Is the Action or Discourse of the Central Bank of the Republic of Türkiye More Effective on Expected Inflation?

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Summary: This study examines the effects of central bank discourse (tone index), action (policy rate), and actual inflation on expected inflation for Türkiye using monthly data between 2020 and 2024 via the SVAR model. Empirical findings demonstrate that the tone index has a statistically significant negative effect on expected inflation for one month, while actual inflation has a statistically positive effect for two months. These results suggest that the CBRT's discourse, rather than its action, has a greater impact on expected inflation in the short term. In addition, the findings indicate that actual inflation has a significant impact on expected inflation in the short run.

Keywords: Monetary policy, Central bank communication, Expectation management, SVAR
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During the difficult period that started with the COVID-19 pandemic and continued with the Russia-Ukraine war and political tensions in the Middle East, Türkiye has implemented several extraordinary strategies in its monetary policy. In the decade from 2006 to 2016, when inflation targeting was introduced, inflation remained above the target, but remained in single digits, with the average rate of 8.3%. However, since 2017, inflation has increased well above the target and has reached double digits. In addition, the dismissal of the Central Bank governors at short intervals created the impression that they were subjected to political pressures. Accordingly, the Central Bank of the Republic of Türkiye (CBRT) preferred the growth target instead of price stability and continued to cut interest rates from September 2021 to June 2023 despite the high inflation. This situation created insecurity in the markets, the country's risk

premium and exchange rate increased, the TL depreciated, inflation expectations and pricing behavior deteriorated. All these trends considerable widened the gap between the target and actual inflation. In this context, credibility of the CBRT has decreased, monetary policy has lost its effectiveness, and economy has become vulnerable to external and internal shocks. The CBRT continues to resolutely implement the tight monetary policy, which it has implemented by changing its monetary policy as of June 2023. A major assumption is that, owing to the growing independence and credibility of the Central Bank, this policy will be successful and will have an impact on expected inflation.

In recent years, the CBRT has increasingly used public communication to support policy objectives and manage expectations that link the policy rates it controls to market interest rates that determine economic decisions. Since the beginning of 2022, when many central banks in the world have raised interest rates, the reduction of policy rates in Türkiye that was inconsistent with market expectations has made communication with the CBRT an important policy tool. In this context, the study aims to identify which of the CBRT's actions and discourses are more effective on the expected inflation.

Accordingly, in the study, we examined the effects of discourses, policy rate, and actual inflation on inflation expectations via the SVAR model using monthly data for Türkiye between February 2020 and December 2024. To this end, the tone index of the CBRT discourses for the sample period was calculated. The policy rate was taken for the CBRT action. Our key assumption was that instantaneous causalities between both the tone index and expected inflation, and policy rate and expected inflation would be bidirectional. Cholesky decomposition assumes that the instantaneous causalities between variables are unidirectional. For that reason, structural factorization (SVAR model), which allows bidirectional instantaneous causalities between variables, was used. Using the SVAR model was expected to yield more realistic results for Türkiye.

The remainder of this paper is structured as follows. In Section 1, monetary policies implemented by the CBRT after the COVID-19 pandemic is reviewed. Section 2 provides information about central bank communication and expectation management. Previous research and contributions of the study are discussed in Section 3. Section 4 outlines the assumptions and dataset of the study. The results are reported in Section 5 on this study. Finally, in Section 6, we draw conclusions and outline recommendations in the light of the data obtained from the mentioned study.

1. Monetary policies implemented by the CBRT after the COVID-19 pandemic.

During the COVID-19 and the post-COVID-19 period, the response of inflation to exogenous shocks has significantly changed as compared to previous periods and has become permanent (Karol Szafranek et al., 2024). After the COVID-19 pandemic and the start of Russia-Ukraine war, the balance that global policymakers tried to maintain in the price stability-economic stability-financial stability triangle became fragile. Accordingly, policy implementation became an incomprehensible anomaly. For

instance, Wojciech Grabowski et al. (2023) referred to the period from March to December 2020 as the implementation of "unprecedented stability policies". These policies included monetary measures and major stimulus programs during the pandemic. All these developments made it more difficult to control inflation and inflation expectations, leading some central banks to resort to unorthodox methods. One of these central banks was the CBRT.

The COVID-19 pandemic, which emerged in 2020, posed a serious health threat on a global scale and significantly affected national economic structures. The measures taken by various states to prevent the spread of the epidemic negatively affected the production and employment processes, particularly with regard to individuals' consumption habits (Cansel Oskay, 2023). In this context, aggregate demand increased with the revival of economic activities because of the monetary expansions implemented by central banks around the world. In this period, central banks largely focused on providing liquidity to the markets and fiscal policies that supported households and firms. Furthermore, global inflation started to grow in 2021 because of the Russia-Ukraine war. Accordingly, with an increase of production, energy costs and all commodity prices increased (Oskay, 2023). Because of these developments, many central banks in the world, especially the FED, have sought to control inflation with tight monetary policy and interest rate hikes since 2021. In Türkiye, in line with the monetary expansion in the world and seeking to limit both the negative impact of the pandemic on the economy and the risks to inflation expectations, the CBRT continued to cut interest rates to 8.25% until May 2020. The overarching goal was to prevent interruption of financial markets, the credit channel, and companies' cash flow.

Because of the rapid credit expansion, increasing inflation, and the deterioration in inflation expectations, the policy rate increased to 10.25% in September 2020. On November 7, 2020, the CBRT Governor Murat Uysal was dismissed and Naci Ağbal was appointed in his place. In this period, numerous factors—including uncertainty in the global economy, expansion in loans increasing domestic demand, increase in the exchange rate, depreciation of the TL, increase in global food inflation—adversely affected inflation, and the increasing current account deficit necessitated monetary tightening. In this context, the policy rate gradually increased to 19% in March 2021. After this date—that is, during the term of Şahap Kavcıoğlu, who was appointed to replace Naci Ağbal who was dismissed four months after his appointment—the expansionary monetary policy was implemented again despite high inflation, and the policy rate was gradually reduced to 14% at the end of 2021. In the period between November 2020 and September 2021, the CBRT simplified its monetary policy in line with inflation targeting and adopted a single-objective-single-instrument strategy. However, as of September 2021, it returned to its expansionary monetary policy, kept inflation targeting in the background, and started to reduce the policy rate despite increasing domestic demand and inflation (Ali Çufadar, 2023). As a result of the interest rate cutting process that started in September 2021, TL rapidly depreciated while the demand for foreign currency increased. Although a tight monetary policy was implemented to control high inflation around the world, the CBRT implemented

an expansionary monetary policy and lowered the interest rate as a measure to maintain inflation targeting. Concurrently, the frequent dismissal of Central Bank Governors raised debates about the independence of the CBRT, which eventually led to deterioration in expectations and pricing behavior, as well as to increases in country risk and in the exchange rate.

In 2022, the interest rate cut continued and was reduced to 9% at the end of the year. The CBRT decided to cut interest rates because central banks would abandon their tightening monetary policy due to the risk of recession. However, inflation continued to rise in 2022, reaching its highest level in the last 20 years. Inflation, which increased to 36.08% in 2021, was realized as 64.27% in 2022. In the first half of 2022, supply constraints became evident with geopolitical developments, and global commodity and food prices, particularly energy, rapidly increased. Along with negative supply shocks, the accelerated growth of the exchange rate in the last quarter of 2021 created inflationary pressure. The increasing exchange rate since 2017 has been putting pressure on inflation, and the dollar rate, which was 5.95 in 2019 before the COVID-19 pandemic, increased to 7.43 in 2020, 13.35 in 2021, and 18.73 in 2022. In December 2023, when the study was completed, the dollar rate rose to 29.09.

Although the increase rate of inflation slowed down after 2022, it remained high. The CBRT cut the policy rate from September 2021 to June 2023 (20 months), especially when inflation deviated from the target at a higher rate. The expansionary monetary policy boosted growth; however, it concurrently led to high inflation, dollarization, a current account deficit, and increased exchange rate pressure. Despite attempts to reduce the exchange rate pressure through reserve sales and the implementation of TL deposit with exchange rate protection, the Central Bank's cash reserves significantly decreased, creating a risk of a balance of payments crisis (Ali Çufadar and Ekrem Cunedioğlu, 2023). The expectation that the exchange rate increase would continue with the expansionary monetary policy increased the stickiness of inflation. In this period, the rise in inflation was driven by exchange rate increase expectations, as well as by domestic demand and global commodity price increases.

In the second half of 2023, the CBRT started the monetary tightening process to restore disinflation as soon as possible, anchor inflation expectations, and contain deterioration in pricing behavior. With the appointment of H. Gaye Erkan as the Governor of the CBRT on 9 June 2023, the fight against inflation was set as a priority target. It was decided to adopt a monetary tightening policy and the policy rate started to gradually increase. In 2023, the policy rate was on the upside. As the first step of monetary tightening, on 23 November 2023, the policy rate was raised to 40% from 8.5% in February 2023, 15% in June 2023, and 35% in October 2023. Interest rate hikes continued in the following months and the policy rate was set at 50% on March 21, 2024. During this period, Fatih Karahan became the new governor of the CBRT.

To ensure the level of monetary tightness required for the permanent establishment of price stability in Türkiye, Turkish lira liquidity developments were closely monitored, and monetary transmission was strengthened through quantitative tightening decisions. In the first stage of the monetary transmission mechanism, short-term market interest rates played an important role. In the traditional inflation targeting

regime, overnight market rates should occur at levels close to the policy rate in terms of controlling long-term interest rates. To this end, central banks actively managed liquidity and implemented quantitative tightening steps when necessary. Central banks also sought to ensure that market interest rates that would be compatible with monetary policy by making decisions regarding the level of liquidity in the market (Joe Ganley, 2002; Virginia Von Heideken and Peter Sellin, 2014). In this context, the liquidity steps taken by the CBRT in recent years aimed to increase the effectiveness of the monetary transmission mechanism.

2. Central bank communication and expectation management

Inflation is one of the most important economic problems of developing countries such as Türkiye. The high level of inflation creates economic uncertainty and stands out as an important factor that prevents economic units from making appropriate decisions about the future. This situation increases the environment of uncertainty and leads to low probability of realization of the expectations, ultimately resulting in a mismatch between means and objectives in monetary policy and, consequently, a reduction in the effectiveness of monetary policy. In recent years, the inflation targeting regime, together with the flexible exchange rate regime, has become an increasingly common monetary policy. To deal with chronic inflation and ensure price stability, Türkiye has been implementing an inflation targeting regime since 2006.

The inflation target is primarily a monetary strategy that guarantees that inflationary expectations will be anchored within the band of the inflation target. Achieving success in expectations, which lays an important role in the inflation-targeting strategy, depends on the public's trust in the policies to be implemented, which means that the bank has a sufficient level of reputation. The success of monetary policy will be ensured if central banks carry out transparent and credible policies, as well as report the results of these policies. A reputable central bank will face lower costs in the fight against inflation. Said differently, since long-term interest rates reflect the expectations for short-term interest rates announced by the Central Bank, monetary policy should be sufficiently transparent and predictable. This is so because monetary authorities use short-term interest rates to affect both market interest rates, asset prices, and long-term interest rates by creating expectations.

Indeed, to ensure that the central bank, which focuses on inflation targeting, successfully implements this strategy, it must first be trusted by the public and the markets. One way to achieve this is to be as transparent as possible while carrying out bank policies, to explain the policies to the public in case of possible supply shocks, and to be fully accountable in this regard. However, due to strong supply shocks, the frequent credibility problem, especially in developing countries, leads to a much faster change in production. The weakness of the institutional structure in developing countries complicates the process of achieving credibility. Low credibility creates a perception in the public that the central bank will not be able to stick to its promises and will not react to major shocks on the desired level. This, in turn, will negatively affect expectations, causing both actual and expected inflation to increase.

Countries with independent central banks have lower inflation rates without incurring any costs in terms of growth. Therefore, for a successful inflation targeting strategy, the central bank's powers should be clear, accountable, capable of determining relevant policy instruments by giving discretion, as well as keep the public informed. Said differently, the central bank's practices should be clear, understandable, and transparent.

To this end, a central bank that implements inflation targeting should transparently announce its decisions to the public through reports and statistics. Central banks that implement this strategy usually publish their inflation reports on a quarterly basis, where they announce and make predictions about the future. These reports discuss the ways in which inflation will follow at different interest rates. Therefore, central banks try to both influence expectations and fulfill their responsibilities to the public. The fact that the central bank informs the public about the targets and activities it has set while conducting monetary policy indicates that the bank is transparent. In such cases, the public will be able to create their expectations in line with the bank's objectives. This, in turn, will increase confidence in the central bank

Growing worldwide favors for inflation targeting, which focuses on central bank transparency and accountability, have provided numerous incentives for central banks to increase both disclosure and "openness." Inflation targeting aims to establish a clear link between monetary policy decisions and the central bank's assessment of future inflation. For that reason, it is important to provide timely information about the central bank's specific view on the inflation outlook in terms of managing expectations.

As argued by Matthias Neuenkirch (2013), central bank communication is an important way of communicating monetary policy prior to actual monetary policy actions, which is referred to as the "market expectations channel" of monetary policy transmission. Communication through this channel increases the predictability of monetary policy, shortens the transmission lag, and increases the effectiveness of monetary policy actions.

Central bank communication policies focus on managing expectations to achieve monetary policy objectives. A predictable monetary policy is needed to manage the expectations. Accordingly, the practice of publishing the decision text and minutes of the meeting, in which monetary policy decisions are announced together with their reasons, became an important element in central banking communication policies. Such the decision text and the corresponding minutes provide stakeholders with an expectation framework regarding when and according to what factors central banks make decisions, and under what conditions. Under this approach, it can be said that the relationship between communication policies and transparency and the effectiveness of monetary policy is largely applied within the scope of expectation management that supports monetary transmission mechanisms. In the same context, monetary policy strategies based on inflation targeting assign special importance to communication and transparency to monetary policy performance. This strategy provides stakeholders with a future-oriented inflation framework with inflation projections and targets. Thus, it is aimed to obtain a positive wind from the expectation channel in order for inflation

to move on a certain path. The need for social consensus in the achievement of inflation targeting necessitates a proactive policy in communication.

In the 1990s, many central banks started to shift to more transparent communication. The most important reason for this shift was the consensus that more transparent communication would increase effectiveness of monetary policy. At the same time, more transparent communication was also believed to increase accountability of the institution, which is an important feature of independent central banks. The world's leading central banks launched communication tools such as the publication of central banks' forecasts, votes at monetary policy meetings, texts explaining monetary policy decisions, forward-looking guidance on future policy rates, press conferences after policy meetings, and numerical inflation targets. However, central bank communication primarily targets specialist audiences, such as financial market participants or professional forecasters (Alan S. Blinder et al., 2008) who carefully monitor every monetary policy decision or statement, and when policy decisions are announced, there are immediate effects on asset prices.

Since the early 1990s, however, central banks started to use more communication tools to support monetary policies. Early empirical studies examining the effectiveness of central bank communication policy confirmed that communication has an impact on policy objectives and financial variables (Blinder et al. 2008; Nergiz Dinçer and Barry Eichengreen 2014; Sylvester Eijffinger and Petra M. Geraats 2006). Central banks aim to manage inflation and production expectations related to economic outcomes, as well as expectations for financial stability. They should also ensure their accountability to the public. Communication tone index is measured as time series data for countries. With this approach, the effects of communication tone on financial and real variables can be more easily examined by econometric methods. Accordingly, in recent years, the effects of the communication tone index on financial variables or expectations have been extensively studied in the literature. Numerous previous studies on the effects of communication tone on expectations reported a relationship between variables (Paweł Baranowski et al., 2021; Paul Hubert and Fabien Labondance, 2021 and Gabriel C. Montes et al., 2016).

During the 2008 financial crisis, central bank communication was widely used as an important non-traditional monetary policy tool. Blinder et al. (2008) pointed out that central bank communication can be used to manage expectations by "creating news" and "reducing noise." As a result, there has been an increase in academic studies on the relationships between central bank communication and expectation management. Ben S. Bernanke, who served as FED chairman between 2006 and 2014, clearly emphasized the importance of communication with the statements, "What I often observed when I was at the FED was that 98% of monetary policy was talk and 2% was action". Later, Bernanke counted verbal guidance among the new monetary policy tools (Ben S. Bernanke, 2020). Verbal guidance, which was initially used only for assistance when the limits of the policy rate were reached, was accepted as a monetary policy tool that can be directly applied in the expectation channel of the monetary transmission mechanism due to its successes in the face of monetary policy challenges. Today, the economic impact of central banks is evaluated together with the current

level of the interest rates these banks apply, as well as their effect on the future expectations of economic actors (Blinder et al., 2008). Despite the effective efforts of central banks during the 2008 global crisis, almost no explanations could be given that would satisfy the public. Central banks can use the verbal guidance channel by clearly stating their monetary policy objectives in order to raise inflation expectations to the desired level. Verbal guidance stands out as central banks as an unusual monetary policy tool used by central banks to manage expectations.

3. Previous studies and the current work

3.1. Previous studies

Central banks control economic fluctuations and ensure price stability by using monetary policy instruments. Along with the policy rate, these banks implement a tight monetary policy or a loose monetary policy according to the conditions of the economy. In modern monetary policy, inflation expectations are as critical as inflation. Market participants update their inflation expectations according to the economic situation. Therefore, expectations are affected by macroeconomic variables. Monetary authorities aim to anchor expectations to their target or preferred value (Gianni Carotta et al., 2023). Conversely, the independence of central banks and the adoption of the inflation-targeting strategy by many advanced and emerging economies highlight the importance of central bank communication (Jeffery D. Amato and Stefan Gerlach 2002). Indeed, the modern approach to monetary policy emphasizes the importance of guiding and influencing the public's expectations of future central bank actions. In this forward-looking outlook of monetary policy, the current setting of the policy interest rate is of little importance for private actors' decisions on consumption, investment, labor supply, and price-setting. Owing to the critical role that private sector interest rate expectations play in macroeconomic stability, central banks should be able to best guide expectations for future monetary policy actions. Many empirical studies highlighted the critical role of central bank communication (Refet Gürkaynak et al., 2005; Blinder et al., 2008; Matthieu Picault and Thomas Renault, 2017; Stephen Hansen et al., 2019; Marco Vega and Eric Lahura, 2020; Oliver Coibion et al., 2022; Carotta et al., 2023; Ada Tony Odu et al. 2024).

Central bank communication or discourse is one of the issues that has recently drawn considerable scholarly attention within the framework of modern monetary theory. Many studies confirmed the economic effects of central bank discourse. Concurrently, several studies highlighted that economic circumstances also affect discourses. For instance, Gürkaynak et al. (2005) noted that monetary policy actions and discourses have a non-negligible impact on asset prices. Accordingly, the impact of discourse in the US economy was reported to have greater effects on long-term treasury yields. In another relevant study, Blinder et al. (2008) argued that communication can be an important policy instrument as it affects financial markets along with macroeconomic variables.

Furthermore, in a study that applied the Swiss Economic Institute's Monetary Policy Communicator to predict the future stance of ECB monetary policy and investigated

the impact of such communication on future policy rates and inflation expectations using the VAR model, Neuenkirch (2013) found that policy communication is effective on expectations and monetary policy transmission. Similarly, Eyüp Kahveci and Aysun Odabaş (2016) examined and compared the CBRT, ECB, and FED statements by categorizing them into optimistic, certainty, and realistic tones. Focusing on the effects of the 2008 global crisis on the discourses of central banks, the authors found that the 2008 crisis especially affected the FED discourses. In addition, Stephen Hansen and Michael McMahon (2016) examined the effects of current and forward-looking monetary policy statements in Federal Reserve statements on markets and real variables. Although the relationship between the variables was not strong, the authors observed that forward-looking statements were more influential than current statements. Picault and Renault (2017) categorized European Central Bank statements into hawkish, dovish, and neutral groups and positive, negative, and neutral groups. The aforementioned study revealed that the hawkish tone of the text and negative statements increase volatility, especially in financial markets. Furthermore, Hansen et al. (2019) concluded that the communication instrument effectively directs economic uncertainties based on the inflation reports of the UK central bank. Along similar lines, in a study on the impact of bank communication on inflation expectations with a tone index based on the discourse of the central banks of Colombia, Chile, and Peru, Vega and Lahura (2020) drew attention to the various effects of central bank communication. In another relevant investigation, Coibion et al. (2022) stated that, in recent years, central banks resorted to a communication strategy to influence economic activity, especially affecting financial markets, arguing that inflation expectations affect household spending decisions; accordingly, central bank announcements should decrease to the household level along with financial markets and, for that reason, alternative communication channels should be found against traditional media. Similarly, in a study on the effect of central bank communication in China on monetary policy expectations using events collected from official websites and social media, Jianguo Liu et al. (2022) found that central bank communication can help drive public expectations; yet, different topics and different forms of communication were found to have heterogeneous effects.

Furthermore, Z. J. C. Anzoátegui and J. C. C. Galvis (2022) examined the effects of the Central Bank of Colombia announcements on inflation forecast errors via regression analysis using an EGARCH model and VAR models using data from January 2008 to March 2020. Inflation expectations were subtracted from government bonds, and forecast error was calculated based on the difference between inflation expectations and the inflation target. The results revealed that, as a monetary policy tool, the communication from the Central Bank of Colombia encourages convergence between financial market expectations and inflation targets. Said differently, communication proved to be effective in managing expectations. Carotta et al. (2023) argued that central bank communication and discourses significantly impact inflation expectations in the Uruguay case. In another relevant study, Martin T. Bohl et al. (2023) showed that unemployment and inflation expectations significantly affected the discourse of the FED and the European Central Bank. Similarly, Odu et al. (2024)

examined the impact of central bank statements on inflation expectations with the tone index in the context of six African countries. The results indicated a statistically significant relationship between central bank statements and inflation expectations. Furthermore, in a study on the effects of central bank statements on financial markets in 21 developing countries, Iegor Vyshnevskyi et al (2024) showed that clarity in statements reduces financial market volatility. Likewise, Magdalena Szyszko et al. (2024) examined the effects of communication by central banks on professional and consumer inflation expectations for 12 small open economies that implemented inflation targeting. The authors found that the tone of communication of the central bank significantly affects expectations in countries that are more experienced in the implementation of inflation targeting. In another pertinent publication, Maria Siranova et al. (2024) examined the effects of policy communication tone on financial and macro variables for 12 countries implementing inflation targeting regimes with the heterogeneous panel SVAR model. The authors found that the tone of communication has important effects on interbank rates and exchange rates. In addition, it was concluded that the tone of communication had no effect on industrial production and inflation.

Finally, economic units can frequently take actual inflation as a reference when creating inflation expectations. For instance, John A. Carlson and Michael Parkin (1975) established the relationship between inflation and inflation expectations in the UK is strong when inflation is high; however, this relationship weakens as inflation declines. Similar findings were also observed in Martin Feldkircher and Pierre L. Siklos (2019), who, in a study on developed and developing countries, found that short-term inflation expectations increase in periods of accelerating inflation. While oil prices accelerate inflation, the effects of supply shocks and demand shocks are short-lived for most countries. Furthermore, Todd E. Clark and Troy Davig (2009) drew attention to the impact of shocks to long-term inflation expectations on both short-term and core inflation. The results revealed that short-term inflation expectations have a significant impact on long-term inflation expectations. In another relevant study, Alain Kabundi and Eric Schaling (2013) found that inflation expectations depend on the lagged values of inflation in the South African case.

3.2. The current work

As discussed above, the results of previous studies linking central bank communication with the performance of monetary policy, the maturity structure of interest rates, and the management of inflation expectations suggest that different communication channels of central banks contain fundamental information that affects the performance and economic outlook of financial markets (Blinder et al. 2008; Michael Ehrmann and David Sonderman 2012). Inflation expectation management plays an important role in monetary policy credibility and expected inflation. Accordingly, there is a need to expand empirical research on the effect of central bank communication tone on expected inflation in developing countries such as Türkiye. In addition to examining the effects of the communication tone of the CBRT on inflation

expectations, the study contributes to the literature by addressing the question concerning which of the policy interest rates representing central bank actions and the tone of communication have a greater effect on expected inflation.
In this study, we assume that the instantaneous causalities between both the tone index, which represents the discourses of the CBRT, and the policy rate, which represents the actions of the CBRT, with expected inflation are bidirectional. Said differently, while the tone index and the policy rate affect the expected inflation, the expected inflation also affects these variables. Since it is not possible to allow these assumptions with Cholesky decomposition, we used the structural VAR model that allows these assumptions. In this respect, the study differs from previous studies.

4. Assumptions and data collection

4.1. Assumptions

Our analysis was based on the following five assumptions. The first assumption was that central bank discourses are determinants of expected inflation. For central banks, signaling future monetary policy actions, rather than changes in interest rates corresponding to monetary policy action, is a crucial function of policymaking. The fact that central banks openly declare their intentions has an impact on inflation expectations (Magdelena Szyszko and Karolina Tura-Gawron, 2021). The central bank discourses included in the monetary policy board text are accepted as a new policy tool. Central banks can influence macroeconomic expectations by making statements about both the current conjuncture and future economic conditions. Inflation expectations are the first indicator that central banks, whose main aim is to ensure price stability, will be willing to direct. When central banks believe that the inflation rate is at high levels or see an upward risk on future inflation, they signal that they will implement tight monetary policies to reduce inflation. By contrast, when inflation reaches the desired levels, they turn to expansionary monetary policy practices and their discourse becomes dovish in tone. Therefore, the more hawkish the central banks' statements are, the stronger is their desire to break inflation expectations and more negatively affected will be the market's inflation expectations (Valerio Alessio Ciarlone Astuti and Alberto Coco, 2022: 3).
The second assumption concerned the effect of expected inflation on central bank discourses. Central bank discourse is an important indicator for the inflation-targeting strategy of central banks. If the expected inflation calculated by the market participants' survey is above the targeted inflation, central banks will adopt a more hawkish discourse and ensure that the expected inflation approaches the target. Conversely, central banks make dovish statements to increase the level of economic activity as inflation approaches the target.
Reflecting the forecast of the units in the economy about how much prices will increase/decrease in the following period, inflation expectations play an important role in the decision-making mechanism of these economic units. In addition, inflation expectations are of key importance for central banks in terms of their role in the monetary transmission mechanism and in determining monetary policy decisions.

The third assumption concerned the effect of the policy rate on expected inflation. The policy rate determined by the central bank is decisive over other interest rates in the market. When inflationary expectations are high, central banks prefer tight monetary policy and increase the policy rate. An increase in the policy rate increases other interest rates in the market. Accordingly, as access to money and credit becomes more costly, demand falls, and expected inflation is suppressed (Esra N. Kilci, 2019). In cases where there is no inflation problem, but there is a slowdown in the level of employment and economic activity, expansionary policy is applied, and the policy rate is reduced.

The fourth assumption that is focused on the effect of the expected inflation on the policy rate. When expected inflation increases, central banks take a tight stance, increase policy rates, and try to reduce expected inflation. On the contrary, when the expected inflation rate approaches the desired level, central banks reduce the policy rate.

Ultimately, the fifth assumption concerned is the effect of actual inflation on expected inflation. As the actual inflation rate increases, household consumption requirement and firms' demand for capital goods increase with the expectation that inflation will increase in times to come. An increase in actual inflation due to the intertemporal price effect will also increase the expected inflation (Jeremy B. Rudd, 2021). In economic theory, increases in expected inflation cause actual inflation to increase (Richard Clarida et al., 1999; Michael Woodford, 2003; Richhild Moessner, 2021). Knowing that inflation will be high in the future, economic actors shift their future demands to today. Since expected inflation is high, current demand is higher than it should be, thus increasing the level of actual inflation.

Many previous studies included discourse analysis or text mining of central bank communications. In previous research, the discourse tones of the central bank in some studies were created through package programs, while other studies were indexed with manually created words. In the study, considering the grammatical structure of the Turkish language, we created a manual dictionary. In addition, when categorizing discourses, sentences or phrases were used instead of words. This was done to objectively analyze the feelings and opinions of the monetary policy committee. In brief, following Picault and Renault (2017), Vega and Lahura (2020), and Carotta et al. (2023), the study contributes to the literature with a tone index obtained through a manually created dictionary from central bank statements. Our analysis also involved a comparison of central bank "discourses" and "actions." Discourses were quantified with a tone index.

4.2. Tone Index

The tone index used in this study was calculated in a way that was similar to the approaches previously used by Hansen and McMahon (2016), Picault and Renault (2017), and Vega and Lahura (2020), but with minor differences. Based on a lexicon tailored to monetary policy objectives, we classified the statements as positive (hawkish) and negative (dovish). The difference in calculating the tone of the CBRT's

discourse texts in this study was based on the difference in the grammatical structure of Turkish. Since Turkish is an agglutinative language, inferring the tone of an announcement based on the number of words in the announcement may lead to an incorrect inference about the tone of the announcement. Accordingly, the tone was calculated to provide data highly sensitive to the reality and purpose of any discourse. For that reason, the sentences in the texts containing the discourses were analyzed separately. In other words, hawkish-dovish-neutral tone was categorized according to whether a sentence in the text referred to tight or loose monetary policy (see Tables A-C in Appendix for examples). We found that the calculated tone index was related to the actual events, so the tone index was consistent (see Table D in Appendix). The tone index obtained from the monetary policy committee texts of the CBRT was calculated as shown in Eq. (1).

$$\text{tone}_t = (\text{h}_t - \text{d}_t)/\ell_t \quad (1)$$

The tone index took a value between 1 and -1. The convergence of the obtained value to 1 indicated that the central bank's tone became hawkish (h); Convergence to -1 demonstrated that it became dovish (d). The number of acceptable sentences (ℓ) is the sum of dovish, hawkish, and neutral statements. Hawkish is the number of sentences towards tight monetary policies, while dovish is the number of discourses to loosen monetary policies. In addition, there were neutral discourses in the text. Neutral discourse was standard, and it did not point in any direction.

4.3. Data collection

The most important threat to financial stability is unexpected changes in the inflation rate. Therefore, central banks are tasked with confining these unexpected developments to a certain framework and/or historical course—that is, the task is to make them expected. In this context, the importance of central banking communication increases, as does providing transparency with the management of monetary policy, which has evolved from uncertain targets to clear and concrete targets. It is clear that the difficulties encountered in the monetary transmission mechanism due to economic crises are the driving factor in the effectiveness of transparency in monetary policy decisions. In such conjunctures, central banks resort to new methods in sharing their decisions with the public. In this context, regular press conferences and publication of the text of the decision are in the first place.

In previous research on the effects of central bank communication on inflation expectations, considerable attention was paid to dictionary methods that facilitate the creation of time series data for central banks communication tone (e.g., Carlo Rosa and Giovanni Verga 2007). The aforementioned study defined a dictionary that analyzes policy announcements and transforms qualitative information published by the European Central Bank through press releases into a regular scale. The expression indicator variable identified words or sequences of words as dove (negative) or hawk (positive). This variable sorts the textual document tone on a scale ranging from 1 to 5.

The next step in the analysis of the macro effects of policy announcements was expressing the tone of communication on a continuous scale ranging from -1 to 1. Such a measure of communication was made by the algorithm's use of a dictionary such as the general dictionary, a general economic dictionary, or more recent monetary policy dictionaries (Szyszko et al., 2024).

In this study, it was examined the effects of the CBRT statements and actions on expected inflation, covering the period between February 2020 and December 2024. "Actions" assumed the policy rate announced by the central bank. "Discourses" or "Communication" was a tone index created by central bank monetary policy committee statements. In many countries, central bank monetary policies were designed based on the policy rate. In the present, we assumed the policy rate as a proxy variable for the "actions" of the central bank. Inflation expectations were 12-month expectations based on a survey of market participants. For inflation, the CPI variable was used. Policy rate, inflation, and inflation expectations data, which were other variables used in the study, were obtained from the electronic data delivery system of the CBRT. The sample period covered monthly data from February 2020 to December 2024. The following notations were used for variables:

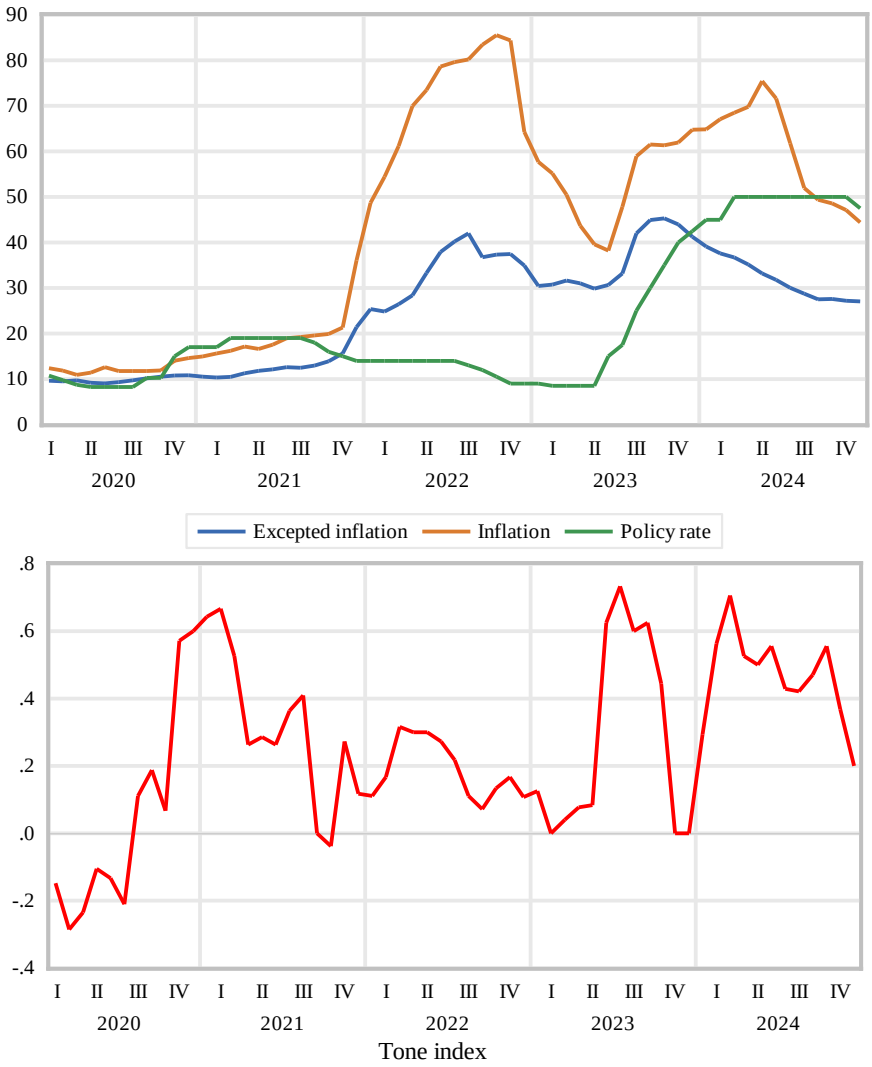
$E(\pi_t)$: Annual CPI-based inflation expectation for the next 12-month (%)
inf_t: CPI-based inflation compared to the same month of the previous year (%)
$tone_t$: Tone index for the CBRT
pf_t: Policy interest rate (%)

5. Empirical results

5.1. Time series properties of data

Time plots of the variables are given in Graph 1. The expected inflation, which was 9.61% in January 2020, increased continuously in the following periods and rose to 41.99% in August 2022. Although there was a short-term downward trend after this period, the expected inflation, which rose to 42.01% in August 2023, increased to its maximum level of 45.28% in October 2023. After this date, a decreasing trend was entered in the expected inflation, and it fell to 27.01% in December 2024.

From January 2020 to the end of 2021, actual inflation increased moderately. Since 2022, increases in inflation accelerated and reached their maximum level of 85.51% in October 2020. After this period, inflation in Türkiye remained at high levels. Although inflation continued to decline since July 2024, the inflation level in December 2024 was still high (44.38%).



Graph 1: Time plot of the variables

Commonly used methods for testing for the presence of unit roots in the series include either the Augmented Dickey-Fuller (ADF) proposed by David A. Dickey and Wayne A. Fuller (1981) or the unit root tests proposed by Peter Phillips and Pierre Perron (1988). However, Pierre Perron (1989) argued that the tests were biased towards the non-rejection of the unit root null hypothesis in the presence of a broken trend. Accordingly, Eric Zivot and Donald W. Andrews (1992), Pierre Perron (1997), and Timothy J. Vogelsang and Pierre Perron (1998) suggested breakpoint unit root tests that would allow for structural breaks to be determined endogenously from the data. When the time plots of the variables were examined, it was seen that there were

structural breaks in the series. Therefore, in the study, the integrated orders of the variables were investigated with the breakpoint unit root test proposed by Vogelsang and Perron (1998). Breakpoint unit root test results are given in Table 1. According to the results of the break-point unit root test, the expected inflation at the 1% significance level was stationary, while the other variables were stationary at their own levels. Said differently, the order of integration for expected inflation was zero for the other variables.

Table 1. Unit root test results

Variable	Break Date	t-Statistic	p-value
$E(\pi_t)$	2021M11	-3.7030	0.2815
$\Delta E(\pi_t)$	2023M08	-5.8577	< 0.01
inf_t	2021M11	-5.7048	< 0.01
pf_t	2023M05	-6.7121	< 0.01
$tone_t$	2023M12	-5.0969	< 0.01

Note: The exogenous variable is only constant. Appropriate lag length was selected using the Akaike Information Criterion (AIC) for a maximum lag of 10 periods. Break type is an additive outlier. The break selection method is minimized Dickey-Fuller t-statistic. Δ is the first-order difference operator.

5.2. SVAR model

The main advantage of structural VAR analysis is that the necessary restrictions on the estimated reduced form model, required for identification of the structural model, can be provided by economic theory. Once the identification is achieved, it is possible to recover from the structural shocks. These shocks can then be used to generate impulse response and variance decomposition functions to evaluate the dynamic impacts on different economic variables. In addition, the main question of this study concerned which of the CBRT's discourses and actions have a greater impact on expected inflation. The results of the variance decomposition of expected inflation based on the SVAR model would answer this basic question. Moreover, impulse-response functions, which show the responses of expected inflation to positive shocks in other variables, provide information about whether the effects of the policy rate, tone index and inflation on expected inflation are statistically significant, the period for which these responses remain statistically significant, and the direction of these responses (positive or negative).

A SVAR model structures economic assumptions to analyze the instantaneous relationship between determinants through structural factorization (Ben S. Bernanke, 1986; Oliver J. Blanchard and Mark W. Watson, 1986; Christopher A**.** Sims, 1986).. It can be applied recursively (Cholesky decomposition) or non-recursively (structural factorization) for orthogonalization of reduced form residuals in a VAR model. Orthogonalization by Cholesky decomposition shows a causal chain that is imposed,

rather than learning causal relationships from variables. This solution can make sense with a reasonable interpretation for recursive ordering (Lutz Kilian, 2013). A SVAR model needs to identify assumptions that help interpret correlations causally. These assumptions can span the entire VAR so that a SVAR model allows only a specific causal link to be investigated (James H. Stock and Mark W. Watson, 2001).
The short-run $SVAR(p)$ specification for the A-B model can be written as shows in Eq. (2).

$$\boldsymbol{A}\left(\mathbf{I}_{\boldsymbol{k}} - \boldsymbol{A_1 L} - \boldsymbol{A_2 L^2} - \ldots\ldots\ldots \boldsymbol{A_p L^p}\right)\boldsymbol{y_t} = \boldsymbol{A e_t} = \boldsymbol{B u_t} \quad (2)$$

where, $\boldsymbol{L}$ is the lag operator, the vector $\boldsymbol{e_t}$ is the error terms of the standard VAR model with covariance matrix $\boldsymbol{\Sigma_e}$, the vector $\boldsymbol{u_t}$ is the error terms of the structural VAR model with covariance matrix $\mathbf{I}_{\boldsymbol{k}}$, k is the number of variables in the model, and $\boldsymbol{A}$ and $\boldsymbol{B}$ are restriction matrices. The order condition requires $k^2 + \frac{k(k-1)}{2}$ restrictions for identification in the short-run A-B model. Considering the assumptions in Section 4, the identifying restrictions in this study are as follows:

- ✓ While the shocks of the tone index affect both actual and expected inflation shocks contemporaneously, it is contemporaneously affected by expected inflation shocks.
- ✓ The policy interest rate and expected inflation shocks influence each other contemporaneously.
- ✓ Actual inflation shocks have a contemporaneous effect on the expected inflation shocks. The shocks of actual inflation are not affected contemporaneously by the shocks of other variables.
- ✓ The shocks of expected inflation have a contemporaneous effect on the tone index. In addition, shocks of all other variables contemporaneously affect expected inflation shocks.

The results of the unit root test imply that all series except for the expected inflation are stationary in their level, the expected inflation is stationary in the first differences at 1% significant level. The short-term analysis is conducted by using the SVAR model in the stationary form. Under these restrictions, the A-B model is specified as follows:

$$\begin{bmatrix} 1 & 0 & 0 & a_{14} \\ 0 & 1 & 0 & a_{24} \\ a_{31} & 0 & 1 & 0 \\ a_{41} & a_{42} & a_{43} & 1 \end{bmatrix} \begin{bmatrix} e_t^{tone} \\ e_t^{pf} \\ e_t^{inf} \\ e_t^{\Delta E(\pi_t)} \end{bmatrix} = \begin{bmatrix} b_{11} & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 \\ 0 & 0 & b_{33} & 0 \\ 0 & 0 & 0 & b_{44} \end{bmatrix} \begin{bmatrix} u_t^{tone} \\ u_t^{pf} \\ u_t^{inf} \\ u_t^{\Delta E(\pi_t)} \end{bmatrix}$$

The order condition requires $k^2 + \frac{k(k-1)}{2} = 22$ restrictions for identification in the short-run A-B model. Since the number of restrictions for the parameters is 22, the SVAR model is exact-identified. The optimum lag length for the VAR model is selected as 3 using AIC.

5.3. Variance decomposition

The results of the forecast error variance decomposition for expected inflation are given in Table 2. In the variance decomposition of expected inflation, the tone index for the first forecast period was found to have a very high share of 50.81%. This share decreased to 33.62% in the second forecast period and then dropped to 29.18% in the 12th forecast period. These results show that the tone index is highly effective on expected inflation in the short run, but this effect decreases in the long run.

While the share of inflation in the variance decomposition of expected inflation was 12.08% in the first forecast period, this share increased to 36.33% in the second forecast period and 36.20% in the third forecast period. These shares remained around 35% in the following periods and maintained their importance. These results suggest that actual inflation has a significant impact on expected inflation.

In the variance decomposition of expected inflation, the share of the policy interest rate was 12.47% in the first forecast period, while this share decreased to 8.01% in the second forecast period. These shares first declined in the subsequent periods, but increased again from the eighth forecast period onwards and reached 12.82% in the 12th forecast period. These results highlight that the policy interest rate has a limited effect on expected inflation.

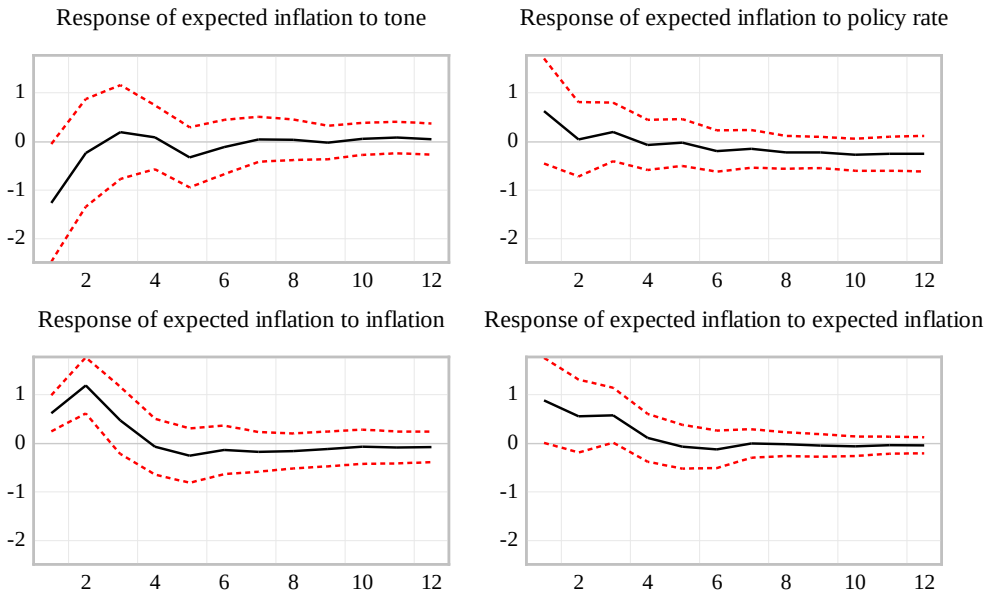
Table 2. Results of variance decomposition for the expected inflation

Period	Tone	Policy rate	Inflation	Expected inflation
1	50.81	12.47	12.08	24.64
2	33.62	8.01	36.33	22.04
3	30.48	7.79	36.20	25.52
4	30.45	7.84	36.10	25.61
5	31.38	7.60	36.11	24.91
6	31.14	8.17	35.88	24.80
7	30.88	8.48	36.07	24.57
8	30.49	9.22	36.04	24.25
9	30.15	9.97	35.86	24.02
10	29.77	11.06	35.43	23.74
11	29.49	11.95	35.10	23.46
12	29.18	12.82	34.78	23.21

5.4. Impulse response function

The response of expected inflation to structural one standard deviation positive innovation is shown in Graph 2. While the response of expected inflation to a positive shock of one standard deviation in the tone index was statistically significant in the first month, it was statistically insignificant in the following periods. The responses of expected inflation to positive shocks in the tone index were negative. The results

revealed that the hawkish attitude of the CBRT indicated that it had caused a decrease in expected inflation for a short period of only one month.
The response of the expected inflation to the positive shock in the policy interest rate was statistically insignificant for all forecast periods, highlighting that the policy rate on the expected inflation was ineffective.
The expected inflation response to positive shocks in inflation was positive. While these responses were statistically significant in the first two months, they were statistically insignificant in the subsequent periods. These results suggest that inflation had a positive effect on expected inflation and that the expected inflation response to inflation shocks continued throughout the first two months. Accordingly, the results highlight that actual inflation has a significant impact on expected inflation in the short run.



Graph 2. Response of expected inflation to structural one standard deviation positive innovation

6. Conclusion and recommendations

Monetary expansion due to the COVID-19 pandemic accelerated inflationary pressure worldwide. As a result, central banks raised policy rates at the risk of shrinking economies. In the period from mid-2021 to mid-2023, the CBRT differentiated itself from the rest of the world by reducing the policy rate despite the rising inflation rate. For Türkiye, the opportunity cost of inflation policies was to sacrifice economic growth. The CBRT helped Türkiye continue its growth process with its policy rate reduction. In this period, since the policy rate was independently determined from

inflation expectation, the impact of the policy rate on inflation expectation became neutralized.

Overall, inflation expectations play an important role in the transmission mechanism of the inflation targeting regime. Accordingly, central bankers should examine economic agents' inflation expectations to bring them closer to the inflation target level. However, economic agents are affected by past and current inflation and the actions and discourse of central banks when forming their expectations of future inflation. In this study, in addition to the CBRT's actions and discourses, we also analyzed the effects of actual inflation on inflation expectations using the monthly data between 2020 and 2023 via the SVAR model. To measure the impact of discourse, we categorized the discourse in the CBRT's monetary policy committee's statement into hawkish, dovish, and neutral. The policy rate variable was then used to represent the CBRT's action.

The study has three important findings for the heterodox monetary policy experience in Türkiye. First, the Central Bank discourse has a significant impact on inflation expectations. The impact of the tone of discourse in the first month was larger than inflation and the policy rate. However, the tone had no significant effect after the first month. These results are consistent with our expectations. This is so because, with some exceptions, the statements are updated every month. The results of the impulse response analysis also showed that inflation expectations negatively respond to a positive shock in the tone index. This suggests that inflation expectations fall in response to a hawkish tone, as expected.

Our second important finding is that inflation has a significant effect on inflation expectations for the first two months. In our analysis, the response of inflation expectations to inflation shocks was positive. This is important, as this finding indicates inflation inertia.

The third important finding of the study is that the policy rate had no significant effect in any period. According to our results, the central bank was unable to guide expectations through policy rate changes in this period.

Taken together, the results of the study indicate that inflation expectations, which play a critical role in inflation policies, are strongly affected by central bank statements. Conversely, actual inflation also impacts inflation expectations. Our findings also suggest that central bank discourse plays a critical role in breaking the vicious circle between inflation and inflation expectations. This evidence suggests that policymakers should meticulously shape their discourse in line with their goals. Further implications of our findings are that inflation policies should be extended over time and that the principle of transparency should not be compromised.

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APPENDIX

Table A: Examples of the hawkish discourses that make up the tone index

Jul.22	*…"Increasing uncertainties in global food security due to trade bans, high and volatile commodity prices, and persistent supply constraints in some sectors, particularly in staple food, lead to higher producer and consumer prices on an international scale."…*
Jul.22	*…"Central banks of advanced economies emphasize that the rise in inflation may take longer than expected due to rising energy prices, supply-demand mismatch and rigidity in labor markets."…*
Jul.22	*…"Employment gains are more favorable than in similar economies."…*
Jul.22	*…"The rise in inflation continues to be driven by rising energy costs due to geopolitical developments, the effects of pricing formations that are far from economic fundamentals, and strong negative supply shocks caused by increases in global energy, food and agricultural commodity prices."…*
Jul.23	*…"The Committee will continue to decisively use all available tools in pursuit of the fundamental objective of price stability."…*
Jul.23	*…"In addition to the interest rate hike, the Monetary Policy Committee decided on selective credit and quantitative tightening to support the monetary tightening process."…*
Aug.23	*…"The Committee decided to continue the monetary tightening process in order to achieve disinflation as soon as possible, anchor inflation expectations and control the deterioration in the pricing behavior."…*
Aug.23	*…"Recent indicators point to a sustained rise in the main trend of inflation."…*
Aug.23	*…"Monetary tightening will be gradually strengthened until—and to the necessary extent—the inflation outlook improves significantly."…*
Nov.23	*…"The current level of domestic demand, the rigidity in services prices and geopolitical risks keep inflation pressures alive."…*

Table B: Examples of the dovish discourses that make up the tone index

Feb.20	*…"The weak course of global economic activity and the low level of global inflation reinforce expectations that central banks of advanced economies will maintain their expansionary monetary policies."…*
Feb.20	*…"The improvement in macroeconomic indicators, particularly inflation, supports the decline in the country risk premium and contributes to contain pressures on cost factors."…*
Jun.21	*…"The strong uptrend in exports, slowdown in credit growth, significant decline in gold imports, and revival in tourism activities due to the strong momentum in vaccination are expected to accelerate the improvement in the current account balance."…*
Apr.21	*…"Services sectors, which have been adversely affected by pandemic restrictions, remain weak."…*
Jul.22	*…"Global growth forecasts for the coming period continue to be revised downwards and the probability of recession is increasing."…*
Jul.22	*…"The tourism-driven strong improvement in the current account balance continues."…*
Feb.23	*…"While the share of sustainable components in the composition of growth has increased, the strong contribution of tourism to the current account balance, which exceeded expectations, continues to spread across all months of the year."…*
Feb.23	*…"Supportive financial conditions have become even more important for sustaining the momentum in industrial production and the rising trend in employment."…*
Jul.23	*…"The rebalancing in the current account, supported by foreign direct investments, the marked improvement in external financing conditions, the ongoing increase in reserves and tourism revenues, will contribute strongly to price stability."…*
Oct.23	*…"The pass-through of the recent wage and exchange rate-driven cost pressures and tax adjustments to inflation has been largely completed."…*

Table C: Examples of neutral discourses that make up the tone index

Mar.22	*…"The cumulative effects of the decisions taken are closely monitored."…*
Jun.22	*…"Efforts to find solutions to the increasing uncertainties in financial markets through new supportive practices and instruments developed by central banks have increased."…*
Dec.22	*…"The growth rate of credits and the use of the accessed financing resources in economic activity in accordance with their purpose are closely monitored."…*
Jan.23	*…"The effects of high global inflation on inflation expectations and international financial markets are closely monitored."…*
Mar.23	*…"While the earthquake (the great disaster on February 6, 2023) is expected to affect economic activity in the near term, it is not expected to have a lasting impact on the performance of the Turkish economy in the medium term."…*
May.23	*…"The effects of high global inflation on inflation expectations and international financial markets are closely monitored."…*
Jan.24	*…"The committee will continue to take its decisions in a predictable, data-driven, and transparent framework."…*
Jan.24	*…"Indicators regarding inflation and its main trend will be closely monitored."…*
Mar.24	*…"Liquidity developments are closely monitored."…*
Jun.24	*…"The Monetary Policy Committee decided to keep the policy rate (one-week repo auction rate) unchanged."…*

Table D: Sample observations that make up the tone index

Date	H	D	N	H+D+N	Tone Index	Central Bank's Tone Position	Critical Events
Feb.20	6	10	11	27	-0.14815	*Dovish*	*The term "**pandemic**", referring to COVID-19, entered the agenda for the first time in the monetary policy statement.*
Nov.20	9	1	4	14	0.57143	*Hawkish*	*Ağbal became a CBRT governor.*
Mar.21	12	2	5	19	0.52632	*Hawkish*	***
Apr.21	9	4	6	19	0.26316	*Hawkish*	*Kavcıoğlu became a CBRT governor.*
Aug.21	12	3	7	22	0.40909	*Hawkish*	***
Sep.21	8	8	7	23	0.00000	*Balance*	*"The interest rate cut process" has begun.*
Oct.21	8	9	9	26	-0.03846	*Dovish*	***
Oct.22	11	7	12	30	0.13333	*Hawkish*	*The end of the "interest rate cut process" was announced.*
May.23	8	6	10	24	0.08333	*Hawkish*	***
Jun.23	11	1	4	16	0.62500	*Hawkish*	*H. Gaye Erkan became a CBRT governor.*
Feb.24	11	2	3	16	0.56250	*Hawkish*	*Karahan became a CBRT governor.*
Dec.24	9	5	6	20	0.20000	*Hawkish*	*"The interest rate cut process" has started again.*