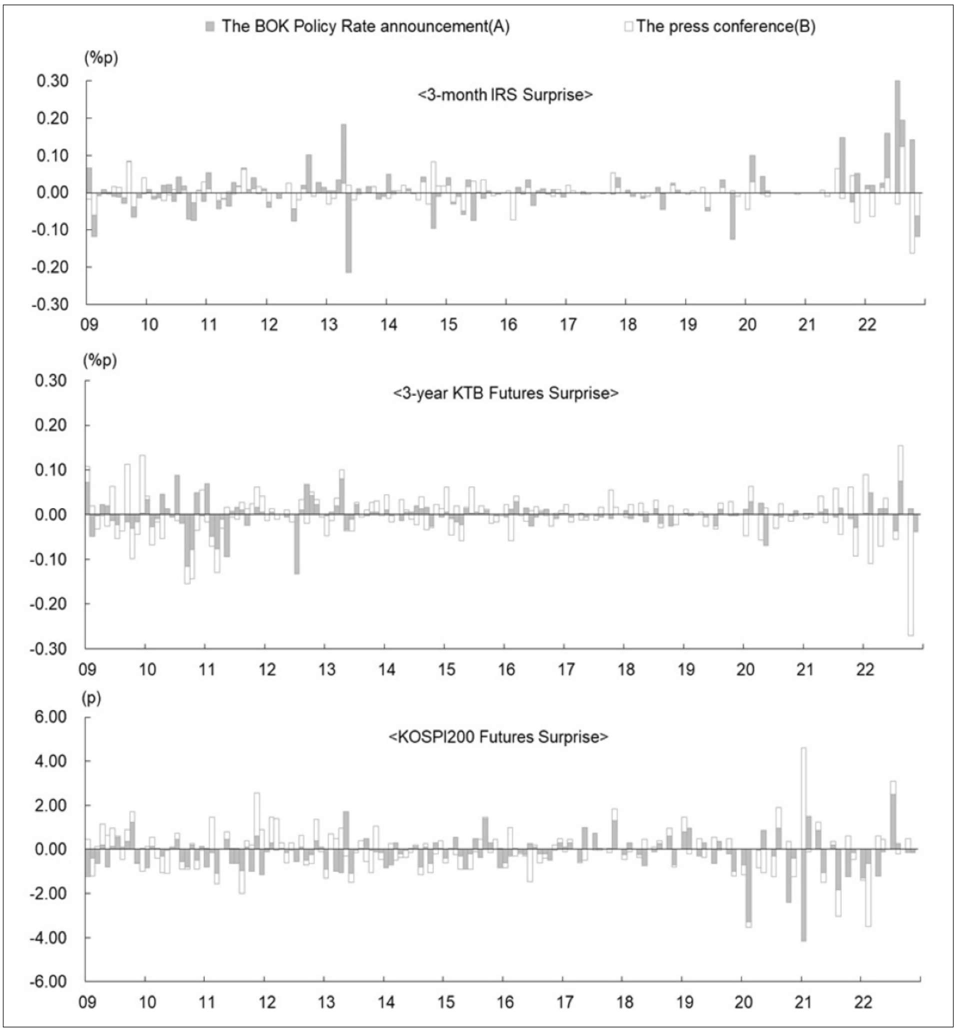
[9] Before 2017, the Monetary Policy Board held policy-setting meetings every month. However, since 2017, meetings are held only eight times a year, excluding March, June, September, and December. However, the temporary policy-setting meeting was held in March 2020. We assume that the monetary surprises in March 2020 have a value of zero because the policy rate was announced after the financial markets had closed.

[10] The standard deviation of surprise increases from 0.047 to 0.052 for the 3-month IRS, from 0.030 to 0.052 for the 3-year KTB futures, and from 0.793 to 0.986 for the KOSPI200 futures.

[11] We exclude samples that have zero value for either $S_1$ or $S_2$ when calculating percentage.

**[Figure 5]** Monetary Surprises on the MPB's Policy-Setting Meeting Days




Note: The gray bars represent surprises that occur after the policy rate announcement ( $S_{1,t}$ ). The white bars are surprises during the press conference ( $S_{2,t}$ ).

## 2.2. Identification of monetary policy shocks

The monetary surprises that we measure contain two distinct types of monetary news and the central bank's assessment of the economic outlook. Monetary news includes the policy rate announcement and information about future monetary policy, especially as conveyed during the press conference. We deconstruct the monetary surprises into three types of shocks: the current policy target shocks, the future policy path shocks, and the central bank information shocks. In order to identify these shocks, we introduce the following three assumptions.

**Assumption 1.** The monetary surprises in the 3-month IRS, the 3-year KTB futures, and the KOSPI200 futures market are exclusively influenced by the current monetary policy, with the effects of other macroeconomic and financial variables being limited.

**Assumption 2.** The monetary policy shocks and the central bank information shocks satisfy the following sign restrictions. The contractionary monetary policy shocks result in an increase in the 3-month IRS and the 3-year KTB futures surprises, while causing a decrease in the KOSPI200 futures surprises. In contrast, the positive central bank information shocks lead to an increase in the 3-month IRS, the 3-year KTB futures, and the KOSPI200 futures surprises. The sign restrictions are imposed solely on the contemporaneous responses under Assumption 1.

**Assumption 3.** The monetary policy shocks can be divided into two distinct types: the current policy target shocks and the future policy path shocks. The current policy target shocks have more significant effects on short-term interest rates than the future policy path shocks. In contrast, the future policy path shocks have more substantial effects on long-term interest rates compared to the current policy target shocks. The monotonic restrictions are imposed solely on the contemporaneous responses under Assumption 1.

The first assumption is naturally satisfied, as the monetary surprises are the unexpected change in interest rates and stock prices within a short time window surrounding the policy rate announcements or the press conferences. This means that the monetary surprises are attributed only from the current monetary policy because all publicly available information prior to monetary policy events is already reflected in financial market prices.

The second assumption is associated with an identification strategy suggested by Jarociński and Karadi (2020), which uses high-frequency comovement of interest rates and stock prices. However, for this assumption to hold, it is essential that stock prices should respond significantly to monetary policy in Korea. We provide three reasons to support this assumption. First, Sohn and Eom (2006) shows that the Korean stock market responds not only to change of the policy rate, but also to pronouncements indicating the future monetary policy. Second, we use futures prices instead of spot prices to measure the stock price surprises, which is different from Jarociński and Karadi (2020). We assume that the KOSPI200 futures price is more sensitive to monetary policy because of higher proportion of institutional investors. We thus expect that KOSPI200 futures data may provide more reliable information to measure the stock price surprises associated with monetary policy. Finally, global news is likely to affect the Korean financial markets at the onset of the trading session, rather than at the time of monetary policy-related events. This implies that the impact of global news on the monetary surprises is limited.

We introduce the third assumption to decompose the monetary policy shock into two distinct types from different sources. The current policy target shock is related to a discrepancy between expectations for the policy rate and the actual announcements. The future policy path shock is associated with changes in the expected future path of the policy rate. We assume that the current policy target shock has a greater effect on short-term interest rates than the future policy path shock, while the latter has a greater impact on long-term interest rates than the former. We apply monotonicity restrictions on the 3-month IRS and the 3-year KTB futures surprises, following the methodology by Cieslak and Schrimpf (2019).

Based on the three assumptions outlined above, we identify three types of shocks—the current policy target shocks ($Target_t$), the future policy path shocks ($Path_t$), and the central bank information shocks ($CBI_t$)—as follows. $h_t$ is a vector of the 3-month IRS surprises ($S_t^{SR}$), the 3-year KTB futures surprises ($S_t^{LR}$), and the KOSPI200 futures surprises ($S_t^{K}$). Furthermore, as shown in Equation 5, we can express $h_t$ as a linear combination of three types of shocks. In order to identify shocks, we impose sign restrictions and monotonic restrictions to $\alpha$, $\beta$, and $\gamma$. Meanwhile, under the Assumption 1, we impose these restrictions for the current period only and assume the zero restrictions for the rest of the period.[12]

$$h_t = [S_t^{SR}, S_t^{LR}, S_t^{K}]^T = \begin{bmatrix} \alpha_1 & \alpha_2 & \alpha_3 \\ \beta_1 & \beta_2 & \beta_3 \\ \gamma_1 & \gamma_2 & \gamma_3 \end{bmatrix} \begin{bmatrix} Target_t \\ Path_t \\ CBI_t \end{bmatrix} \tag{5}$$

**(Sign Restrictions)**

· Contractionary Current Policy Target Shock: $\alpha_1 > 0$, $\beta_1 > 0$, $\gamma_1 < 0$

· Contractionary Future Policy Path Shock: $\alpha_2 > 0$, $\beta_2 > 0$, $\gamma_2 < 0$

· Positive Central Bank Information Shock: $\alpha_3 > 0$, $\beta_3 > 0$, $\gamma_3 > 0$

**(Monotonicity Restrictions)**

· $Target_t$ have a greater impact on the 3-month IRS surprises than $Path_t : |\alpha_1| > |\alpha_2|$

· $Path_t$ have a greater impact on the 3-year KTB futures surprises than $Target_t : |\beta_1| < |\beta_2|$

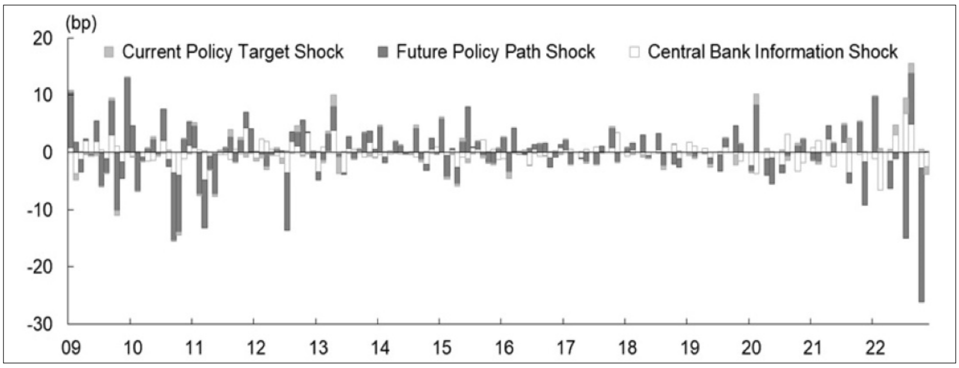
[12] See Appendix A for more detailed explanations.

# III. Empirical Analysis[13]

## 3.1. Assessing the validity of identified monetary shocks

We identify the current policy target shocks ($Target_t$), the future policy path shocks ($Path_t$), and the central bank information shocks ($CBI_t$) with the identification approach discussed in subsection 2.2. Figure 6 presents the decomposition of the 3-year KTB futures surprises into these three types of shocks since January 2009. These three types of shocks that we identify align with economic intuition in major historical events.

**[Figure 6]** Decomposition of the 3-year KTB Futures Surprises




Note: Each structural shock is re-scaled so that their sum reflects the 3-year KTB futures surprises.

The first example is June 2016, when the BOK reduced the policy rate from 1.5% to 1.25%. In this case, the current policy target shock and the central bank information shock are negative (–), while the future policy path shock is positive (+). The financial markets had generally anticipated that the BOK would hold the policy rate. The Yonhap Infomax Consensus predicted the policy rate as 1.46%, which means that the majority of financial market participants anticipated the policy rate as 1.5%. As the BOK decided to cut the policy rate, the 3-year KTB futures yield sharply declined after the announcement. However, three key messages were conveyed during the press conference: (1) the policy rate was approaching the effective lower bound, (2) the monetary policy decision to cut the policy rate was made unanimously, and (3) downside risks are expected to grow. The financial markets interpreted the first statement as an indication that further policy rate cuts were unlikely, leading to a rebound of the 3-year KTB futures yield.

[13] We utilized the code provided by Cieslak and Schrimpf (2019) and Jarociński and Karadi (2020) in our empirical analysis.

In this context, the contractionary future policy path shock can be interpreted as reflecting the BOK Governor's comment that the policy rate is close to the effective lower bound. Meanwhile, the negative central bank information shock is associated with the second and third comments. In particular, the market was concerned about future economic conditions as the monetary policy decision was made unanimously. This decision contrasts with the previous meeting's unanimous decision to maintain the policy rate unchanged, implying that the BOK has a negative view of economic conditions. In addition, the BOK Governor's remark regarding downside risks appears to have played a role.

The second example is July 2022, when the BOK raised the policy rate by 50bp. The financial markets had strongly anticipated 50bp hike and restrictive monetary policy stance. The Yonhap Infomax Consensus predicted the policy rate as 2.5%, which means that financial markets participants expected 50bp hike. The current policy target shock shows a positive (+). However, the future policy path shock is a negative (–) as the 3-year KTB futures yield retraced its previous excessive increases[14] following the BOK Governor's comments during the press conference. The BOK Governor indicated that a gradual interest rate increase of 25bp per step is preferable. This statement led market participants to interpret the future path of the policy rate as less restrictive than initially expected. The positive (+) central bank information shock appears to originate from the messages of the BOK Governor, which reassured markets by stating that stagflation is not a significant concern and that the GDP growth forecast exceeds potential GDP growth.

### 3.2. Impulse response of financial and macroeconomic variables to shocks from a VAR model

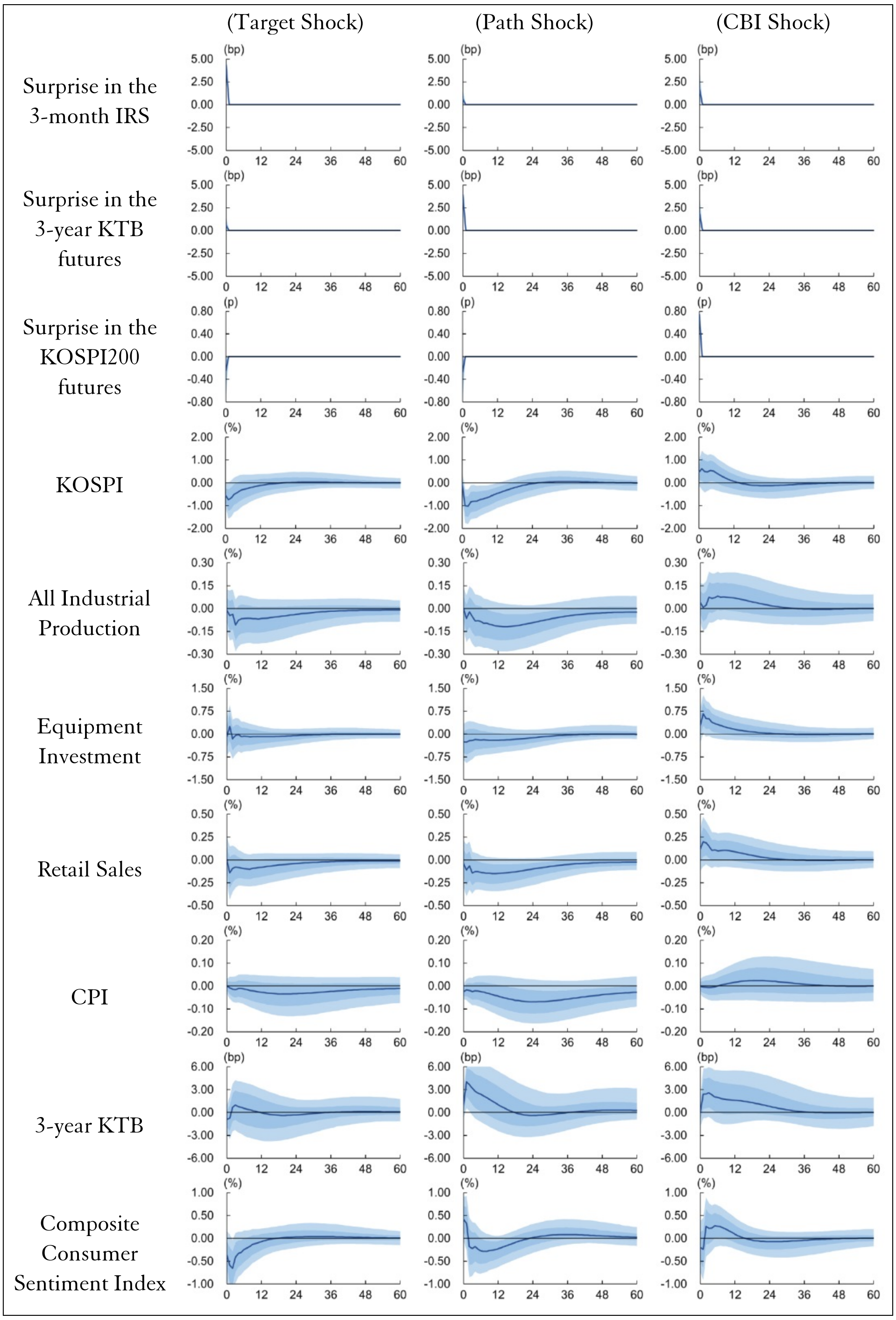
In this subsection, we examine the effects of the three types of shocks—the current policy target shocks, the future policy path shocks, and the central bank information shocks—on financial and macroeconomic variables using a sign-restriction VAR model.[15] Table 1 shows the results of the impulse response of financial and macroeconomic variables to one standard deviation shocks. The results of the analysis have three main findings.

First, the contractionary current policy target shock and the future policy path shock have tightening effects on the economy. The one standard deviation of the current policy target shock corresponds to the increase in the 3-year KTB futures surprises by 0.56bp. The peak responses of financial and macroeconomic variables to the current policy target shocks are as follows: the KOSPI decreases by 0.74%, the All Industrial Production Index falls by 0.11%, the Equipment Investment Index

[14] As the financial markets anticipated the substantial policy rate hike and restrictive policy, the 3-year KTB futures yield previously increased prior to the policy decision.

[15] See Appendix A for the detailed structure and data of the VAR model.

**[Table 1]** Impulse Response to One Standard Deviation Shocks: Baseline




Note: The solid line and shaded areas report the median, 68%(darker), and 90%(lighter) band of a posterior probability distribution.

**[Table 2]** Response of Surprises to One Standard Deviation Shocks

| | Target Shock | | Path Shock | | CBI Shock | |
|---|---|---|---|---|---|---|
| | Median | 90% C.I. | Median | 90% C.I. | Median | 90% C.I. |
| 3-month IRS(bp) | 4.40 | [2.57, 5.03] | 0.61 | [0.06, 1.68] | 1.68 | [0.35, 4.04] |
| 3-year KTB futures(bp) | 0.56 | [0.05, 1.58] | 3.95 | [1.87, 4.60] | 1.87 | [0.47, 4.03] |
| KOSPI200 futures(p) | -0.24 | [-0.77,-0.02] | -0.27 | [-0.81,-0.02] | 0.74 | [0.35, 0.93] |

falls by 0.15%, the Retail Sales Index drops by 0.14%, the CPI declines by 0.03%, and the Composite Consumer Sentiment Index (CCSI) decreases by 0.65%, the 3-year KTB interest rate increases by 0.99bp. The one standard deviation of the future policy path shock corresponds to the increase in the 3-year KTB futures surprises by 3.95bp. The peak responses of financial and macroeconomic variables to the future policy path shocks are as follows: the KOSPI decreases by 1.03%, the All Industrial Production Index falls by 0.12%, the Equipment Investment Index falls by 0.26%, the Retail Sales Index drops by 0.15%, the CPI declines by 0.07%, and the CCSI decreases by 0.28%, the 3-year KTB interest rate increases by 4.01bp. We find that the two types of monetary policy shocks are consistent with the findings of previous studies, which argue that output responds more quickly to monetary policy than prices (Romer and Romer, 2004; Gertler and Karadi, 2015). The All Industrial Production index shows its peak response to the current policy target shock and the future policy path shock within a period of 3 to 15 months, while the CPI reaches its peak response approximately 24 months.

Second, the future policy path shocks have a more significant and persistent impact on major economic variables compared to the current policy target shocks. All variables, except for the CCSI, exhibit a more persistent response to the future policy path shocks, and their peak responses are slightly larger. The forecast error variance decomposition also shows that the contribution of the future policy path shocks on major economic variables is larger than that of the current policy target shock, as shown in Table 3. Meanwhile, it is natural for the CCSI to be more sensitive to the current policy target shocks because it serves as an economic sentiment indicator for the present or within a 6-month horizon. It is noteworthy that the demand-side factors such as retail sales and equipment investment are more significantly influenced by the future policy path shock. In the case of equipment investment, companies generally consider long-term interest rates to be more important than short-term interest rates when making investment decisions. Regarding the retail sales index, the future policy path shocks have a greater impact compared to the current policy target shock. The larger impact of the future policy path shocks may be attributed to durable goods, which are highly sensitive to expected future interest rates. However, the current policy target shock also significantly affects retail sales because much household debt is based on floating rates linked to short-term interest rates in Korea. This suggest that the substantial effect of the current policy target shocks on short-term interest rates likely impacts on consumption.

Finally, the central bank information shock has a different effect on financial and macroeconomy variables compared to the current policy target shock and the future policy path shock. The one standard deviation of the central bank information shocks increase the KOSPI by 0.61%, the all Industrial Production Index by 0.08%, the Equipment Investment Index by 0.67%, the Retail Sales Index by 0.20%, the CPI by 0.02%, the CCSI by 0.28%, and the 3-year KTB interest rate increases by 2.58bp, based on the peak response. In addition, the forecast error variance decomposition analysis also estimates that the central bank information shocks have a contribution of about 3% -5% of the changes in major variables, as shown in Table 3.

**[Table 3]** Forecast Error Variance Decomposition

| horizon (month) | KOSPI | | | All Industrial Production | | | Equipment Investment | | | Retail Sales | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TG | Path | CBI | TG | Path | CBI | TG | Path | CBI | TG | Path | CBI |
| 0 | 2.2 | 2.6 | 1.5 | 0.8 | 0.8 | 0.9 | 0.9 | 1.3 | 1.3 | 0.8 | 0.9 | 1.3 |
| 6 | 5.9 | 3.8 | 3.5 | 2.8 | 2.9 | 2.6 | 2.6 | 3.2 | 5.5 | 3.1 | 3.7 | 4.4 |
| 12 | 5.8 | 4.9 | 4.1 | 3.3 | 4.3 | 3.3 | 2.8 | 3.8 | 5.5 | 3.7 | 5.2 | 4.7 |
| 24 | 5.3 | 4.9 | 4.1 | 3.7 | 6.2 | 3.8 | 3.0 | 4.5 | 5.5 | 3.9 | 6.6 | 4.8 |
| horizon (month) | CPI | | | 3-year KTB | | | Composite CSI | | | | | |
| | TG | Path | CBI | TG | Path | CBI | TG | Path | CBI | | | |
| 0 | 0.8 | 2.0 | 0.9 | 1.4 | 1.5 | 0.9 | 2.2 | 2.6 | 1.5 | | | |
| 6 | 2.1 | 2.8 | 1.8 | 2.3 | 6.9 | 4.6 | 5.9 | 3.8 | 3.5 | | | |
| 12 | 2.5 | 3.6 | 2.2 | 2.5 | 6.0 | 4.6 | 5.8 | 4.9 | 4.1 | | | |
| 24 | 3.2 | 5.8 | 3.0 | 2.8 | 5.5 | 4.9 | 5.3 | 4.9 | 4.1 | | | |

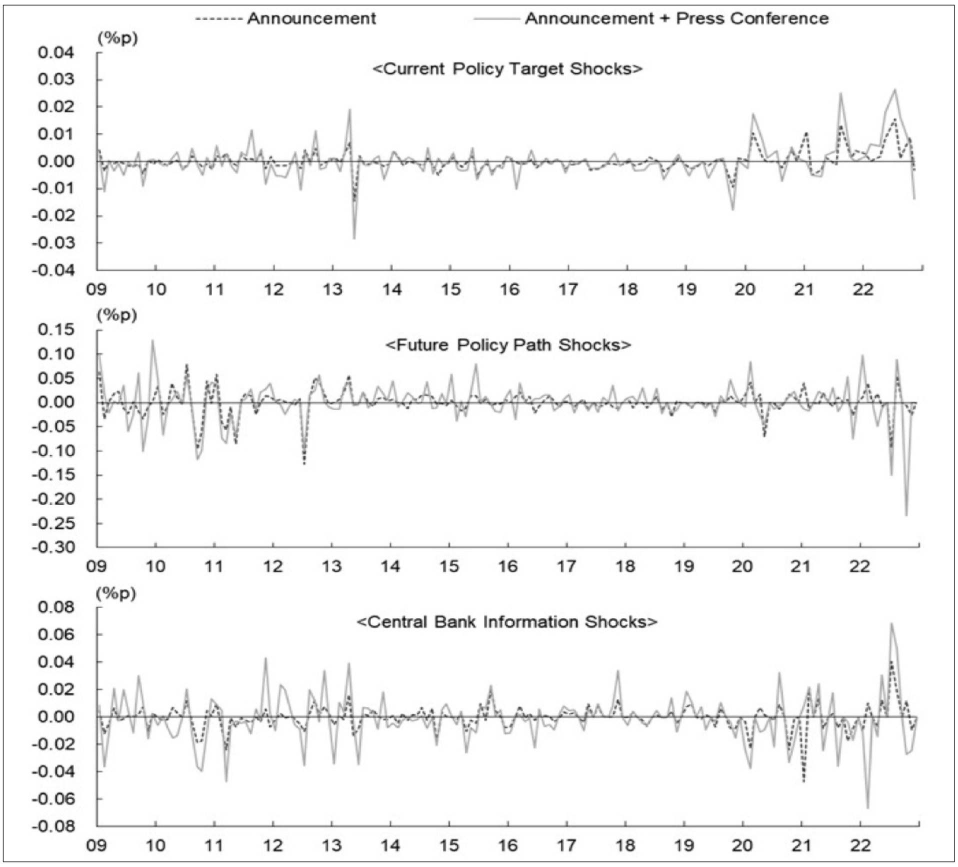
# IV. Robustness Check

## 4.1. Importance of the BOK Governor's press conference

This subsection demonstrates the importance of the press conference. We compare structural shocks identified in the baseline model with shocks derived solely from $S_{1,t}$. We also examine historical examples where the inclusion of the press conferences led to structural shocks that more accurately reflect economic realities.

We find that the press conference has a relatively large impact on the future policy path shocks compared to the current policy target shocks. Figure 7 shows the comparison of the identified structural shocks based on the contribution to the 3-year KTB futures surprises. The current policy target shocks are similar regardless of whether $S_{1,t}$ or $S_t(=S_{1,t}+S_{2,t})$ is used.[16] In fact, the correlation coefficient between the two current policy target shocks made by the above surprises is 0.824. This high correlation likely arises from the fact that the current policy target shocks are typically generated by discrepancy between expectations for the policy rate and the actual announcements. On the other hand, the inclusion of the press conference leads to a significant difference in the future policy path shocks and the central bank information shocks. The correlation coefficient of the structural shocks using $S_{1,t}$ and $S_t$, are 0.627 for the future policy path shocks and 0.623 for the central bank information shocks. Furthermore, the volatility of these shocks increases when the press conference is incorporated.[17]

**[Figure 7]** Comparison of Identified Structural Shocks: Baseline vs. Announcement Only




Note: Each structural shock is re-scaled so that their sum reflects the 3-year KTB futures surprises.

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[16] The notation follows Equation 4 in chapter 2.

[17] The standard deviation of shocks increases from 0.003 to 0.006 for the current policy target shocks, from 0.027 to 0.044 for the future policy path shocks, and from 0.009 to 0.018 for the central bank information shocks.

There are two historical examples that illustrate the importance of the press conference when measuring the monetary surprise. The first example is the MPB's policy-setting meeting held in September 2009, where the MPB decided to leave the policy rate unchanged. When we use $S_{1,t}$, the current policy target shock and the central bank information shock are nearly zero[18], while the future policy path shock is negative. However, when we use $S_t$, we observe that all three shocks are significantly positive. During the press conference, the BOK Governor indicated that the monetary policy stance remained accommodative even if the BOK raise the policy rate. Financial market participants interpreted this comment as a signal of future policy rate increases. This example highlights the importance of the information conveyed during the press conferences, implying that the press conferences should be considered when measuring the monetary surprises.

The another example is MPB's policy-setting meeting held in October 2022, when the BOK raise the policy rate by 50bp. When we use $S_{1,t}$, the three types of shock have nearly value of zero.[19] However, during the press conference, the minority view advocating for a 25bp hike was disclosed. This information led to a change in financial markets' expectation, indicating that the future path of the policy rate would be lower than previously anticipated. Thereby, the future policy path shock has negative value when using $S_t$. This case also shows that the press conferences can generate unexpected change about future monetary policy that markets did not anticipate at the time of the policy rate announcement.

## 4.2. Treating a monetary policy shock as a single factor

In this subsection, we demonstrate that monetary policy shocks are not properly identified without distinguishing between the current policy target shocks and the future policy path shocks. We compare our baseline results with those of Ahn et al. (2021), which follows Jarociński and Karadi (2020) in treating monetary policy as a single factor. Equation 6 illustrates how Ahn et al. (2021) identifies the monetary policy shocks and the central bank information shocks. We use this identification approach by using $S_t$.

$$h_t = [S_t^R, S_t^K]^T = \begin{bmatrix} \alpha_1 & \alpha_2 \\ \beta_1 & \beta_2 \end{bmatrix} \begin{bmatrix} MP_t \\ CBI_t \end{bmatrix}, \quad MP_t \perp CBI_t \tag{6}$$

$S_t^R$ = 3-year KTB futures yield surprises

$S_t^K$ = KOSPI200 futures price surprises

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18 The Yonhap Infomax Consensus predicted the policy rate would be left unchanged as 2.00%.

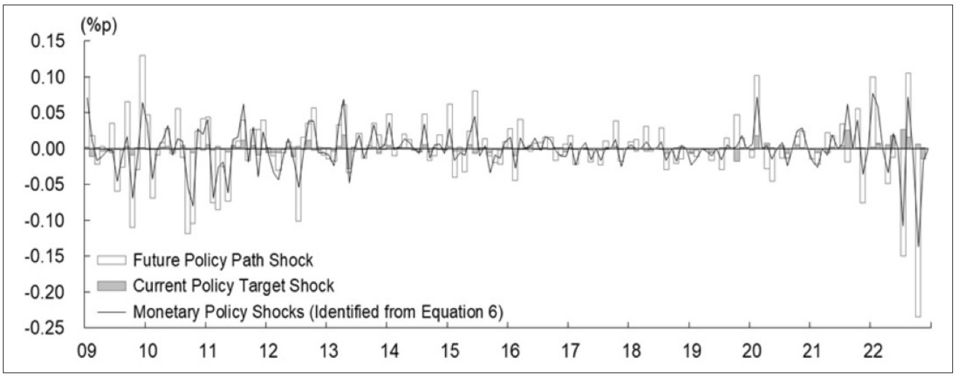
19 The Yonhap Infomax Consensus predicted a 50bp base rate hike, so called 'big step'

**(Sign Restrictions)**
· Monetary Policy Shocks: $\alpha_1 > 0$, $\beta_1 < 0$

· Positive Central Bank Information Shocks: $\alpha_2 > 0$, $\beta_2 > 0$

Figure 8 shows the comparison of the identified monetary policy shocks based on the contribution to the 3-year KTB futures surprises. The monetary policy shocks from Equation 6 are similar to sum of $Target_t$ and $Path_t$ in our baseline. The correlation coefficient is 0.90.

**[Figure 8]** Comparison of Identified Monetary Policy Shocks: Baseline vs. Single Factor

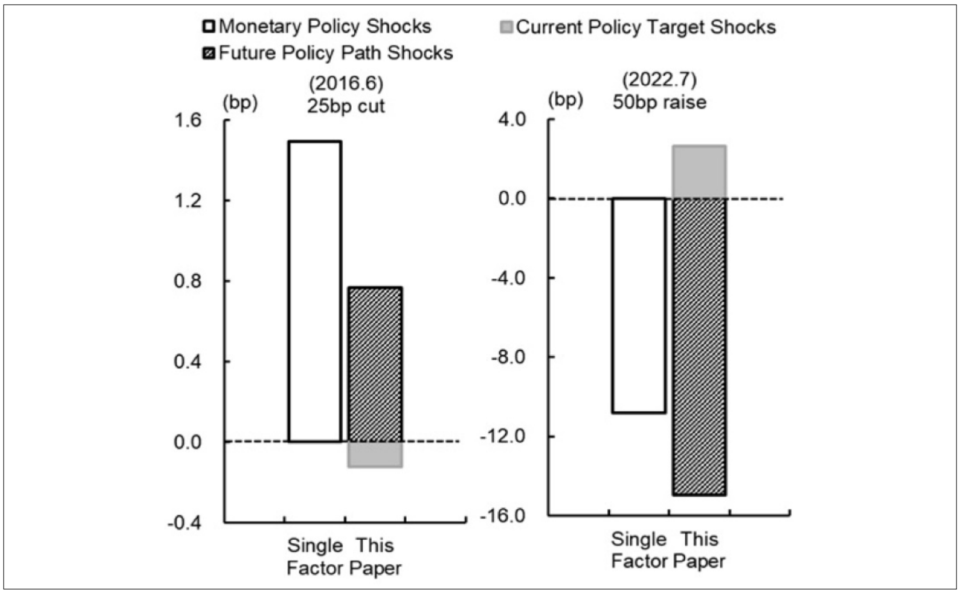



Note: Each structural shock is re-scaled so that their sum reflects the surprises. We assign zero to surprises associated with March, June, September, and December since 2017.

While the monetary policy shocks identified from Equation 6 are similar to sum of $Target_t$ and $Path_t$, the baseline methodology offers distinct advantages in examining the multi-dimensional effects of monetary policy. The current policy target shocks generally align with the direction of policy rate decisions. However, this alignment becomes less likely when monetary policy shocks are considered as a single factor. Among total 144 cases, there were 29 cases of policy rate changes. The current policy target shocks align with the direction of the policy rate changes in 21 of these cases, while monetary policy shocks from Ahn et al. (2021) align in only 14 cases. This appears to result from the failure to distinguish between $Target_t$ and $Path_t$, although those two have opposite signs. Figure 9 demonstrates two historical examples.

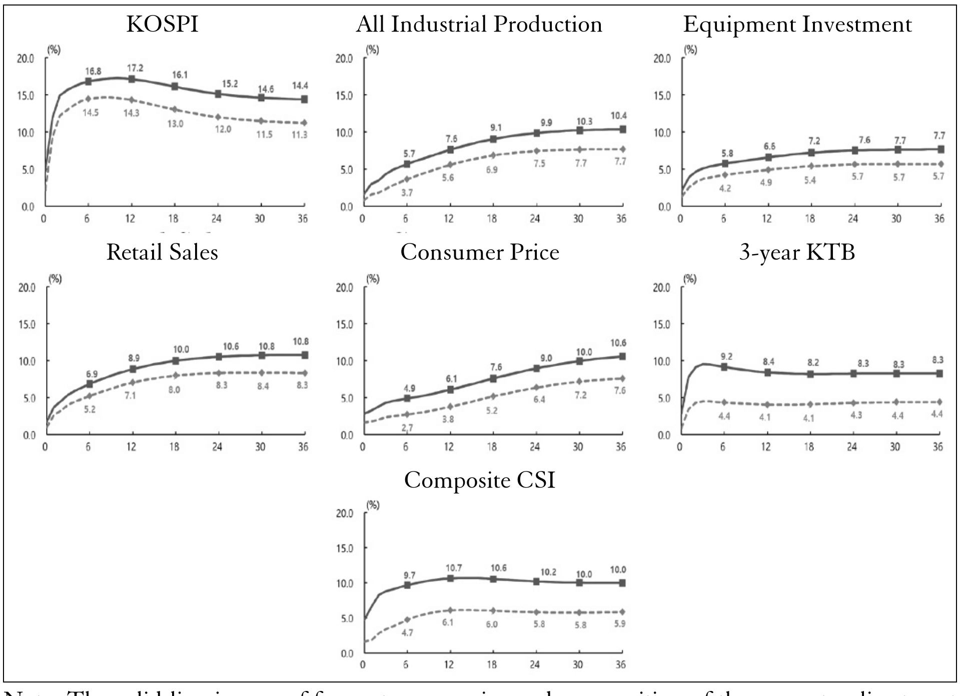
The first case is June 2016 when the BOK cut the policy rate by 25bp. The monetary policy shock from Ahn et al. (2021) appears positive. However, the current policy target shock has a negative value, implying that the positive shock of Ahn et al. (2021) may be attributed from the future policy path shock. The BOK Governor commented that the policy rate was approaching its effective lower bound. The financial markets interpreted this message as indicating that further policy rate cuts would be difficult in the future.

**[Figure 9]** Monetary Policy Shocks in June 2016 and July 2022: Baseline vs. Single Factor



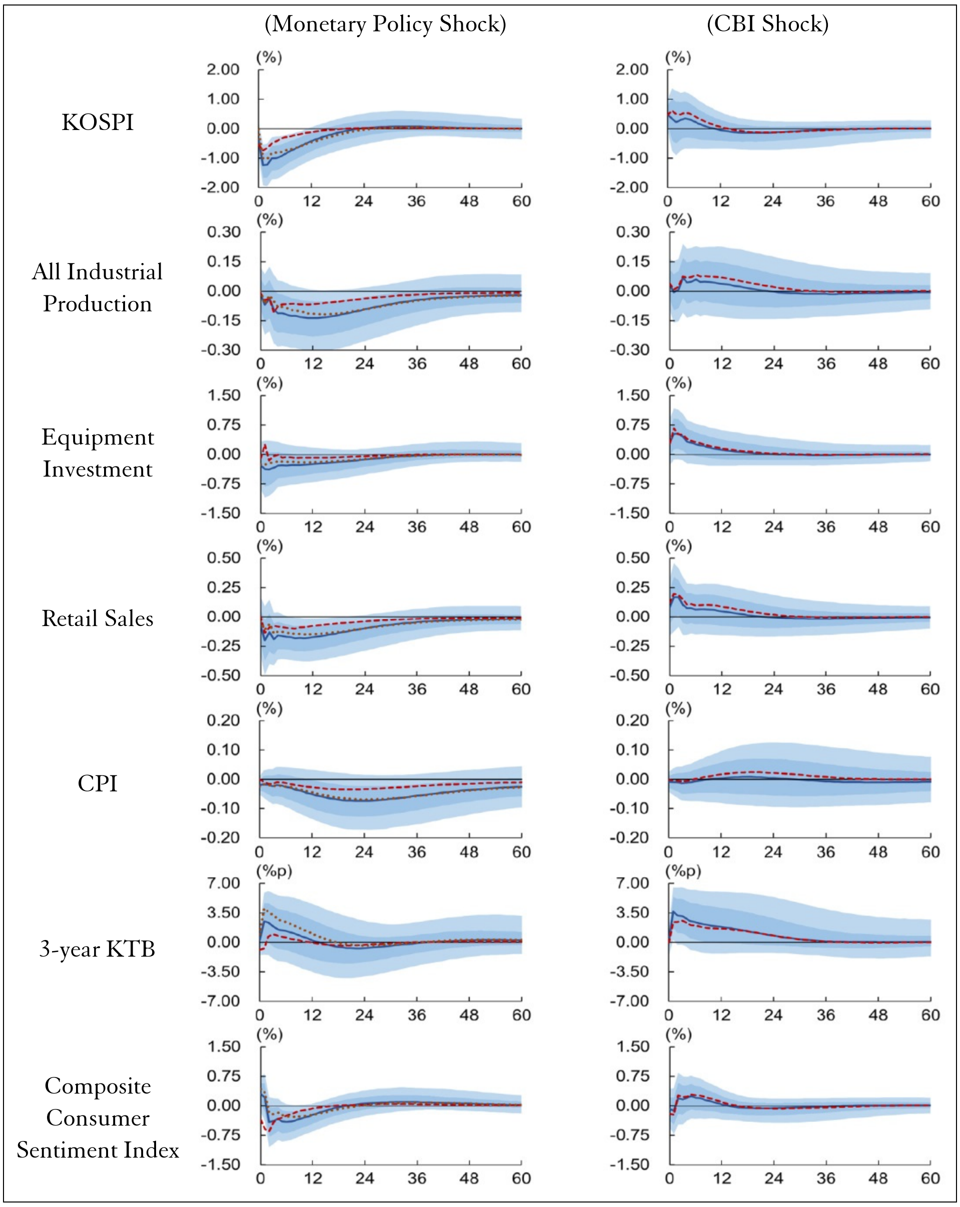

Note: Each structural shock is re-scaled so that their sum reflects the 3-year KTB futures surprise.

**[Table 4]** Forecast Error Variance Decomposition: Baseline vs. Single Factor




Note: The solid line is sum of forecast error variance decomposition of the current policy target shock and the future policy path shock. The dashed line is forecast error variance decomposition of monetary policy shock by Ahn et al. (2021).

**[Table 5]** Impulse Response to One Standard Deviation Shock: Baseline vs. Single Factor




Note: The solid line and shaded areas report the median, 68%(darker), and 90%(lighter) band of a posterior probability distribution. In case of Monetary Policy shock, the dashed line is the IRF of the current policy target shock and the dotted line is that of the future policy path shock. While about the central bank information shock, the dashed line is the IRF of the central bank information shock in the baseline

The second case is July 2022 when the BOK raise the policy rate by 50bp. The monetary policy shock from Ahn et al. (2021) has a negative value. However, the current policy target shock has a positive value, also suggesting the negative shock of Ahn et al. (2021) may be attributed from the future policy path shock. The BOK Governor commented that the MPB views a gradual 25bp hike as more preferable in the future. The financial markets interpreted this message as indicating that the future path of the policy rate would be gradual and lower than previously expected. This results in a negative value in the future policy path shock.

We then compare the forecast error variance of monetary policy shocks from Ahn et al. (2021) and our baseline. Table 4 demonstrate that the explanatory power driven by sum of the $Target_t$ and $Path_t$ in our baseline is more substantial than that of monetary policy shock by Ahn et al. (2021). This suggests that by decomposing monetary policy shocks into finer components, we are better able to explain the impacts of monetary policy on the economy.

Finally, we compare the impulse response of financial and macroeconomic variables to shocks from Ahn et al. (2021) and those from our baseline. In Table 5, the responses of real variables to the monetary policy shocks from Ahn et al. (2021) resemble those of the future policy path shocks. However, the peak responses to shocks from Ahn et al. (2021) are greater than our baseline. This is likely attributed from the distribution of the impact of the shock between the current policy target shock and the future policy path shock.

However, the response of the 3-year KTB interest rate to the future policy path shock is more pronounced, aligning with economic intuition. Regarding the central bank information shocks, the responses are generally similar across both approach. These finding suggests that it is important to consider multi-dimensional nature of monetary policy.

### 4.3. Appropriateness of the time window

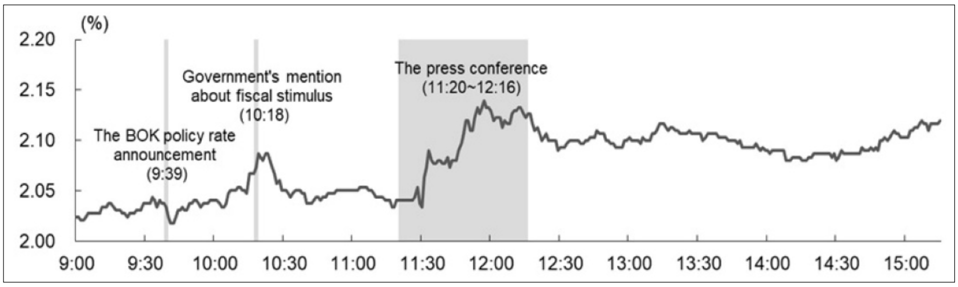
In this subsection, we analyze the appropriateness of the time window in measuring the monetary surprises. In the baseline model, we measure the monetary surprises by summing $S_{1,t}$ and $S_{2,t}$. However, we consider alternative monetary surprises ($S_{3,t}$) using a time window that spans from ten minutes prior to the policy rate announcement to the end of the press conference, as shown in Equation 7.

$$S_{3,t} = P_{t,\tau_2} - P_{t,\tau_1 - 10} \tag{7}$$

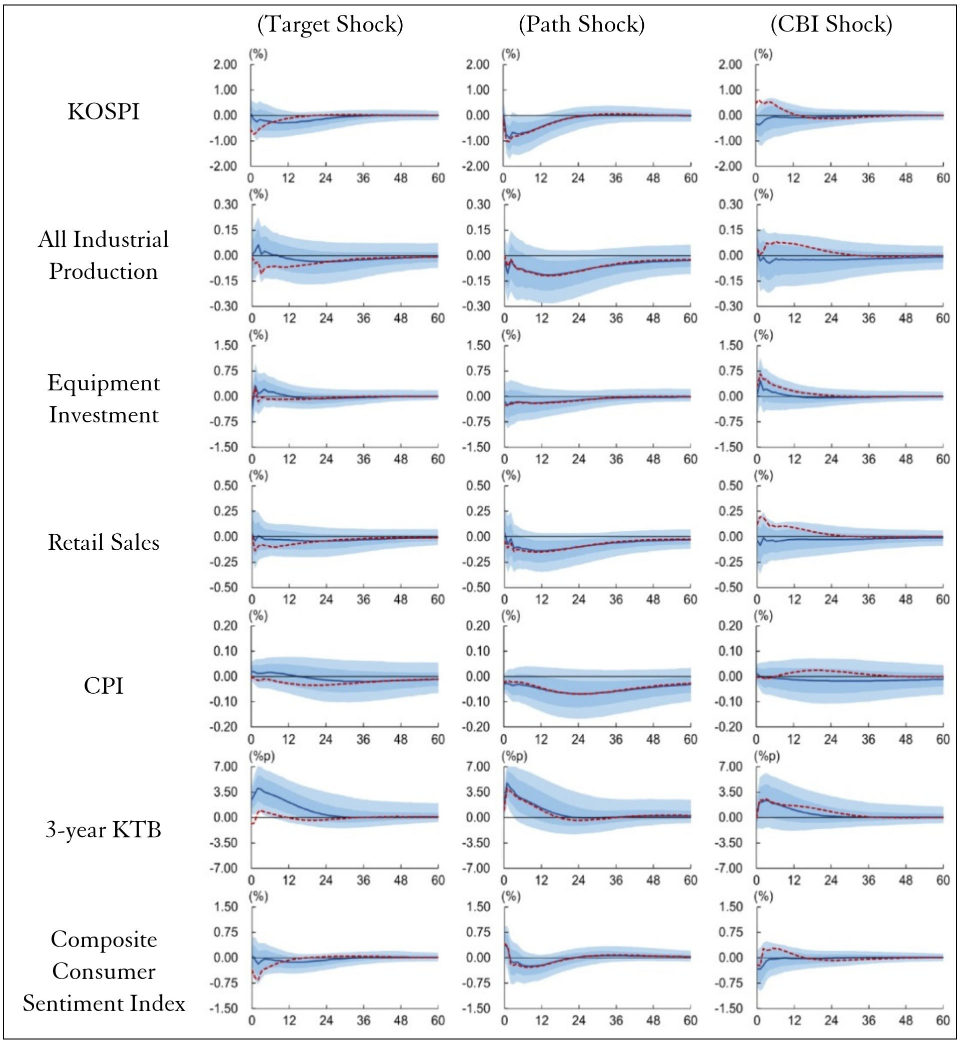
$P_{t,h}$ = The market price of the financial variable at time $h$ on the MPB's policy-setting meeting day($t$) ($\tau_1$: Time of policy rate announcement, $\tau_2$: End time of the press conference)

The impulse response of financial and macroeconomic variables to shocks are presented in Table 6. The response to the current policy target shocks has weakened.

**[Figure 10]** Intraday Movements of the 3-year KTB Futures Yield on January 14, 2022




**[Table 6]** Impulse Response to One Standard Deviation Shocks: Time Window Expanded




Note: The solid line and shaded areas report the median, 68%(darker), and 90%(lighter) band of a posterior probability distribution. The dashed line is IRF of the baseline model.

Moreover, the impact of the current policy target shocks on some macroeconomic variables, such as all industrial production and equipment investment, deviate from economic intuition. In the case of positive central bank information shock, a contractionary response was observed. These results appear to arise from the inclusion of noise unrelated to monetary policy decision by expanding time window. For example, on the MPB's policy-setting meeting day held in January 2022, the Korean government mentioned specific details related to the fiscal stimulus around 10:18 AM.[20] This announcement of Korean government led to a decline in the 3-year KTB futures yield as shown in Figure 10. These results suggest that dividing the time window into two segments and summing the respective surprises is a reasonable approach, as it captures solely the effect of the BOK's monetary policy decision.

## V. Conclusion

In this study, we analyze central bank communication in Korea using a high-frequency identification approach. The main contribution of our study lies in the identification of three different shocks from information contained in the monetary surprises: the current policy target shocks, the future policy path shocks, and the central bank information shocks. In particular, we decompose the monetary policy shocks into two components—each corresponding to the policy rate announcement and information about future monetary policy. Our identification approach exploits high-frequency comovement of interest rates and stock prices, along with monotonicity restrictions. We assume that the current policy target shocks have more significant effects on short-term interest rates than the future policy path shocks. In contrast, the future policy path shocks have more substantial effects on long-term interest rates compared to the current policy target shocks.

Our study provides evidence that monetary policy in Korea should not be considered as a single factor. We find that the impact of central bank communication on the economy may differ from the current policy rate decision. The future policy path shock has more significant and persistent impacts on the financial markets and the real economy than the current policy target shock. Moreover, these two monetary policy shocks occasionally have opposite signs, suggesting that central bank communication about the future monetary policy may have a different impact compared to the policy rate decision.

The policy implication of our study is that central banks should carefully managing their communication to align market expectations with policy objectives.

[20] Meanwhile, the BOK's policy decision was announced at 9:39 AM, and the press conference began at 11:20 AM.

Recently, many central banks, including the Bank of Korea, have communicated their future monetary policy through various channels, such as press conferences. Our study provides central banks with analytical tools to analyze the policy communication.

# Appendix

## A. VAR model and data

We construct a reduced-form VAR model as shown in Equation 8 to analyze the impulse response of financial and macroeconomic variables to the shocks that we identify.[21] $h_t$ is a vector of the 3-month IRS surprises ($S_t^{SR}$), the 3-year KTB futures surprises ($S_t^{LR}$), and the KOSPI200 futures surprises ($S_t^{K}$). The monetary surprises have a value of zero in months when the MPB's policy-setting meeting was not held.[22] $x_t$ is a vector of monthly variables, consisting of the KOSPI ($x_{1t}$), the all industrial production index ($x_{2t}$), the equipment investment index ($x_{3t}$), the retail sales index ($x_{4t}$), the CPI ($x_{5t}$)[23], the 3-year KTB interest rate ($x_{6t}$), and the CCSI ($x_{7t}$). $m_t$ is a vector of exogenous variables ($d_{1t}$ and $d_{2t}$). $d_{1t}$ is the import price index (in dollars) and $d_{2t}$ is the COVID-19 policy stringency index (Oxford Stringency Index) by Hale et al. (2021). The level and index variables used in $x_t$ are log-transformed and multiplied by 100.

$$\begin{bmatrix} h_t \\ x_t \end{bmatrix} = \sum_{p=1}^{12} \begin{bmatrix} 0 & 0 \\ B_{h,p} & B_{x,p} \end{bmatrix} \begin{bmatrix} h_{t-p} \\ x_{t-p} \end{bmatrix} + \theta^T m_t + \begin{bmatrix} u_t^h \\ u_t^x \end{bmatrix}, \begin{bmatrix} u_t^h \\ u_t^x \end{bmatrix} \quad N(0, \Sigma_u) \tag{8}$$

$$h_t = [S_t^{SR}, S_t^{LR}, S_t^{K}]^T$$

$$x_t = [x_{1t}, x_{2t}, x_{3t}, x_{4t}, x_{5t}, x_{6t}, x_{7t}]^T$$

$$m_t = [1, d_{1t}, d_{2t}]^T$$

$$\theta = \begin{bmatrix} 0 & 0 & 0 & \theta_{11} & \theta_{12} & \theta_{13} & \theta_{14} & \theta_{15} & \theta_{16} & \theta_{17} \\ 0 & 0 & 0 & \theta_{21} & \theta_{22} & \theta_{23} & \theta_{24} & \theta_{25} & \theta_{26} & \theta_{27} \\ 0 & 0 & 0 & \theta_{31} & \theta_{32} & \theta_{33} & \theta_{34} & \theta_{35} & \theta_{36} & \theta_{37} \end{bmatrix}$$

Table 8 represents the sign restrictions and the monotonicity restrictions that we impose on the VAR model to identify structural shocks according to the three assumptions in subsection 2.2. We assume that the contractionary monetary policy shocks result in an increase in the 3-month IRS and the 3-year KTB futures

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[21] We refer to Jarociński and Karadi (2020) and Ahn et al. (2021) for a description of the VAR model structure.

[22] Before 2017, the MPB held its policy-setting meetings every month. However, since 2017, the number of meetings was reduced to eight per year. As a result, the MPB's policy-setting meetings have not been held in March, June, September, and December since then. Consequently, surprises associated with these months are assigned zero for the period following 2017. In case of March 2020, however, the temporary policy-setting meeting was held. We assume that the monetary surprises in March 2020 have a value of zero because the policy rate was announced after the financial markets had closed.

[23] We use the seasonally adjusted data using the X-13-ARIMA method.

**[Table 7]** Data Transforming Methods, and Sources

| | Transformation/Calculation Methods | Frequency | Source |
|---|---|---|---|
| 3-year KTB Futures Price | Convert price to yield by using price determination formula of futures | Minute | Infomax |
| KOSPI200 Futures Price | Not applicable | Minute | Infomax |
| 3-month IRS | Not applicable | Tick | Bloomberg |
| All Industrial Production Index (S.A.) | Log transform | Monthly | Statistics Korea |
| Consumer Price Index | Seasonal adjustment by X-13-ARIMA, and log transform | Monthly | Statistics Korea |
| KOSPI | Log transform | Daily to Monthly (On Average) | Korea Exchange |
| Retail Sales Index (S.A.) | Log transform | Monthly | Statistics Korea |
| Equipment Investment Index (S.A.) | Log transform | Monthly | Statistics Korea |
| 3-year KTB interest rate | Not applicable | Monthly | KOFIA |
| Composite Consumer Sentiment Index | Log transform | Monthly | Bank of Korea |
| Covid-19 Stringency Index | Log transform | Daily to Monthly (On Average) | Hale et al. (2021) |
| Import Price Index (Dollars) | Log transform | Monthly | Bank of Korea |

**[Table 8]** Sign and Monotonicity Restriction on Surprises and Other Variables by Shocks

| | Monetary Policy Shocks | | CBI Shocks | Other Shocks |
|---|---|---|---|---|
| | Current Target | Future Path | | |
| Surprise | | | | |
| -3-month IRS | ++ (A) | + (A´) | + | 0 |
| -3-year KTB futures | + (B) | ++ (B´) | + | 0 |
| -KOSPI200 futures | - | - | + | 0 |
| Other Macro-Economic Variables | * | * | * | * |

Note: 1. Each signs refers to the direction of the impact of structural shocks on a particular variable. * means that no restrictions have been imposed, and zero means that the impact does not affect any particular variable.
2. ++, refers to the monotonicity restrictions, which means that $|{++}\ (A)| > |{+}(A')|$, $|{++}\ (B')| > |{+}(B)|$ based on the magnitude(in absolute value) of the impact on the variable.

surprises, while causing a decrease in the KOSPI200 futures surprises. In contrast, the positive central bank information shocks lead to an increase in the 3-month IRS, the 3-year KTB futures, and the KOSPI200 futures surprises. We impose the sign restrictions for the current period only and assume the zero restrictions for the rest of the period. Furthermore, we impose monotonicity restrictions to divide monetary policy shocks into the current policy target shock and the future policy path shocks according to the third assumption. Meanwhile, we do not impose any sign restrictions on the impact of each shock on other macroeconomic and financial variables.

The prior distributions for the VAR model are specified as a Normal distribution for the coefficient matrix, an Inverse Wishart distribution for the variance-covariance matrix of the error term, and a Normal-Inverse Wishart distribution for the joint probability distribution of both. The conditional posterior distributions of each parameters are estimated using the Gibbs sampling method, with a tightness of 0.2 and a lag decay of 1.5 among the hyperparameters. The specific identification procedure is as follows

(1) Estimate the variance-covariance matrix of the coefficients and error terms($\Sigma_u$) in the reduced form equation by Gibbs-sampling.
(2) Find a lower triangular matrix $P$ that satisfies the Cholesky decomposition $\Sigma_u = PP^T$ for the $i$ th $\Sigma_u$.
(3) Randomly extract a square matrix $Q$[24] which satisfies $QQ^T = I$.
(4) Estimate the structural model based on $H$, which satisfies $H = PQ$[25], and find the impulse response function.
(5) If the shock response satisfies the sign restrictions, store the $H$ and perform (3) for the $i+1$th $\Sigma_u$. If it does not satisfy the sign restrictions, perform (3) again for the $i$ th $\Sigma_u$.
(6) Repeat the above process to generate $N$ parameters that satisfy the sign restrictions. We set $N$ at 100,000 and focus on the median value when analyzing the results.

## B. Dates and times of announcements and press conferences

The time of the policy rate announcement is based on the first report from the Yonhap News Agency. The start time of the press conference is determined according to the BOK's weekly press schedule, and its duration is derived from the playback time of the video available on the BOK's website. Table 9 lists the dates and times of the policy rate announcements and the press conferences since 2021. For data from 2009 to 2020, see Ahn et al. (2021)

[24] To identify the structural shocks of the surprise vector, the elements of the 3×3 matrix are randomly drawn from the normal distribution, and a square matrix $Q^*$ is constructed by QR decomposition. The remaining area is composed of the zero matrix and the identity matrix which satisfies $\begin{bmatrix} Q^*_{3\times3} & 0 \\ 0 & 1 \end{bmatrix}$.

[25] Unlike $P$, $H$ is not a lower triangular matrix since $\Sigma_u = PP^T = PQQ^TP^T = HH^T$ is satisfied.

**[Table 9]** Dates and Times of Announcements and Press Conferences

| The MPB's policy-setting meeting dates | Time of announcement | Press Conference | |
|---|---|---|---|
| | | Starting time | Duration |
| 2021-01-15 | 09:40 | 11:20 | 42 |
| 2021-02-25 | 09:41 | 11:20 | 54 |
| 2021-04-15 | 09:50 | 11:20 | 48 |
| 2021-05-27 | 09:49 | 11:20 | 49 |
| 2021-07-15 | 09:47 | 11:20 | 48 |
| 2021-08-26 | 09:45 | 11:20 | 54 |
| 2021-10-12 | 09:48 | 11:20 | 44 |
| 2021-11-25 | 09:42 | 11:20 | 55 |
| 2022-01-14 | 09:39 | 11:20 | 56 |
| 2022-02-24 | 09:48 | 11:20 | 52 |
| 2022-04-14 | 09:47 | 11:20 | 45 |
| 2022-05-26 | 09:45 | 11:10 | 44 |
| 2022-07-13 | 09:50 | 11:10 | 49 |
| 2022-08-25 | 09:50 | 11:10 | 55 |
| 2022-10-12 | 09:50 | 11:10 | 48 |
| 2022-11-24 | 09:50 | 11:10 | 55 |

## C. Monetary policy surprise and risk premium

It is possible that the shocks we identified are influenced by risk premium.[26] We demonstrate that the risk premium has a limited impact on the 3-year KTB futures surprises in our baseline ($S_{1,t}^{LR} + S_{2,t}^{LR}$), and consequently, on the shocks themselves. In order to explore this, we construct the following regression using the methodology of Piazzesi and Swanson (2008).

$$y_t = \theta_0 + \theta_1 x_{1,t(-1)} + \theta_2 x_{2,t(-1)} + \theta_3 x_{3,t(-1)} + \theta_4 x_{4,t(-1)} + \theta_5 x_{5,t(-1)} + \varepsilon_t \tag{9}$$

$y_t$ = 3-year KTB futures surprise on the MPB's meeting days

$x_{1,t(-1)}$ = Term spread(1year -91days) on a day prior to the MPB meetings

$x_{2,t(-1)}$ = Term spread(3years -1year) on a day prior to the MPB meetings

$x_{3,t(-1)}$ = Term spread(5years -3years) on a day prior to the MPB meetings

$x_{4,t(-1)}$ = Term spread(10years -5years) on a day prior to the MPB meetings

[26] According to the identification method of Cieslak and Schrimpf (2019), which categorizes the risk premium into discount rate risk premium and cash flow risk premium, the future policy path shock and the central bank information shock in our study may also encompass risk-related factors. Cieslak and Schrimpf (2019) argues that the discount rate risk premium amplifies the risk premium of stocks and bonds, causing stock price and bond yield to move in opposite directions, which aligns with the sign restriction of the future policy path shock. Conversely, the cash flow risk premium induces comovement of stock price and bond yield, which corresponds to the sign restriction of the central bank information shock.

$x_{5,t(-1)}$ = Credit spread(Corporate Bond(AA-) - 3-year KTB) on a day prior to the MPB meetings

The long-term interest rate is determined by both the risk premium and the expected short-term interest rate. Similarly, the term spread, calculated on the day prior to the policy rate announcement, reflects both the risk premium and the financial markets' expectations regarding the future path of short-term interest rates. On the other hand, since 3-year KTB futures surprise is defined as independent of financial markets' expectation, it should theoretically remain unaffected by it. Therefore, if term spreads exhibit significance for 3-year KTB futures surprises, this would indicate an influence of the risk premium. The Equation 9 reflects this characteristic, allowing us to examine whether the surprises are influenced by the risk premium.

The OLS estimation of the Equation 9 is provided in Table 10. The results indicate that neither the coefficients for individual term spreads nor credit spreads are statistically significant, and the overall significance of the model is very low. This suggests that monetary policy surprises are not significantly affected by the risk premium.

**[Table 10]** OLS Estimates for Equation 6

| | 3-year KTB futures surprise | | | | |
|---|---|---|---|---|---|
| constant | 0.0041<br>(0.0042) | 0.0038<br>(0.0043) | -0.0069<br>(0.0086) | -0.0096<br>(0.0150) | -0.0116<br>(0.0157) |
| 1y-91days | -0.0215<br>(0.0199) | -0.0282<br>(0.0342) | -0.0342<br>(0.0347) | -0.0329<br>(0.0359) | -0.0351<br>(0.0370) |
| 3y -1y | | 0.0068<br>(0.0230) | -0.0178<br>(0.0318) | -0.0180<br>(0.0322) | -0.0188<br>(0.0323) |
| 5y-3y | | | 0.0732<br>(0.0538) | 0.0617<br>(0.0521) | 0.0566<br>(0.0564) |
| 10y-5y | | | | 0.0183<br>(0.0620) | 0.0212<br>(0.0627) |
| credit spread | | | | | 0.0052<br>(0.0161) |
| R-squared | 0.016 | 0.017 | 0.052 | 0.053 | 0.054 |

Note: Reporting the coefficient of Equation 9, Asteriks(*, **, ***) mean statistically significant at levels of 10%, 5%, and 1%, respectively. () is the robust standard error.

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# 고빈도 데이터를 이용한 통화정책 커뮤니케이션의 파급효과에 대한 연구: 한국의 사례를 중심으로*

안 중 섭** · 이 병 호*** · 김 주 완****

초 록

본 논문은 한국의 금융시장 고빈도 데이터를 이용해 중앙은행 커뮤니케이션의 영향을 분석한다. 이를 위해 통화정책방향 결정회의 당일 한국은행 기준금리 공표와 총재 기자간담회에 따른 금융시장의 반응을 기반으로 통화정책 서프라이즈(monetary surprise)를 측정한다. 통화정책 서프라이즈는 현재 정책금리, 향후 통화정책 경로라는 두 가지 유형의 통화정책 뉴스와 함께 경제상황에 대한 중앙은행의 평가와 관련된 뉴스를 포함한다. 이에 본 논문은 장단기 금리 및 주가지수 서프라이즈에 대한 부호제약(sign restriction)과 단조성 제약(monotonicity restriction)을 이용해 현재 정책금리 충격과 향후 정책경로 충격, 중앙은행 정보충격을 식별한다. 실증분석 결과 향후 정책경로 충격은 현재 정책금리 충격보다 경제에 더 큰 영향을 미치는 것으로 분석되었으며, 두 가지 유형의 통화정책 충격은 때때로 상반된 부호를 가지는 것으로 나타났다.

**핵심 주제어: 통화정책, 중앙은행 커뮤니케이션, 고빈도 식별**
**경제학문헌목록 주제분류: E43, E52, E58**

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