



CAN CENTRAL BANK COMMUNICATION HELP STABILISE INFLATION EXPECTATIONS? A TEXTUAL ANALYSIS PERSPECTIVE

Key points

- *Effective central bank communication is important for anchoring inflation expectations and strengthening monetary policy transmission. This study investigates the influence of Asia Pacific central banks' forward guidance on near-term inflation expectations.*
- *A novel natural language processing (NLP) methodology is applied to derive indices capturing the sentiment, context and temporal orientation of forward guidance. A composite index is then constructed based on these NLP-derived indices and used as the main explanatory variable in a panel regression. The dependent variables are deviations of the general public and professional forecasters' inflation expectations from central banks' inflation targets.*
- *The results show that (1) a more emphatically positive forward guidance emphasising price stability can help anchor expectations when inflation deviates from the target, with the effect being proportional to the size of the deviation; and (2) compared to professionals, the general public exhibits stronger reactions to both inflation developments and communication.*
- *This underscores the importance of central banks tailoring messaging to different audiences through clear explanations to strengthen expectation anchoring, especially among non-experts. The findings support continued investments in strategic communication to aid monetary policy transmission.*

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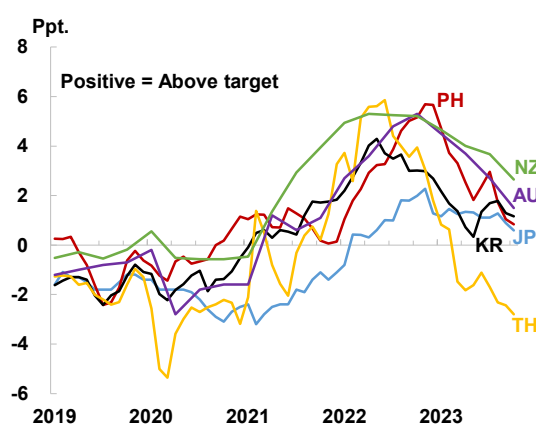
The views and analysis expressed in this paper are those of the authors, and do not necessarily represent the views of the Hong Kong Monetary Authority.

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I. INTRODUCTION

The global economy faced a surge in inflation during 2021-2022. The price pressure was driven largely by supply chain disruptions stemming from the COVID-19 pandemic and heightened geopolitical tensions arising from the Russian-Ukraine conflicts. These challenges collectively pushed inflation well beyond the inflation targets set by central banks in the Asia Pacific region (Chart 1).

Chart 1. Deviation of headline inflation from central bank's target



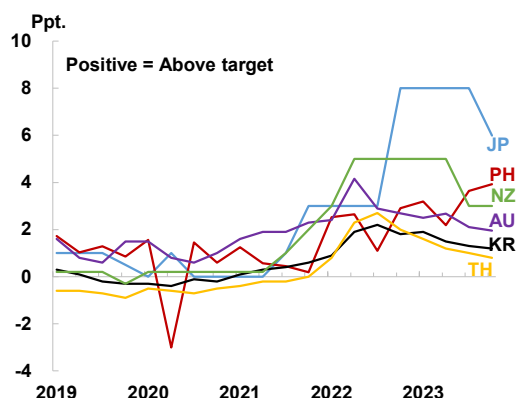
Note: The chart shows the difference between actual year-on-year headline inflation and the central bank's inflation target. For those with a target range, the median of the range is used in the calculation.

Sources: CEIC and HKMA staff calculation.

During the period of heightened inflation, both professional forecasters and the general public have swiftly adjusted their near-term inflation expectations, signalling apprehensions that inflation may persist at uncomfortably high levels (Chart 2). These upward revisions in inflation expectations are likely to influence decisions related to saving, investment, consumption, and the demand for wage growth, consequently exacerbating inflation. Notably, service inflation, being more sensitive to labour market conditions, increased substantially in 2022 and remained at elevated levels in 2023 even as goods inflation receded, partly reflecting the heightened price pressures stemming from the elevated expectations.

Chart 2. Deviation of inflation expectations from central bank's target

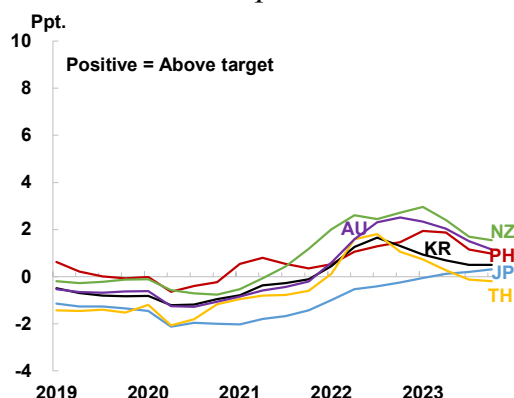
a. Households' expectations



Note: The chart shows the difference between households'/consumers' headline inflation expectations over the next 12 months and the central bank's inflation target. For those with a target range, the median of the range is used in the calculation.

Sources: CEIC and HKMA staff calculation.

b. Market economists' expectations

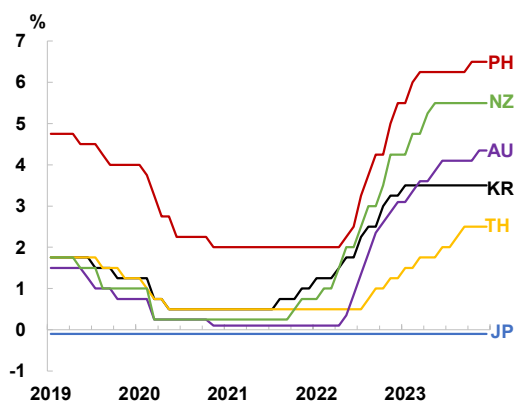


Note: The chart shows the difference between market economists' headline inflation expectations over the next 12 months and the central bank's inflation target. For those with a target range, the median of the range is used in the calculation.

Sources: CEIC, Consensus Forecasts and HKMA staff calculation.

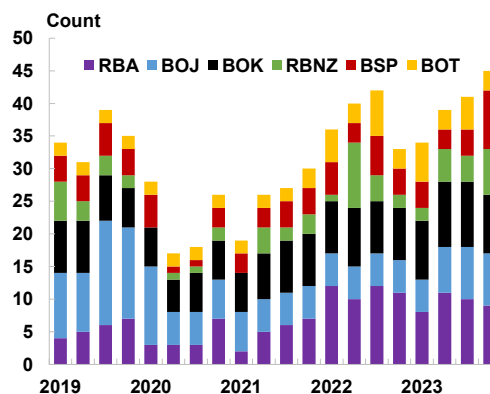
In response to the rising inflationary pressure and expectations, global central banks, including those in the Asia Pacific region, rapidly tightened their monetary policy with communication in their policy statements that focused on bringing inflation “back to normal” (Chart 3 and Chart 4). The mix of fast policy tightening and judicious communication appeared to be effective, as inflation and inflation expectations finally stabilised and began to moderate in 2023.

Chart 3. Policy interest rate



Source: BIS.

Chart 4. Occurrence of words related to inflation in forward guidance



Note: Words related to inflation are “inflation”, “price” and “CPI”. Forward guidance is that part in the post-meeting monetary policy decision statement that signals the future policy inclination. Footnote 1 provides more discussion on this.

Sources: Central banks and HKMA staff calculation.

Recent literature suggests that by fostering an increase in the share of forward-looking learners in the economy, improvements in monetary policy frameworks and central bank communication strategies can speed up the return of inflation to the target while minimising the impact on overall economic output (IMF, 2023). To contribute more concrete and detailed evidence to support this idea with the experience of Asia Pacific economies, our study aims to investigate if the statements made by inflation-targeting central banks in Asia Pacific economies, particularly the part indicating the future policy direction (i.e. the forward guidance), would have an impact on inflation expectations.¹ Specifically, we aim to answer two questions: (1) *Does this impact vary between professional forecasters and the general public?* (2) *Does this impact vary proportionately to the extent of the deviation of inflation from the target?*

¹ This study focuses on the forward guidance in central bank policy statements. While the definition of "forward guidance" may vary across contexts, we define it as the paragraphs or sentences in post-meeting statements that provide an indication of the future path or inclination of monetary policy (Shirai, 2013). This particular aspect of the statements is directly related to our research questions since, among other elements in policy statements, only the forward guidance section aims to enhance the predictability of upcoming monetary policy actions. By reducing uncertainty about future policy moves, forward guidance seeks to better inform and steer inflation expectations over the outlook period. This study examines how variations in the language and clarity of forward guidance influence expectations.

To answer these questions, we estimate the determinants of deviation of inflation expectations of professional forecasters and the general public from the central bank's target. The key explanatory variable is an *index that measures the level of commitment to price stability as indicated in the central bank's policy statements*. This index is derived from a prominent natural language processing (NLP) model.

The paper is structured as follows: Section 2 provides a literature review on the role of policy communication in shaping expectations. Section 3 discusses the concept of method and data. In Section 4, we introduce the NLP model and the derived index, which captures the central banks' commitment to maintaining price stability. Section 5 discusses the key results. Section 6 concludes. Details of empirical method and estimation results are presented in the appendices.

II. THE ROLE OF POLICY COMMUNICATION IN SHAPING EXPECTATIONS: RELATED LITERATURE

Over the years, studies underscored the importance of clear central banks communication in enhancing policy effectiveness (Posen et al., 1998; Blinder, 1999), steering market expectations and thus improving monetary policy predictability (Blinder et al., 2008; Woodford, 2012). The predictability of monetary policy has crucial macro-financial implications as the expectations theory of the term structure explained the role of expected short-term interest rates (which are largely influenced by monetary policy interest rates) in shaping the long-term rate. As a result, better communication was increasingly seen as a gateway to strengthening the connection between the central bank's policy rate and the medium- and long-term interest rates, which play a key role in influencing decisions related to saving and investment.

Meanwhile, the widespread adoption of inflation targeting in the 1990s drew increased attention to monetary policy communication. As more studies refined the pivotal role of a clear communication strategy in achieving the mandate of inflation targeting (Bernanke, 2003), inflation-targeting central banks gradually revealed more information about their monetary policy. In this regard, the Fed published its first post-meeting policy decisions statement in

February 1994. Many other central banks, including those in the Asia Pacific region, also issued a policy statement shortly after each policy meeting in the 1990s. Since then, policy statements have continued to evolve, endeavouring to articulate policies and goals with increasing clarity.

A well-written policy statement should encompass a clearly defined target, articulate the strategic approach to achieving this target, and provide a comprehensive overview of the latest economic developments (Blinder et al., 2001; Casiraghi and Perez, 2022). Within the realm of an inflation targeting regime, the narrative becomes particularly critical (Adrian et al., 2018). The communication strategy should not only be sufficiently tied to inflation but should also adopt a forward-looking stance, offering insights that extend beyond the immediate horizon, fostering an environment conducive to a stable economic outlook. In addition, while the credibility established on the central bank's track record is a key to effective communication (De Fiore et al. 2022), the tone of the policy statement is also influential to readers' perception of the current macro-financial situations and their expectations to future monetary policy decisions (Hubert and Labondance, 2021). In this regard, policy statements should exude a confident and positive tonality, emphasising the ability to effectively manage inflationary or deflationary pressures and steering it back towards the target.

However, it is challenging for central banks to include all elements in the policy statements. Striking the right balance is not easy since an overly detailed statement risks becoming scattered and hard to grasp, while an overly simplified one may lead to misunderstandings, disrupting the transmission of policy decisions. Another hurdle is determining the intended audience for these statements. Professional economists and market analysts, who possess economic and financial literacy, may find it easier to comprehend the reasoning and implications of policy decisions. In contrast, ordinary individuals may only become more attentive when facing exceptionally high inflation (Coibion et al., 2022). Consequently, the same sentence in a policy statement can carry varying implications for different readers (Huang and Simon, 2021).

Compared to the studies on the impact of central bank communications on inflation expectations of professional forecasters, there are fewer studies that have looked into the impact on general public inflation expectations. This study contributes to the literature by exploring how policy statements, particularly forward guidance, distinctly influence near-term inflation expectations among professionals and the general public.

III. CONCEPTUAL FRAMEWORK AND METHODOLOGY

We use a panel data regression to estimate the effect of central bank policy communication on inflation expectations. To examine the different impacts of central bank communication on professional forecasters and the general public, we consider two types of inflation expectations in the regression. The first relates to inflation expectations of the general public which are primarily obtained from household surveys or consumer surveys. The second represents inflation expectations of professional forecasters and are derived from regular surveys conducted among market economists.

The following key explanatory variables are incorporated in the model:

- i. The NLP-derived index that measures the central bank's confidence to maintain price stability as expressed in its policy statement. A higher value of this index indicates a stronger confidence accompanied with a more positive sentiment to maintain price stability in the future.²
- ii. The deviation of actual inflation from the central bank's inflation target.
- iii. The interaction between the NLP-derived index and the actual-target deviation, which captures how inflation expectations respond to central banks' forward guidance under varying levels of inflationary pressures. This interaction term captures both the magnitude and direction of the impact of forward guidance on inflation anchoring.

Table 1 shows the expected estimation results and the underlying rationale. In brief, to address our research question, we will focus on the estimated coefficient of the interaction term.

This study analyses inflation targeting economies in the Asia Pacific region that collect surveys on inflation expectations amongst consumers and professional forecasters. The consumer surveys queried household respondents on their expectations for "the inflation rate over the next 12 months". Meanwhile, the professional forecaster surveys conducted by Consensus Forecasts polled market economists on their inflation outlook. To generate an NLP-derived index of central bank communications, this study requires English versions of policy statements issued by the central banks shortly after every

² Details of the construction of this index will be discussed in the next section.

monetary policy meeting.³ The sample therefore includes Australia, Japan, South Korea, New Zealand, the Philippines and Thailand.

All data series were transformed to a quarterly frequency to ensure temporal alignment across economies and variables. The availability of policy statements and expectations data constrained the balanced panel sample to Q2 2016 through Q3 2023. Whilst not spanning decades, this sample period encompassed notable shifts in inflation dynamics - from persistently low inflation predating late 2021, to sharply rising inflationary pressures from late 2021 through early 2023, followed by a gradual moderation. Such variation across inflationary regimes strengthened the power of empirical tests to discern the effects of communication on expectations formation.⁴

³ The requirement for an English version policy statement is due to the need for fair comparison of central banks' communications. Even though NLP models can process multiple languages, the scoring may not be consistent across languages. In addition, we believe that professional forecasters generally take English materials as their primary reference.

⁴ As a robustness check, an unbalanced panel was also estimated starting in Q1 2013. It is presented in Appendix 2.

Table 1. Expected sign of coefficients with rationale

Variable	Estimated coefficient		Rationale
	Sign	Magnitude	
The actual-target deviation	Positive	Public > Professionals	Inflation expectations tend to become more disanchored if actual inflation deviates further from the target. Also, without professional knowledge, the general public tend to react more strongly than professionals, as indicated in Chart 2.
Interaction between the NLP-derived index and the actual-target deviation	Negative	Public > Professionals	When the level of actual inflation is far from a central bank's inflation target, a clearly expressed commitment to price stabilisation in the policy statement could help anchoring inflation expectations. Without professional knowledge, the general public tend to react more strongly than professionals.
The NLP-derived index	Positive or Negative	-	The NLP derived index provides an insight into the central bank's commitment to maintaining price stability, without specifying the direction of that commitment. As a result, the estimated coefficient of this index alone in the model lacks meaningful interpretation when central banks attempt to re-anchor public inflation expectation. Instead, our emphasis should be on the interaction term between the NLP-derived index and the deviation from the inflation target.

Source: HKMA staff.

IV. APPLYING THE NATURAL LANGUAGE PROCESSING MODEL TO POLICY STATEMENTS

To quantify the *sentiment*, *context* and *temporal orientation* of central bank monetary policy statements, this study employs a natural language processing model called Bidirectional Encoder Representations from Transformers (BERT), which is one of the state-of-the-art language model that compatible with human performance.⁵ BERT is a pre-trained small language model that utilises bidirectional training of Transformer blocks to learn deep contextual representations of language. To conduct the context analysis, selected text segments containing near-term policy directions from central bank monetary policy statements (i.e. forward guidance)⁶ were input to the NLP model to estimate three indexes:

- i. *Net sentiment index (NP_t)*: The model assigned probability scores to indicate the likelihood that the tone and sentiment expressed in the forward guidance is positive (pos_t), negative (neg_t) or neutral (neu_t). The three scores sum up to 1. Then we calculate $pos_t - neg_t$ to give the net positive sentiment index, which ranges between -1 and 1.

We take the net sentiment score because we want to give a comparative measure of relative positive versus negative tones and remove the potential misperception due to neutral sentiment. This better reflects a statement's overall tone than just looking at the raw sentiment score alone. As an illustration, Table 2 lists the NLP-derived sentiment scores from two statements. While both statements have a positive sentiment score of 0.2, they have different neutral and raw negative sentiment scores. As a result, the first statement would have a net positive sentiment score of $0.2 - 0 = 0.2$; while the second statement would have a net positive sentiment score of $0.2 - 0.8 = -0.6$, which is less positive than the first one.

⁵ The version of BERT model we adopted in this paper is DeBERTaV3 model, which is enhanced by He et al. (2022). According to SuperGLUE leaderboard, the performance of DeBERTa model surpass the human baselines score.

⁶ These sentences are mostly located in the last few paragraphs of policy statements.

Table 2. Hypothetical illustration of the net sentiment score

	Positive	Neutral	Negative	Net positive
<i>Statement 1</i>	0.2	0.8	0	0.2
<i>Statement 2</i>	0.2	0	0.8	-0.6

Source: HKMA staff calculation.

- ii. *Inflation relevance index (INF_t)*: A 0 to 1 score that represents the probability the sentences discuss matters concerning inflation such as price trends, the inflation outlook or inflation target.
- iii. *Forward-looking index (FWD_t)*: A 0 to 1 score that represents how forward-lookingness of the language and views presented in sentences.⁷

A composite index (S_t) between -1 and 1 is then set up based on these three indices using the following formula:

$$S_t = NP_t \times INF_t \times FWD_t \quad (1)$$

By construction, any sentence or paragraph with more emphatically positive language that strongly discusses inflation and future views will have higher composite values. This composite index quantifies the sentiment, content and temporal orientation of the forward guidance in a simple metric. Using this index as an explanatory variable in estimating Equation 1 is preferable to directly using the three individual NLP-derived indexes (i.e. NP_t , INF_t and FWD_t) as explanatory variables, as it could reduce the problem of multicollinearity, keep the model parsimonious and avoid oversimplifying the underlying meaning of the policy direction.⁸

Appendix 1 shows some examples of the derived net sentiment index (NP_t), inflation relevance index (INF_t) and forward-looking index (FWD_t) based on the corresponding policy statements of regional central banks.

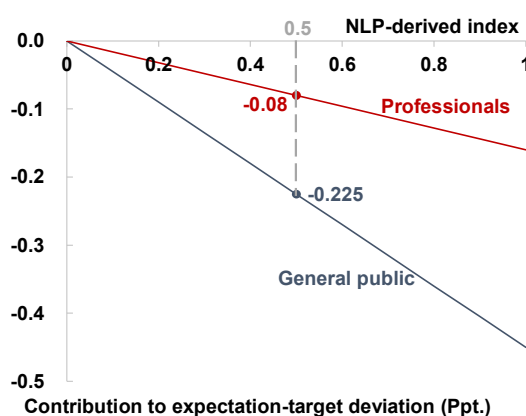
⁷ The context and time horizon dimensions involved single categorical choices (i.e. inflation vs. non-inflation; forward-looking vs. non-forward-looking) so raw scores (i.e. not net score as that of net sentiment score) were used. This approach aims to consistently represent the key dimensions across statements.

⁸ We also estimate the model with these three indexes as a robustness check and this is presented in Appendix 2.

V. KEY RESULTS

The empirical results are in line with expectations.⁹ Chart 5 depicts the marginal effect of changes in the NLP-derived index on inflation expectations when actual inflation is one percentage point above the central bank's target. As shown, compared to professional forecasters (red line), the general public (dark blue line) demonstrates a stronger reaction to the forward guidance. For instance, when the NLP-derived index equals 0.5 in the current quarter and actual inflation is one percentage point above the central bank's target, the deviation between expectations and the target will narrow by approximately 0.225 and 0.08 percentage points for the general public and professional forecasters, respectively in the next quarter.

Chart 5. Marginal effect of forward guidance on inflation expectations (actual-target deviation = 1 ppt.)



Source: HKMA staff estimate.

In sum, there are two key results from the estimation. **First, for both the general public and professional forecasters, a forward guidance with more emphatically positive tone focusing on maintaining price stability and with future views could narrow the gap between inflation expectations and the central bank's inflation target. The size of this effect depends on the extent to which the actual inflation deviates from the target.** Our results suggest that when the actual inflation rate exceeds the central bank's target, a forward guidance with a positive tone on inflation can help to contain both the inflation expectations of the general public and market economists. The

⁹ Details can be found in Appendix 2.

magnitude of this effect is proportional to the magnitude of the deviation. Conversely, the same holds true when the actual inflation rate falls below the central bank's target.

Second, compared to professional forecasters, the general public exhibits a stronger reaction to both inflation deviations from the target and the forward guidance. There are a few plausible explanations for this phenomenon. One reason is that the general public typically has higher inflation expectations than professional forecasters (De Fiore et al., 2022). As such, it is not unnatural that the general public would display a stronger reaction than professional forecasters.¹⁰ Another reason is that market economists rely on their technical expertise and employ empirical models to generate inflation forecasts.¹¹ On the other hand, households and ordinary consumers tend to assess inflation based on their daily experiences and express their expectations in rounded numbers or notches (e.g., "about 5%," "less than 3%") (Rieche and Meyler, 2022; Pizzineli, 2022). This less precise inflation expectation may contribute to a greater level of sensitivity and potentially more significant reactions to changes in inflation.¹²

VI. CONCLUSION AND POLICY IMPLICATIONS

This study examined the impact of central bank communication on inflation expectations among professional forecasters and the general public in Asia Pacific economies. Employing a novel NLP approach, we quantified three key components (i.e. sentiment, context and temporal orientation) of central bank' forward guidance in their post-meeting policy statements.

The empirical findings suggest that a more emphatically positive communication focusing on maintaining price stability in future can help anchor inflation expectations when actual inflation deviates from target. Our robustness checks also reveal that an effective forward guidance should contain all three key components.

¹⁰ To account for the generally higher average values of inflation expectations of the general public relative to professional forecasts, we carry out a robustness check using the standardized expectation-target deviation as the dependent variable. See Appendix 2 for details.

¹¹ For example, the estimation results demonstrate that the output gap affects professional forecasters' inflation expectations, while it has no impact on the inflation expectations of the general public.

¹² This result is consistent with Easaw et al. (2013) which found that households tend to overreact to professional forecasts when updating inflation expectations.

Notably, the general public exhibits a stronger reaction to both inflation developments and central bank communication compared to professional forecasters. This underscores the important role communication plays in keeping inflation expectations well-anchored, especially among non-expert audiences.

Three policy implications can be drawn from the results. **First, central banks should continue emphasising their commitment to price stability through consistent, proactive messaging as part of their communication strategy.** A confident, balanced tone acknowledging both risks and progress can boost the credibility of their inflation-targeting mandate. Forward guidance stating a planned policy path in definitive terms, linked to achievement of targets, is effective.

Second, it is important to tailor the communication to different audiences. Supplementing policy statements with plain language summaries, infographics and briefings can help the general public stay attentive. Outreach through multiple platforms, such as social media seeding, to diverse communities would be helpful.

Third, the findings support the need for central banks to continue investing in strategic communication narratives and public awareness initiatives to strengthen the effectiveness of monetary policy transmission.

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Appendix 1. Examples of NLP-derived indices

To demonstrate how the NLP methodology captured differences in forward guidance messages, we provide examples of the derived net sentiment index (NP_t), inflation relevance index (INF_t) and forward-looking index (FWD_t) accompanied by excerpts of the corresponding forward guidance text.

Table A1 shows the forward guidance part extracted from the two post-meeting announcements from the Reserve Bank of New Zealand (RBNZ) in August and October 2023. The phrases or keywords that are likely attributing to the difference in scores between these two statements are highlighted. According to the NLP-derived sentiment index, the forward guidance in the post-meeting announcement in August 2023 is more positive than that in the October post-meeting statement. This may be due to the word “*confident*” used in the August statement, which suggests a strong belief that rates remaining restrictive will achieve the goals, conveying more optimism. Also, the August statement says inflation “*will return*” to the target range, which sounds definitive. In contrast, the October statement states, “*the OCR needs to stay at a restrictive level to ensure that annual inflation returns*”, which is more cautious and conditional.

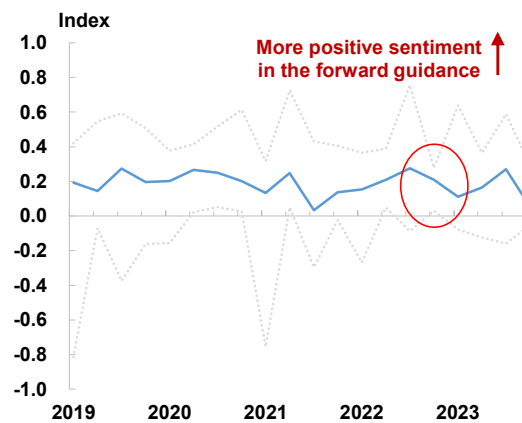
Table A1. Examples of net sentiment index (NP_t) of forward guidance

Date	Forward guidance	Sentiment score
16 Aug 2023	<p>“The Committee <i>is confident</i> that with interest rates remaining at a restrictive level for some time, consumer price inflation <i>will return to</i> within its target range of 1 to 3% per annum, <i>while supporting</i> maximum sustainable employment.”</p> <p>(Press statement of OCR announcement, RBNZ)</p>	<p>pos_t: 0.60 neg_t: 0.14 neu_t: 0.26 NP_t: 0.44</p>
4 Oct 2023	<p>“The Committee <i>agreed</i> that the OCR needs to stay at a restrictive level <i>to ensure</i> that annual consumer price inflation returns to the 1 to 3% target range and <i>to support</i> maximum sustainable employment.”</p> <p>(Press statement of OCR announcement, RBNZ)</p>	<p>pos_t: 0.27 neg_t: 0.35 neu_t: 0.38 NP_t: -0.09</p>

Sources: RBNZ and HKMA staff estimation.

Chart A1 shows the estimated NP_t . The blue line is the median among six Asia Pacific economies. The grey dotted lines show the maximum and minimum values. As shown, the underlying tone of forward guidance has been barely positive since 2019, with the median value hovering around 0.2 for most periods. The index fell in the second half of 2022 and early 2023, as shown by the red circle in the chart, possibly reflecting heightened concern expressed in the forward guidance over rising inflation and uncertainties during that time.

Chart A1. Estimated net sentiment index (NP_t)



Source: HKMA staff estimation.

Table A2 presents the forward guidance from two post-meeting announcements by the Bank of Korea (BOK) in April and May 2022. The phrases or keywords that are likely attributing to the difference in scores between these two statements are highlighted. The NLP-derived inflation relevance index score for the May statement is 0.92, higher than the April statement (0.63). This difference can potentially be attributed to the May guidance explicitly stating monetary policy will place “*more emphasis on inflation for some time*” and prioritising the “*trends of growth and inflation*” when adjusting the policy stance. In comparison, the April statement does not explicitly emphasise inflation control or reference the inflation target. It also weighs other factors before inflation and economic growth in its monetary policy signal. This level of specificity regarding the inflation mandate yields a higher relevance index score for the May announcement.

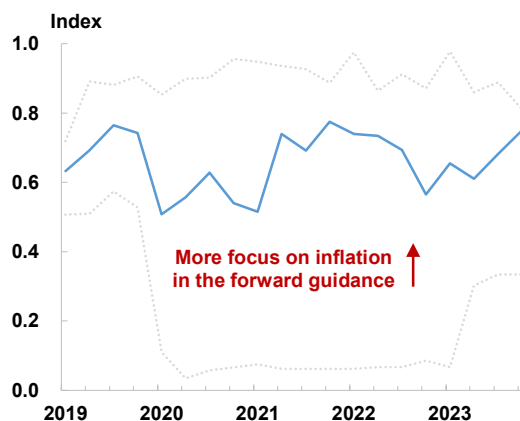
Table A2. Examples of inflation relevance index (INF_t) of forward guidance

Date	Forward guidance	INF_t score
14 Apr 2022	<p><i>“The Board will continue to conduct monetary policy in order to sustain the recovery of economic growth and stabilize consumer price inflation at the target level over a medium-term horizon, while paying attention to financial stability. The Board will appropriately adjust the degree of monetary policy accommodation as the Korean economy is expected to continue its recovery and inflation to run above the target level for a considerable time, despite underlying uncertainties in domestic and external conditions. In this process the Board will judge when to further adjust the degree of accommodation while thoroughly assessing developments related to <u>COVID-19, the risk of a buildup of financial imbalances, monetary policy changes in major countries, geopolitical risks, and the trends of growth and inflation.</u>”</i></p> <p><i>(Press statement of monetary policy decision, BOK)</i></p>	0.63
26 May 2022	<p><i>“The Board will continue to conduct monetary policy in order to sustain the recovery of economic growth and stabilize consumer price inflation at the target level over a medium-term horizon, while paying attention to financial stability. The Board sees it as warranted to conduct monetary policy with more emphasis on inflation for some time, as the Korean economy is expected to continue its recovery and inflation to run above the target level for a considerable time, despite underlying uncertainties in domestic and external conditions. In this process the Board will judge when to further adjust the degree of accommodation while thoroughly assessing the trends of growth and inflation, the risk of a buildup of financial imbalances, monetary policy changes in major countries, and external economic conditions including geopolitical risks.”</i></p> <p><i>(Press statement of monetary policy decision, BOK)</i></p>	0.92

Sources: BOK and HKMA staff estimation.

Chart A2 shows the estimated INF_t plotted with the same settings as in Chart A1. As the chart shows, the forward guidance of regional central banks has consistently focused on inflation, as the index remained above 0.6 for most periods. The index trended upward from late 2022 and onwards amid elevated inflationary pressures.

Chart A2. Estimated inflation relevance index (INF_t)



Source: HKMA staff estimation.

Table A3 presents the forward guidance from two post-meeting announcements by the Bank of Thailand (BOT) in May and August 2023. The phrases or keywords that are likely attributing to the difference in scores between these two statements are highlighted. The NLP-model suggests that the August statement is more forward-looking about the monetary policy path. It may be because the August statement explicitly references “*deliberating further policy rate increases looking ahead*” directly orienting the statement towards upcoming adjustments to rates. It also frames policy decisions around longer-term goals of inflation stability and macroeconomic stability.

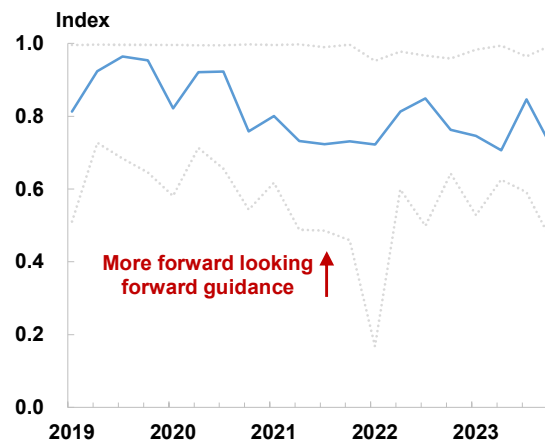
Table A3. Examples of forward-looking index (FWD_t) of forward guidance

Date	Forward guidance	FWD_t score
31 May 2023	<p><i>“Under the prevailing monetary policy framework, the Committee seeks to maintain price stability, support sustainable growth in line with potential, and preserve financial stability. In the view of these objectives, the Committee expects a steady economic expansion but sees a need to monitor upside risks to inflation. The Committee thus decided to increase the policy interest rate to normalize the monetary policy stance in a gradual and measured manner towards a level consistent with long-term sustainable growth. The Committee is prepared to adjust the size and timing of policy normalization should the evolving growth and inflation outlook differ from the current assessment.”</i></p> <p><i>(Press statement of monetary policy decision, BOT)</i></p>	0.67
2 Aug 2023	<p><i>“Under the prevailing monetary policy framework, the Committee seeks to maintain price stability, support sustainable growth in line with potential, and preserve financial stability. In view of these objectives, the Committee expects a continuing economic expansion and narrowing slack. Inflation is expected to stabilize within the target range, with upside risks that still warrant monitoring. Against such backdrop, monetary policy should continue to ensure that inflation stays sustainably within the target range as well as give due consideration to macro-financial stability in the longer term. In deliberating further policy rate increases looking ahead, the Committee will take into account economic and inflation outlook as well as associated risk assessments.”</i></p> <p><i>(Press statement of monetary policy decision, BOT)</i></p>	0.96

Sources: BOT and HKMA staff estimation.

Chart A3 shows the estimated FWD_t plotted with the same settings as in Chart A1 and Chart A2. As shown, the forward guidance of regional central banks has been forward looking enough as the index has hovered around 0.8 for most periods.

Chart A3. Estimated forward-looking index (FWD_t)



Source: HKMA staff estimation.

Appendix 2. Empirical method and results

We employ a fixed effect panel regression model to examine the impact of central bank communication on inflation expectations. The model can be written as Equation (A1):

$$\mathbf{Disanchor}_{i,t} = \alpha + \beta_1 \mathbf{Comm}_{i,t-1} + \beta_2 \mathbf{DisTarget}_{i,t-1} + \beta_3 \mathbf{Comm}_{i,t-1} \times \mathbf{DisTarget}_{i,t-1} + \sum_{h=1}^n \theta_h \mathbf{control}_{h,i,t-1} + \gamma_i + \mathbf{e}_{i,t} \quad (\text{A1})$$

The dependent variable, denoted as $\mathbf{Disanchor}_{i,t}$, represents the deviation of inflation expectations from the inflation target (i.e. $\pi_{i,t}^{EXP} - \pi_{i,t}^{Target}$). The NLP-derived index, $\mathbf{Comm}_{i,t}$, measures the central bank's confidence to maintain price stability as expressed in its policy statement. A higher value of this index indicates a stronger confidence accompanied with a more positive sentiment to maintain price stability in the future. $\mathbf{DisTarget}_{i,t}$ is the deviation of actual inflation from the inflation target (i.e. $\pi_{i,t} - \pi_{i,t}^{Target}$). The interaction term between $\mathbf{Comm}_{i,t}$ and $\mathbf{DisTarget}_{i,t}$ captures how inflation expectations respond to central bank forward guidance under varying levels of inflationary pressures. We also include a set of h control variables ($\mathbf{control}_{h,i,t}$), including output gap and changes in crude oil and food prices. Finally, γ_i represents the economy fixed effect. All explanatory variables lag the dependent variable by one quarter.

To examine the different impact of central bank communication on professional forecasters and the general public, we consider two types of inflation expectations in our analysis. The first type pertains to the general public and is obtained mainly from household surveys or consumer surveys. The second type represents professional forecasters and is obtained from regular surveys conducted among market economists.¹³

¹³ These surveys offer various forecast horizons, but we focus on the one-year ahead inflation expectations for several reasons. Firstly, this horizon is the most commonly available in the majority of surveys. Secondly, recent studies have indicated that the one-year ahead household inflation expectations are more responsive to current inflation developments compared to longer-term horizons. Moreover, they have also demonstrated that these expectations can serve as a predictor of inflation (Gornicka et al., 2022; Brandão-Marques, 2023).

This study analyses inflation targeting economies in the Asia Pacific region that collect surveys on inflation expectations amongst consumers and professional forecasters. The professional forecaster surveys conducted by Consensus Forecasts polled market economists on their “current year” and “next year” inflation outlook on a monthly basis. We transformed them into expectations for “the inflation rate over the next 12 months” by a simple weighting scheme. To generate an NLP-derived index of central bank communications, this study also requires English versions of policy statements issued by the central banks shortly after every monetary policy meeting. The sample therefore includes Australia, Japan, South Korea, New Zealand, the Philippines and Thailand.

All data series were transformed to a quarterly frequency to ensure temporal alignment across economies and variables. The availability of policy statements and expectations data constrained the balanced panel sample to Q2 2016 through Q3 2023.

Table A4 presents the estimation results of Equation A1. Column 1 displays the estimations using the deviation of general public inflation expectations from the inflation target as the dependent variable, while Column 2 presents the estimations for professional forecasters. The results align with the expected signs of the key estimated coefficients as shown in Table 1. The positive coefficient of $DisTarget_{i,t-1}$ in both Column 1 and Column 2 confirms the intuition that as actual inflation deviates further from the central bank's target, inflation expectations would become more disanchored.

To check the robustness of the estimation results, we re-estimate Equation A1 with modifications: (1) using lengthened but unbalanced panel data sample covers the periods of Q1 2013 – Q3 2023; (2) using the upper and lower bounds of the inflation target range in the calculation of the expectation-target deviation and the actual-target deviation (3) replacing the original dependent variable with the standardised expectation-target deviation and (4) replacing the composite NPL-derived index by the three component indices (i.e. NP_t , INF_t and FWD_t) in the estimation.

Column 3 and Column 4 in Table A4 present the estimation results with a lengthened but unbalanced panel data sample starting from 2013. As shown, the estimated coefficients of the interaction term $Comm_{i,t-1} \times DisTarget_{i,t-1}$ are negative. Additionally, comparing the estimation for general public to the

estimation for professional forecasters, the magnitudes of the estimated coefficient of $DisTarget_{i,t-1}$ and $Comm_{i,t-1} \times DisTarget_{i,t-1}$ are larger in the general public specification. These results are consistent with those of the baseline estimations.

Similarly, Column 5 to Column 8 in Table A4 present the estimation results using the upper and lower bounds of the inflation target range respectively in the calculation of the dependent variable ($\pi_{i,t}^{EXP} - \pi_{i,t}^{Target}$) and explanatory variables ($DisTarget_{i,t-1}$). All of these modifications produce negative estimated coefficients of the interaction term $Comm_{i,t-1} \times DisTarget_{i,t-1}$, with the general public specification yielding larger magnitudes of the estimated coefficients of $DisTarget_{i,t-1}$ and $Comm_{i,t-1} \times DisTarget_{i,t-1}$. This suggests that our key results are generally robust.

Column 9 and Column 10 in Table A4 show the results using the standardised expectation-target deviation (i.e. z-score of $\pi_{i,t}^{EXP} - \pi_{i,t}^{Target}$) as the dependent variable. This scaling helps account for generally higher average values seen in surveys of the general public expectations relative to professional forecasts. The estimated coefficient of the interaction term $Comm_{i,t-1} \times DisTarget_{i,t-1}$ in both specifications are negative and the magnitude of this coefficient in the general public specification is larger than that in the professional forecasters specification. Thus, the general public still reacts more to the forward guidance than professional forecasters.

Table A5 shows the results using the three component indices (i.e. NP_t , INF_t and FWD_t) in the estimation. All of them produce negative estimated coefficients of $DisTarget_{i,t-1}$ and the interaction term ($K_{i,t-1} \times DisTarget_{i,t-1}$), and the general public specification yielding larger magnitudes of these estimated coefficients. However, the estimated coefficients of the interaction term are not significant in half of these specifications (Column 1, Column 4 and Column 5), possibly reflecting that any single component of information contained in S_t may not be sufficient for readers to adjust their inflation expectations.

Table A4. Baseline estimation and robustness checks 1 - 3

	Baseline estimations		Robustness checks 1, 2 and 3							
			<i>Lengthened data</i>		<i>Using upper bound of inflation target</i>		<i>Using lower bound of inflation target</i>		<i>Using z-score of $\pi_{i,t}^{EXP} - \pi_{i,t}^{Target}$</i>	
	(1) <i>General public</i>	(2) <i>Prof. forecasters</i>	(3) <i>General public</i>	(4) <i>Prof. forecasters</i>	(5) <i>General public</i>	(6) <i>Prof. forecasters</i>	(7) <i>General public</i>	(8) <i>Prof. forecasters</i>	(9) <i>General public</i>	(10) <i>Prof. forecasters</i>
<i>Comm</i>_{<i>i,t-1</i>}	0.36 [0.35]	-0.04 [0.11]	-0.44 [0.30]	0.40** [0.18]	-0.06 [0.40]	-0.22 [0.18]	0.95** [0.44]	0.21* [0.12]	-0.1 [0.19]	0.24* [0.14]
<i>DisTarget</i>_{<i>i,t-1</i>}	0.63*** [0.04]	0.47*** [0.01]	0.53*** [0.05]	0.45*** [0.01]	0.62*** [0.04]	0.47*** [0.01]	0.64*** [0.05]	0.46*** [0.01]	0.46*** [0.02]	0.49*** [0.01]
<i>Comm</i>_{<i>i,t-1</i>} × <i>DisTarget</i>_{<i>i,t-1</i>}	-0.45** [0.22]	-0.16*** [0.06]	-0.40** [0.20]	-0.22*** [0.07]	-0.36** [0.20]	-0.22* [0.07]	-0.53** [0.24]	-0.19*** [0.06]	-0.17 [0.14]	-0.11 [0.08]
<i>Ygap</i>_{<i>i,t-1</i>}	0.01 [0.02]	0.02* [0.01]	0.01 [0.02]	0.02 [0.01]	0.01 [0.02]	0.02 [0.01]	0.02 [0.02]	0.03** [0.01]	0.01 [0.01]	0.03** [0.01]
<i>Oilmom</i>_{<i>i,t-1</i>}	0.03** [0.01]	0.03*** [0.01]	0.02 [0.02]	0.02*** [0.01]	0.02* [0.01]	0.03*** [0.01]	0.03** [0.01]	0.03*** [0.01]	0.03*** [0.01]	0.03*** [0.01]
<i>Foodmom</i>_{<i>i,t-1</i>}	0.001 [0.05]	-0.001 [0.02]	-0.01 [0.05]	-0.01 [0.02]	-0.01 [0.05]	-0.01 [0.02]	-0.005 [0.05]	-0.01 [0.02]	0.01 [0.03]	-0.003 [0.02]
<i>Sample period:</i>	<i>Q2 2016 – Q3 2023</i>		<i>Q1 2013 – Q3 2023</i>		<i>Q2 2016 – Q3 2023</i>		<i>Q2 2016 – Q3 2023</i>		<i>Q2 2016 – Q3 2023</i>	
<i>No. of economies:</i>	6		6		6		6		6	
<i>Total observations:</i>	180		232	244	180		180		180	

Note: *, ** and *** represent significant at the 1%, 5% level and 10% level respectively. Robust standard error in the square brackets.

Source: HKMA staff estimate.

Table A5. Robustness check 4: Estimation with net sentiment index (*NP*), inflation-relevance index (*INF*) and forward-looking index (*FWD*) separately

	<i>K = NP</i>		<i>K=INF</i>		<i>K=FWD</i>	
	(1) <i>General public</i>	(2) <i>Professional forecasters</i>	(3) <i>General public</i>	(4) <i>Professional forecasters</i>	(5) <i>General public</i>	(6) <i>Professional forecasters</i>
$K_{i,t-1}$	0.80** [0.32]	0.01 [0.08]	-0.73** [0.32]	-0.18* [0.1]	-0.26 [0.33]	-0.16 [0.14]
$DisTarget_{i,t-1}$	0.62*** [0.04]	0.47*** [0.01]	0.97*** [0.16]	0.50*** [0.03]	0.79*** [0.22]	0.60*** [0.07]
$K_{i,t-1} \times DisTarget_{i,t-1}$	-0.2 [0.15]	-0.1** [0.05]	-0.59** [0.23]	-0.07 [0.05]	-0.27 [0.27]	-0.19** [0.09]
$Ygap_{i,t-1}$	0.02 [0.02]	0.02* [0.01]	0.01 [0.02]	0.02** [0.01]	0.01 [0.02]	0.02* [0.01]
$Oilmom_{i,t-1}$	0.03** [0.01]	0.03*** [0.01]	0.03** [0.01]	0.03*** [0.01]	0.03** [0.01]	0.03*** [0.01]
$Foodmom_{i,t-1}$	0.02 [0.05]	-0.001 [0.02]	0.02 [0.05]	-0.004 [0.02]	-0.002 [0.05]	0.004 [0.02]
<i>Sample period:</i>	<i>Q2 2016 – Q3 2023</i>		<i>Q2 2016 – Q3 2023</i>		<i>Q2 2016 – Q3 2023</i>	
<i>No. of economies:</i>	6		6		6	
<i>Total observations:</i>	180		180		180	

Note: *, ** and *** represent significant at the 1%, 5% level and 10% level respectively. Robust standard error in the square brackets.

Source: HKMA staff estimate.