

## 3. Medium-Term Projections

### 3.1 Current State, Short-Term Outlook and Assumptions

#### Changes in Key Forecast Variables

***In the last quarter of 2023, economic activity followed a stronger course than projected in the Inflation Report and demonstrated a resilience in domestic demand.*** On a quarterly basis, the contribution of private consumption to growth gained pace, while the positive contribution of net exports to growth declined in the last quarter. Domestic demand remained robust on the back of wage developments, firms' promotions and brought-forward demand in the first quarter of 2024. The change in the calculation of the retail sales volume index (Zoom-in 2.2) also pointed to an acceleration in retail sales in the first quarter, contrary to implied by the old index. Accordingly, output gap forecasts for the fourth quarter of 2023 and the first quarter of 2024 were revised upwards (Table 3.1.1).

***Consumer inflation was 69.8% in April 2024, hovering above the forecast range presented in the first Inflation Report of the year.*** Due to the robust course of domestic demand, sticky services inflation, soaring energy prices and developments in food prices, inflation followed a higher course than projected (Table 3.1.1). In the first quarter, services inflation recorded an upsurge due to time-dependent price setting and items with high tendency for backward indexation, and B inflation increased quarter-on-quarter. The rise in energy prices was fueled by rising global crude oil prices amid geopolitical developments as well as the cutback in production. Meanwhile, food prices maintained the uptrend, led by red meat. In April, annual inflation receded in food prices but increased in other groups. A quarter-on-quarter decline was seen in 12- and 24-month-ahead inflation expectations, yet the end-2024 inflation expectation exceeded the previous Inflation Report forecast. After a notable fall in the last quarter of 2023, the underlying trend of inflation was higher than projected in this period, led by services inflation.

**Table 3.1.1: Changes in Key Forecast Variables\***

	2023-IV	2024-I
Output Gap	2.3	2.8
(%)	(1.6)	(0.9)
Consumer Inflation**	64.9	69.8
(Annual % Change)	(64.9)	(66.0)
B-Index Inflation **	67.7	72.7
(Quarter-End, Annual % Change)	(67.7)	(68.8)

\* Figures in parentheses are from the previous Inflation Report.

\*\* Denotes inflation in January for 2023-IV and April for 2024-I.

#### Assumptions for Exogenous Variables

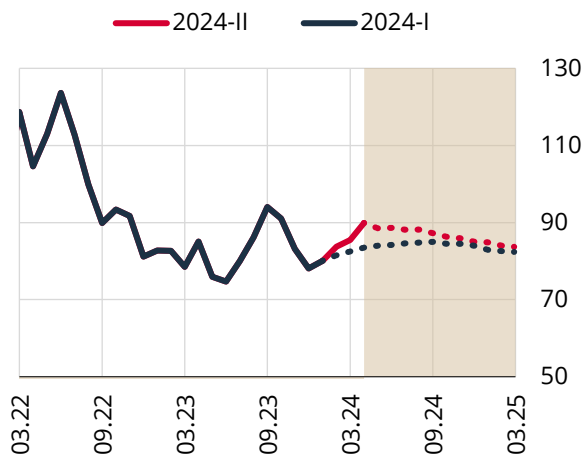
***Assumption for the global growth outlook were slightly revised upwards compared to the projections of the previous Inflation Report.*** Leading indicators for global growth point to a partial improvement in the growth outlook for 2024 compared to the previous reporting period, driven mostly by services. Among Türkiye's main trading partners, a mild growth outlook was maintained in the euro area, while growth forecasts for the US and Russia were revised upwards. Against this background, the assumption for the export-weighted global growth index, based on Türkiye's foreign trade partners, was revised slightly upwards to 2.1% for 2024 and was kept intact at 2.3% for 2025.

***Assumptions are based on tighter global financial conditions compared to the previous reporting period amid stronger expectations for a more cautious stance of major central banks in rate cuts coupled with aggravated geopolitical risks.*** The tightness in global labor markets and the resulting wage pressures lead to stickiness in services inflation in particular, while geopolitical developments have an adverse impact on the disinflation process in global economies through energy prices and supply conditions. While the strong economic activity in the US supports this, the UK and the euro area have seen a more favorable course in recent inflation realizations. Against this backdrop, major central banks are expected to adopt a more

cautious stance in rate cuts. Monetary policies of emerging economies are heterogenous, and rate cut processes accelerated in countries with inflation rates moving towards the target. When all these developments are evaluated together, it is likely that interest rate cuts will spread across advanced and emerging economies in the upcoming period in line with the decline in inflation. However, given the current levels of global inflation, rigidities and risks, rate cuts are expected to be more cautious than those in the previous reporting period and will be sustained in a way that will maintain monetary tightness.

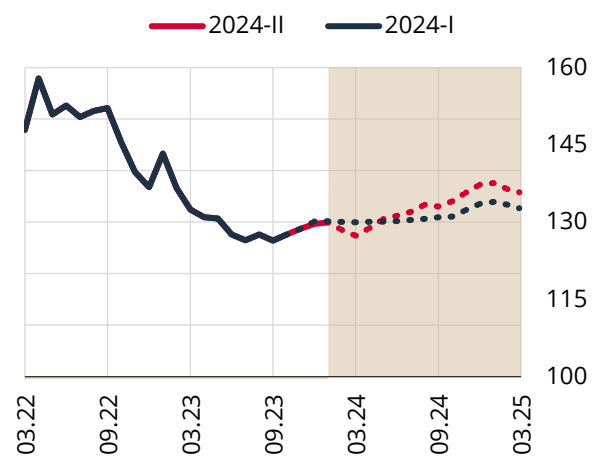
**Global growth and composition, geopolitical tension and supply-side factors continued to shape commodity prices.** Geopolitical turmoil in the Red Sea and the Middle East as well as production cutback by OPEC+ member countries keep supply-side risks in oil prices brisk and sustain upward pressures. The current global growth outlook, inventory levels and financial conditions cause oil prices to fluctuate. Accordingly, oil price assumptions for 2024 and 2025 have been revised upwards, and oil prices are assumed to be USD 86.4 and USD 82.3 on average, respectively (Chart 3.1.1). On the back of the improved growth outlook in China, industrial commodity prices posted notable increases compared to the previous reporting period. Agricultural commodity prices, on the other hand, did not exhibit a homogenous outlook, yet the headline index increased compared to the previous reporting period. Thus, import price assumptions were revised significantly upwards compared to the previous reporting period, for precious and industrial metals in particular. Import prices are projected to increase by 0.8% and 2.6% in 2024 and 2025, respectively (Chart 3.1.2).

**Chart 3.1.1: Revisions in Oil Price Assumptions\*** (USD/bbl)



Source: Bloomberg, CBRT.  
\* Shaded area denotes the forecast period.

**Chart 3.1.2: Revisions in Import Price Assumptions\*** (Index, 2015=100)



Source: CBRT, TURKSTAT.  
\* Shaded area denotes the forecast period.

**The assumption for food prices was slightly revised upwards for 2024.** Annual food inflation ended the first quarter of 2024 at 70.4%, exceeding the assumptions of the previous Report. In April, annual food price inflation fell to 68.5%. Given the recent outlook, the assumption for food price inflation was raised by 0.9 percentage points for 2024 and maintained at 15.0% for 2025 (Table 3.1.2).

**Table 3.1.2: Revisions in Assumptions\***

	2024	2025
Export-Weighted Global Production Index (Annual Average % Change)	2.1 (2.0)	2.3 (2.3)
Oil Prices (Average, USD)	86.4 (83.6)	82.3 (81.2)
Import Prices (USD, Annual Average % Change))	0.8 (-0.1)	2.6 (0.7)
Food Prices (Year-End % Change)	35.5 (34.6)	15.0 (15.0)

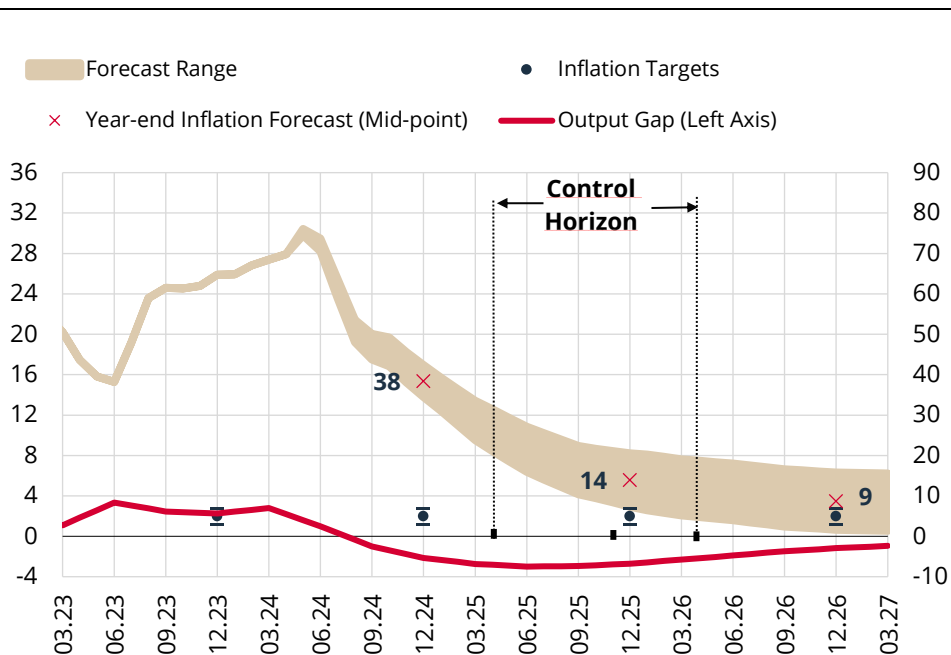
\* Figures in parentheses are from the previous Inflation Report.

**Forecasts are based on an outlook in which macroeconomic policies are determined in a coordinated manner by adopting a medium-term perspective and focusing on disinflation.** In this context, it is assumed that fiscal policy within the framework of the Medium-Term Program will continue to be formed so as to contribute to the rebalancing process in the economy and that administered prices, borrowing, tax and income policies and wage adjustments will be largely determined to support the disinflation process. The outlook underlying our forecasts also implies that earthquake-related expenditures will be balanced and spread over a long period of time so as not to adversely affect budgetary discipline and macro financial stability.

### 3.2 Medium-Term Outlook

**Year-end inflation forecasts were revised as 38% for 2024, while those for 2025 and 2026 were kept intact at 14% and 9%, respectively.** With 70% probability, inflation is projected to be between 34% and 42% (with a mid-point of 38%) at end-2024, between 7% and 21% (with a mid-point of 14%) at end-2025, and to fall to single-digit levels at 9%, before stabilizing at the 5% target in the medium term (Chart 3.2.1). Medium-term projections are based on an outlook in which the tight monetary policy stance will be maintained until the inflation outlook improves significantly, and the coordination among economic policies will be preserved.

**Chart 3.2.1: Inflation Forecasts\* (%)**



Source: CBRT, TURKSTAT.

\* Shaded area denotes the 70% confidence interval for the forecast.

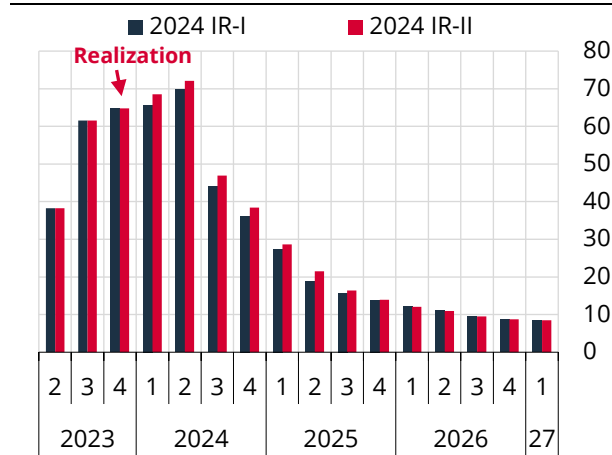
**The revision in the forecast path was driven by the impact of the upward revision in the output gap on initial conditions given the strong demand outlook coupled with inflation realizations that remained above the forecast range of the previous Inflation Report.** Assumptions for oil prices and import prices were revised upwards, while geopolitical developments have weighed on the uncertainty over commodity prices. Table 3.2.1 shows the sources of the upward revision in the inflation forecast for 2024.

**Table 3.2.1: Revisions in Year-End Inflation Forecasts for 2024 and Sources of Revisions**

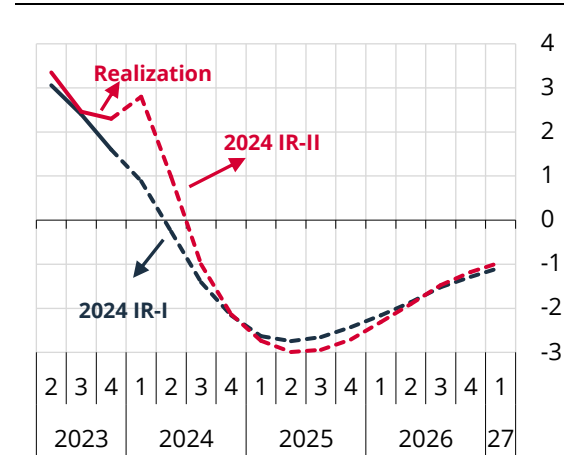
	<b>2024</b>
Inflation Report 2024-I Forecast (%)	36
Inflation Report 2024-II Forecast (%)	38
<b>Forecast Revision Compared to Inflation Report 2024-I</b>	<b>2.0</b>
<b>Sources of Forecast Revision (% Points)</b>	
Underlying Inflation	+1.8
Turkish Lira Import Prices	-0.2
Output Gap	+0.4
Food Prices	+0.2
Administered Prices	-0.2

Source: CBRT.

**The end-2024 inflation forecast was revised upwards to 38%** (Chart 3.2.2). Revised initial conditions were primarily accountable for the revision of forecasts for 2024. The temporary deterioration in exchange rate expectations in February and March affected inflation through the exchange rate, demand and expectations channels, causing the estimated slowdown in the underlying trend of inflation after January to remain limited. Demand conditions were stronger in the first quarter and are expected to converge to the projections laid down in the previous reporting period as of the last quarter of the year (Chart 3.2.3). The rebalancing process in domestic demand is projected to continue on the back of the coordination between tight monetary and fiscal policies. Accordingly, the revision in the output gap forecast pushed the 2024 inflation forecast up by 0.4 points. In addition, the revision in TL-denominated import prices pushed the forecast down by 0.2 points. The rise in food inflation, on the other hand, pushed the forecasts up by 0.2 points. In 2024, it is considered that the final impact of the factors such as automatic tax revisions on alcohol-tobacco and energy prices on year-end inflation will be downside. Thus, the assumption for a more limited increase in administered prices compared to the previous reporting period led year-end inflation forecasts to be revised downwards by 0.2 points (Table 3.2.1). Recently, the underlying trend of inflation has realized above our projections. As the tight monetary policy stance and policy coordination will offset this deterioration in initial conditions, the effect of the underlying trend on year-end inflation is expected to be limited to 1.8 points.

**Chart 3.2.2: Inflation Forecast (Quarter-End, Annual, %)**

Source: CBRT, TURKSTAT.

**Chart 3.2.3: Output Gap Forecast (%)**

Source: CBRT.

**Forecasts are based on an outlook involving tighter than projected global financial conditions in the previous reporting period and a global growth outlook that is largely consistent with past projections.**

Underlining sticky services inflation and tight labor markets, major central banks have given forward guidance stating that they will be more cautious in rate cut cycles contrary to their market pricings in the first months of the year. Global financial markets will experience higher data sensitivity and related higher volatilities in the upcoming period. In this context, monetary policy will remain tight in Türkiye until permanent price stability is achieved, which will help contain the possible adverse impacts of volatile global financial markets on the sovereign risk premium.

**Forecasts rely on a monetary policy that will remain tight until a significant and sustained decline in the underlying trend of monthly inflation is observed, and inflation expectations converge to the projected forecast range.** With the contribution of the financial policies that will support and strengthen monetary transmission and monetary policy forward guidance emphasizing the decisive tight stance, the convergence of inflation expectations to the Inflation Report forecasts in the short term and to the inflation target in the medium term is critical for ensuring a permanent decline in inflation. It is considered that macroprudential policies will remain in effect to support monetary transmission, and financial conditions will be tightened. Medium-term forecasts rely on an outlook involving an uptick in loan rates which will result in a slowdown in loan growth and balancing in domestic demand. Moreover, it is assumed that the fiscal discipline will be preserved and fiscal policies will support the disinflation process in coordination with the monetary policy.

**After hitting the peak in May, inflation is projected to decline steadily in the remainder of the year.**

Indicators for the underlying trend of inflation, albeit with some deceleration, display a more unfavorable outlook compared to the forecasts of the previous Inflation Report. The expiration of the arrangement offering 25 m<sup>3</sup> of the natural gas free of charge will push monthly inflation up by 0.66 points in May. Moreover, inflation will peak in May due to the unfavorable base effect. Thanks to the strong increase in the policy rate in March, additional macroprudential measures and the tightening in financial conditions, the rebalancing in domestic demand is considered to become more evident as of the second quarter of the year (Chart 3.2.3). The decisive monetary policy stance is expected to ensure moderation in domestic demand, real appreciation in the Turkish lira and improvement in inflation expectations. All these factors are expected to lower the underlying trend of monthly inflation and establish disinflation in the second half of 2024. Meanwhile, seasonally adjusted average monthly inflation is projected to fall to around 2.5% in the third quarter and slightly below 1.5% in the last quarter. As the stickiness in services inflation weakens during this process and the monetary stance is maintained in line with the targets, the underlying trend of inflation will further recede to historical averages in 2025.

**Analyses of the impact of the monetary tightening suggest that the banking sector will remain robust.**

Approximately half of the banks' TL-denominated loans and securities portfolios are at floating rates. Turkish lira fixed-rate securities are mainly accounted for at amortized cost, which is not sensitive to interest rate changes. In addition, the maturity of banks' borrowing is extended with the backing of reserve

requirement practices, and the declining risk premium reduces the sector's vulnerability to interest rate changes. The capital adequacy ratio of the banking sector, which is well above the legal limits, is considered to be sufficient to absorb losses that may stem from interest rate changes. Banks' asset quality and profitability indicators remain strong, which supports financial stability during the monetary tightening period.

### 3.3. Key Risks to Inflation Forecasts and Possible Impact Channels

***Geopolitical developments and volatilities in commodity prices pose upside risks to inflation forecasts.***

The volatility in oil prices caused by geopolitical risks and continued production cuts by OPEC+ countries is expected to persist. Effects of the developments in the Red Sea on transportation costs are also monitored. Geopolitical developments may also affect the risk perceptions about Türkiye through external demand and export revenues.

***Although the fall in core inflation continues in advanced economies, the downward course in headline inflation has been replaced by a rather flat course in the current reporting period.***

The stickiness in services inflation emerges as one of the most significant factors slowing the convergence of headline inflation to the targets in advanced economies. Expectations that central banks of advanced economies will be more cautious in their rate cuts have strengthened given the level of headline inflation, stickiness in inflation, and upside risks. This exerts pressure on global financial conditions and keeps downside risks to the global growth outlook alive. These two factors, in turn, may play a role in inflation dynamics by affecting domestic exchange rates, aggregate demand conditions, and import prices through capital flows, external demand, and commodity prices.

***Persistent domestic demand poses upside risks to inflation forecasts.*** The disinflation process may be weakened if the decelerating effects of monetary tightening on domestic demand are not seen quickly enough. Recent indicators suggest that domestic demand has remained strong in the first quarter of 2024. However, domestic demand is expected to rebalance on the back of the impact of the current tight monetary policy on financial conditions. This rebalancing in domestic demand is projected to contribute to the current account balance by weakening imports, and to the fall in inflation through the demand channel by moderating excessive consumption. On the other hand, likely upside risks that the elevated levels of inflation expectations may pose to the consumption tendency and loan demand may cause domestic demand to gain persistence and hamper the rebalancing process.

***Inflation expectations remain elevated.*** Inflation expectations of economic units (professionals, firms and consumers) play a key role in pricing behavior, wage decisions, portfolio preferences and consumption/credit demand (Box 3.1). Alignment of inflation expectations with the CBRT's inflation forecasts in the short term and with inflation targets in the medium term is critical for the disinflation process. According to the Survey of Market Participants, medium-term inflation expectations continue to come down despite still hovering above targeted levels. Continuation of this downward movement will contribute to the disinflation process through the price-setting behavior. On the other hand, inflation expectations of firms and consumers remain both elevated and persistent. This indicates that a patient and decisive stance in monetary policy will be important.

***The continued stickiness of services prices and a slower-than-anticipated deceleration in the underlying trend of inflation may keep inflationary pressures alive.*** Despite the recent slowdown, the underlying trend is somewhat above the level projected in the previous Inflation Report. Another risk factor for inflation forecasts is the interruption of the deceleration in the underlying trend due to the possible brisk course of domestic demand and the elevated course of food prices (meat in particular) and services prices (rents in particular).

***Adjustments likely to be made in indirect taxes to finance earthquake-related public expenditures may pose upside risks to inflation.*** The amount and timing of earthquake-related public expenditures will be important for maintaining fiscal discipline. The success of the fight against inflation requires an effective coordination between monetary and fiscal policies. Therefore, supporting the tight monetary policy stance with fiscal discipline is essential for anchoring price-setting behavior, rebalancing domestic demand and improving the sovereign risk premium. In addition, a rise in the weight of indirect taxes in the tax revenues policy may not only directly increase consumer prices but also may have secondary effects by distorting

inflation expectations. In this respect, steps towards enhancing the efficiency of tax collection or increasing the weight of direct taxes may support the disinflation process.

**Coordination of monetary and fiscal policies is crucial in the disinflation process.** The incomes policy may affect inflation and expectations through the demand and production cost channels. Tax and administered price adjustments that are not in line with the projected disinflation path may also put pressure on inflation. Therefore, the frequency of wage adjustments, the conduct of administered price, wage and tax adjustments in view of the inflation forecasts presented in the MTP, and the underpinning of the tight monetary policy stance with prudent fiscal policy are critical to establish the projected disinflation path.

**Table 3.2.2: Key Risks to Inflation Forecasts and Possible Impact Channels\***

Risk	Evaluation of Risks Compared to the Baseline Scenario and Possible Effects on Inflation (↑   ↔   ↓)	Tracked Indicators
Risks to the course of energy prices	<ul style="list-style-type: none"> <li>• Continued production cuts by OPEC+ countries and the strong global demand outlook pose upside risks to oil prices from both supply and demand channels.</li> <li>• The geopolitical risks-driven volatility in oil and commodity prices may continue.</li> </ul>	<ul style="list-style-type: none"> <li>• Crude oil prices and demand-supply balance</li> <li>• OPEC+ decisions</li> <li>• Indicators for domestic energy market</li> <li>• Administered prices</li> </ul>
Risks to global financial markets and macroeconomic outlook	<ul style="list-style-type: none"> <li>• Strengthened expectations that the central banks of advanced economies will be more cautious in their rate cuts given the stickiness in inflation and upside risks put pressure on global financial conditions.</li> </ul>	<ul style="list-style-type: none"> <li>• Global inflation rates</li> <li>• Monetary policy response in advanced and emerging economies</li> <li>• Global risk appetite indicators</li> <li>• Export-weighted global economic activity index</li> <li>• Global trade volume and inflation developments</li> <li>• Import and commodity prices</li> </ul>
Demand conditions	<ul style="list-style-type: none"> <li>• The persistent domestic demand continues to exert demand-side pressure on inflation. Domestic demand is expected to moderate on the back of the tight monetary policy.</li> </ul>	<ul style="list-style-type: none"> <li>• Domestic demand indicators</li> <li>• Retail sales volume index</li> <li>• Credit card spending</li> <li>• White goods and automobile sales</li> </ul>







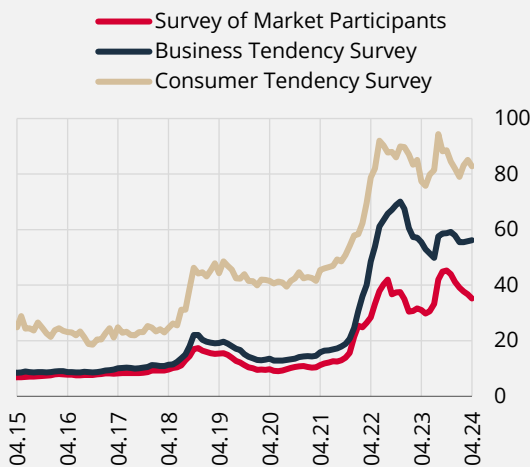
## Box 3.1

### Inflation Expectations of Firms

Inflation expectations of firms play an important role in understanding pricing behavior due to their price-determining role in the economy. In addition, firms take into consideration the future inflation rates when determining employee wages and forming inventory and investment strategies. Bunn et al. (2022) showed that the margin of error in firms' inflation expectations is related to low profitability and total factor productivity. The expectations of firms that hold the power to determine prices also have important consequences for monetary policy. For example, if firms expect permanent and high inflation, they may increase prices more aggressively, seeking to protect their profit margins, and if this is reflected in wage levels in the economy, it may create a self-reinforcing inflationary spiral. This may also negatively affect the effectiveness of the monetary policy transmission mechanism. Therefore, central banks closely monitor firms' inflation expectations as an important indicator of the future course of inflation. The inability to anchor expectations or any significant deviation of the central bank from its target makes it difficult to achieve the price stability goal. Therefore, from the point of view of policy makers, survey data on inflation expectations of firms have an important information value.

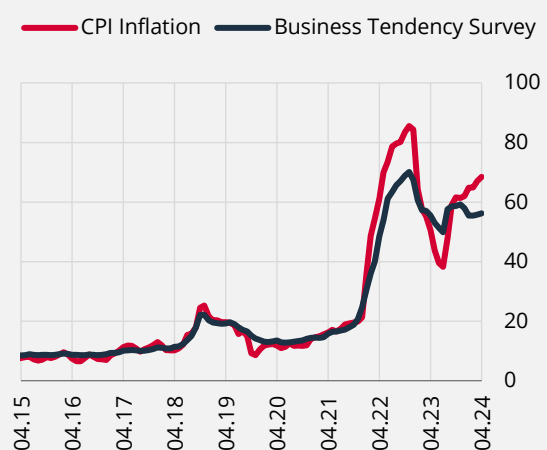
In this box, firms' CPI inflation expectations are analyzed using the micro data of the Business Tendency Survey applied by the CBRT to firms operating in the manufacturing industry in Türkiye. In this context, first of all, the average firm-based expectations are compared with the inflation expectations of market participants and consumers, and then inflation uncertainty is examined through the rounding behavior of firms to certain numbers when expressing inflation expectations. In the Business Tendency Survey, firms are asked about their "annual consumer price inflation expectations as of the end of the next twelve months".<sup>1</sup> In Chart 1, the sectoral weighted average values of the firms' inflation expectations calculated using the answers given to this question are compared with the appropriate averages of the inflation expectations of the Survey of Market Participants and Consumer Tendency Survey.

**Chart 1: 12-Month-Ahead Inflation Expectations (%)**



Source: CBRT, TURKSTAT.

**Chart 2: CPI Inflation and 12-Month-Ahead Inflation Expectations of Firms (%)**



Source: CBRT, TURKSTAT.

<sup>1</sup> Data on firms' CPI inflation expectations are not disclosed to the public and are collected regularly by the CBRT. In the Business Tendency Survey, firms are also asked about their "annual producer price inflation expectations as of the end of the next twelve months". Since there is no expectations of other economic agents regarding producer prices, this study focuses on consumer inflation expectations.

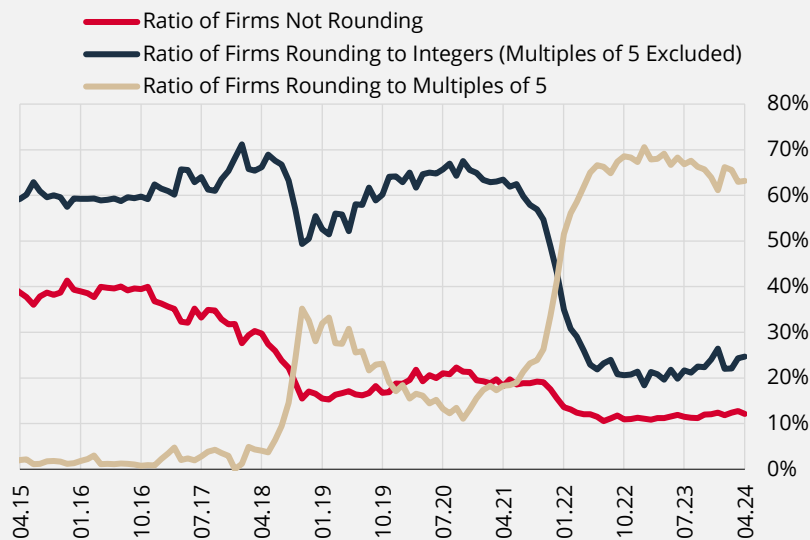
Compared to the consumer inflation expectations examined in CBRT (2024), it is seen that firms made inflation forecasts that were closer to those of market participants until the end of 2021. After the last quarter of 2021, when inflation and the exchange rate increased rapidly, the relation between the expectations of firms and market participants has weakened, and the deterioration in firm inflation expectations was more evident than the deterioration in the expectations of consumers and professionals. When the inflation expectations of the recent period are examined, while the exchange rate developments in June and July 2023 caused an increase in the expectations of all economic units, this increase remained relatively limited in firms. On the other hand, the improvement in firms' inflation expectations after the monetary tightening that started in the second half of 2023 is not as strong as that of consumers and market participants. When firms' inflation expectations and actual inflation rates are compared, it is seen that firms opt for backward-indexation when determining their consumer inflation forecasts and that the sensitivity to the previous month's annual CPI inflation is high (Chart 2). Although this close relationship weakens with the rise in inflation at the end of 2021, firms set their inflation expectations at levels closer to realized inflation rates compared to other economic agents. However, despite the recent increase in annual CPI inflation, the flat course of firms' expectations stands out as a positive development.

The rounding effect of consumer inflation expectations was analyzed in CBRT (2024). Similarly, this box investigates whether firms tend to give an approximate number that is imprecise and may include other numbers nearby to express their estimates in consumer inflation expectations shared in the Business Tendency Survey. Binder (2017) introduced a method that measures uncertainty at the micro level and time series dimension by associating the rounding effect in inflation expectations stated by consumers with inflation uncertainty. In that study, it is assumed that the inflation expectations of each consumer participating in the survey came from the subjective probability distribution and that consumers with uncertainty above a certain level round their inflation estimates to multiples of five. Thus, the uncertainty levels of survey participants can be calculated probabilistically, and the proportion of participants who round their estimates for each month can be estimated. The subjective probability mass distribution functions of consumers with low and high uncertainty groups can be written as follows:

$$\begin{aligned}\Phi_t^l &= P(\pi_{it}^e = j | i = \text{Low Uncertainty}) = \int_{f_{\min(j)}^l}^{f_{\max(j)}^l} p_d(\pi_{it}^e, \theta^l) dx, \quad j \in S_l \\ \Phi_t^h &= P(\pi_{it}^e = j | i = \text{High Uncertainty}) = \int_{f_{\min(j)}^h}^{f_{\max(j)}^h} p_h(\pi_{it}^e, \theta^h) dx, \quad j \in S_h\end{aligned}$$

For consumer  $i$  at any time  $t$ ,  $\Phi_t^l$  and  $\Phi_t^h$  denote the probability distribution mass function of low and high uncertainties, respectively, and  $\pi_{it}^e$  denote the inflation expectation of consumer  $i$ .  $S_l$  and  $S_h$  indicate the response set for the relevant uncertainty groups,  $S_d = \{1, 2, 3, 4, 5, \dots\}$  and  $S_y = \{5, 10, 15, \dots\}$ .  $f_{\min(j)}$  and  $f_{\max(j)}$  are used for the lowest and highest possible forecast values that can be given for the relevant uncertainty groups. Finally,  $p_l$  and  $p_h$  refer to the probability distribution function, and  $\theta = \{\theta^d, \theta^y\}$  refers to the parameter set of the distributions. Since each participant who gives an expectation of five and multiples of five does not necessarily round their estimate to multiples of five, the group of consumers cannot be directly observed. Accordingly, the participants' predictions come from mixture of two distributions  $\Phi_t = (1-\lambda)\Phi_t^l + \lambda\Phi_t^h$  in each month. In this equation, the parameter  $\lambda$  gives the proportion of consumers who round up to multiples of five, i.e. those with high inflation expectation uncertainty. Maximum likelihood estimates of the parameters of the mixture distribution,  $\lambda$  and  $\theta$ , are estimated by the expectation maximization method. Briefly, the share of firms who responded with rounding behavior among those who answered five and multiples of five is estimated.

The method of Binder (2017) is also applied to survey results containing inflation expectations of different agents instead of consumers (Clements, 2020). In this box, the rounding effect of firm expectations included in the Business Tendency Survey is estimated. Unlike Binder (2017), instead of two different uncertainty groups, firms are analyzed in three different groups: those who give decimal estimates (those who do not round), those who round to integers (except for multiples of five), and those who round to multiples of five. Thus, the proportion of firms with low, medium and high inflation uncertainty are estimated.

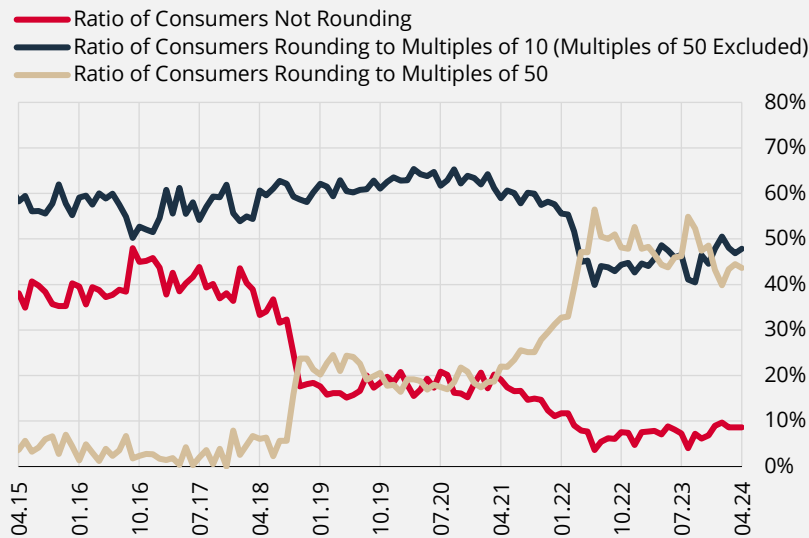
**Chart 3 : Rounding Behaviour of Firms (%)**

Source: CBRT.

When the uncertainty of firms' inflation expectations is analyzed through rounding behavior (Chart 3), the share of firms that do not round and those with low uncertainty (those who estimate decimal numbers) decreased in 2018 and 2021 amid sharp increase in inflation rates. On the other hand, the share of the group with high inflation uncertainty (those rounding to multiples of five) increased from 15% to 35% in the second half of 2018. With the effect of the disinflation process and the improvement in inflation expectations that followed the monetary tightening in 2018, the share of this group improved and decreased to 20% in 2019. As of the last quarter of 2021, the share of firms with high uncertainty continued to rise in line with the increase in inflation and reached 70% at the beginning of 2023. The share of this group, which reached 63% after the recent moderate decline, still remains high.

In order to compare the inflation expectations of different economic agents, the same methodology is applied to consumer inflation expectations obtained from the Consumer Tendency Survey. Consumers prefer round numbers, hence, rather than giving a precise inflation forecast value, they give the forecast, a round number, which can be called more 'categorical'. To examine these less sharp forecast values, the rounding effect in consumer expectations is calculated based on multiples of 10 (excluding multiples of 50) and multiples of 50, which are commonly observed in micro data.

Here, it is assumed that consumers with low, medium and high uncertainty round to integers (except multiples of 10), multiples of 10 (excluding multiples of 50), and multiples of 50, respectively. The course of the shares of these three groups is shown in Chart 4 and reveals that, similar to the outlook in firms' expectations, there has been an increase in the high uncertainty group after 2021. Even though uncertainty remained high in the last months of the past period, its share has decreased. However, unlike firms, consumers seem to round their forecasts to multiples of higher values. This shows that, regardless of the level of inflation, consumers express their inflation forecasts in a wider range, which is imprecise and based on products with high price increases in the consumption basket.

**Chart 4: Rounding Behaviour of Consumers (%)**

In this box, firms' inflation expectations are analyzed and uncertainties regarding inflation expectations are estimated by improving the method presented in Binder (2017). The rounding behavior that exists in consumer expectations is also observed in firms' expectations, albeit at lower multiples (multiples of five instead of multiples of 50). Moreover, neither the level nor the course of uncertainty of inflation expectations for both agents have reached the desired levels for the disinflation process. The CBRT will continue to closely monitor the inflation expectations of economic agents through micro data.

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