

INFLATION EXPECTATIONS AND CENTRAL BANK COMMUNICATION IN TURKEY

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ABSTRACT This study assesses how inflation expectations respond to inflation targets, forecasts, and realizations with a particular focus on whether the sensitivity of expectations to inflation realizations increases with the level of inflation. For the sample period between April 2006 and May 2012, our findings indicate that forecasts, targets, and past inflation are important determinants of inflation expectations. Moreover, expectations are more sensitive to inflation realizations at higher levels of inflation. Interestingly, we find that sensitivity of expectations to inflation has decreased over time, especially since the end of 2011 despite a very rapid and sizable increase in CPI inflation due to one-off factors. Our results suggest that the implementation of tight monetary policy and intensive communication efforts by Central Bank of the Republic of Turkey might have reduced the sensitivity of expectations to the inflation realizations.

JEL C51, E58

Keywords Monetary policy, Inflation expectations, Central bank communication

ÖZ Bu çalışma Türkiye’de enflasyon beklentilerinin hedeflere, resmi tahminlere ve enflasyon gerçekleşmelerine duyarlılığını incelemektedir. Analizde beklentilerin enflasyona duyarlılığının enflasyon seviyesi ile birlikte artış artmadığına da özel olarak odaklanılmaktadır. Nisan 2006-Mayıs 2012 dönemi örneklemleri ile elde edilen bulgular, resmi tahminlerin, enflasyon hedefinin ve enflasyon gerçekleşmelerinin beklentilerin önemli belirleyicileri olduğunu göstermektedir. Ayrıca, beklentilerin enflasyona duyarlılık derecesinin daha yüksek enflasyon düzeyinde daha fazla olduğu gözlenmektedir. Öte yandan, beklentilerin enflasyon gerçekleşmelerine olan duyarlılığı zaman içinde, özellikle enflasyonda geçici faktörlere bağlı hızlı ve gözle görülür artışların gerçekleştiği 2011 yılı sonundan bu yana azalmıştır. Bu sonuçlar, Türkiye Cumhuriyet Merkez Bankasının sıkı para politikası uygulamalarının ve yoğun politika iletişiminin, beklentilerin enflasyon gerçekleşmelerine olan duyarlılığının azalmasında etkili olabileceğini ima etmektedir.

TÜRKİYE’DE ENFLASYON BEKLENTİLERİ VE MERKEZ BANKASI İLETİŞİMİ

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Anahtar Kelimeler Para politikası, Enflasyon beklentileri, Merkez bankası iletişimi

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1. Introduction

The analysis of survey-based inflation expectations spans a long list of studies revealing their different aspects ranging from testing their rationality to macroeconomic determinants.¹ Besides being a matter of academic interest, the latter attracts attention also by central banks, whose monetary policy design and implementation problem partly entail the measurement of the credibility of the policies. In particular, the studies on the determinants of inflation expectations have been quite frequently conducted for assessing the extent to which inflation expectations respond to different monetary policy regimes or fiscal stance.²

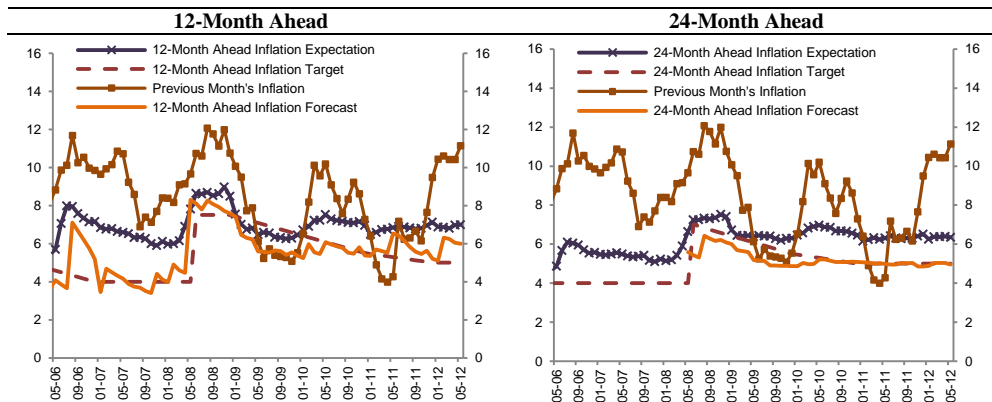
In this study, we ask a slightly different question from earlier studies focusing on how inflation expectations respond to forward-looking signals on inflation outlook, such as the official forecasts and targets, and the inflation realizations. In particular, we ask whether the sensitivity of inflation expectations to the inflation realizations, besides the level of expectations itself, change with the inflation realizations. In order to test this, we modify the framework used by Başkaya, Kara, and Mutluer (2008) and Başkaya, Gülşen, and Orak (2010) such that the level of latest inflation realizations potentially affects the degree to which the inflation expectations react to the realizations. Besides providing a test for this hypothesis using the Survey of Expectations by Central Bank of the Republic of Turkey (CBRT) for April 2006 and May 2012, we also assess how this sensitivity changed over time by using 48-month rolling window of samples. A particular sub-period that we analyze with these samples is the period after the second half of 2011, where the consumer price index has been disturbed by a series of sizable but temporary shocks, significantly increasing the annual inflation rates within the course of few months (Figure 1). This period attracts attention as a period of considerable policy communication by CBRT emphasizing that these increases are temporary and monetary

¹ For studies on the macroeconomic determinants of inflation expectations, see Figleski and Wachtel (1981) and Gramlich (1983) for United States, Pesaran (1985) and Lee (1994) for United Kingdom.

² For example, Cerisola and Gelos (2005) and Bevilaqua et al. (2007) show that the expectation formation process changed in Brazil with the implementation of the inflation-targeting regime. Minella et al. (2003) emphasizes the role of credibility of the inflation targets to anchor expectations in Brazil. For Turkey, Celasun, Gelos and Pratti (2004) show that fiscal variables such as the primary budget surplus or debt burden have been among important factors for in expectations formation. For other studies on formation of inflation expectations in Turkey, see also Barlas-Özer and Mutluer (2005), Kara and Küçük-Tuğer (2010) and Çiçek et al. (2011).

authority will implement what it takes to keep the inflation in line with the 5-percent annual CPI inflation target.³

Figure 1. Inflation Realizations, Expectations, Targets, and Forecasts



Inflation expectations are the average of the first and the second survey period results of the CBRT's Survey of Expectations. Monthly inflation target series are computed by the linear interpolation of the year-end inflation targets. Source: TurkStat, CBRT.

Our main results are follows: First, in line with earlier studies on inflation expectations in Turkey, we find that the 24-month ahead inflation expectations are relatively more sensitive to the forward looking signals on inflation than the 12-month ahead inflation expectations. In contrast, the inflation expectations at the longer horizon are less sensitive to inflation outturns than those at the shorter horizon. Second, considering the entire sample, we show that the response of expectations to the inflation realizations shows a significant convexity such that the expectations become more sensitive to the inflation realizations as the level of inflation increases. Third, considering the results obtained with 48-month rolling windows, we observe that the sensitivity of inflation expectations to the inflation realizations has declined in the recent periods, which coincide with the period in which CBRT intensified its communication emphasizing the price stability as the main ultimate objective and the one-off and temporary nature of the shocks that led higher CPI inflation.

The rest of the study is structured as follows. In the next section, we present the main features of our dataset and our empirical model. In section 3, we present our empirical results and its possible implications for the recent communication policy conducted by CBRT. Section 4 presents the concluding remarks.

³ See Başçı and Kara (2011) and Kara (2012) for a more detailed evaluation of this period.

2. Data and Empirical Model

In this study, we use 12-month and 24-month ahead CPI inflation expectations data from the CBRT's Survey of Expectations. The Survey is conducted bimonthly since August 2001, where the survey participants are asked in the first and third weeks of the each corresponding month for their consumer price inflation expectations at various horizons, such as year-end, current and next month, 2-months ahead, 12-months ahead, and 24-months ahead.⁴ The Survey aims at keeping track of the expectations of experts and decision makers from the financial and real sectors, regarding to macroeconomic outlook of Turkey with special emphasis on the monetary policy, inflation, economic activity, and financial markets. The analysis covers the period between April 2006 (the date where the participants were asked for the first time about 24-month ahead inflation expectations) and May 2012. With the presumption that the participants would have a longer time for processing the information content of the most recent inflation numbers, which are announced in the first week of each month, we use the survey responses in the second survey period of each month.⁵

In line with the earlier studies using the Survey for analyzing the relationship between the inflation expectations and macroeconomic variables, such as Başkaya, Kara, and Mutluer (2008) and Başkaya, Gülşen and Orak (2010), we construct the following empirical model:

$$\pi_{i,t,t+k}^e = \beta_0 + \mu_i + \beta_1 \pi_{t-1} + \beta_2 \pi_{t-1}^2 + \beta_3 \pi_{t,t+k}^z + \gamma X_t + \varepsilon_{it} \quad (1)$$

$$k = 12, 24. \quad z = h, f$$

where the dependent variable $\pi_{i,t,t+k}^e$ shows k-month ahead inflation expectations of participant i answering the CBRT's Survey of Expectations at time t, π_{t-1} is the annual inflation rate of the previous month. $\pi_{t,t+k}^h$ and $\pi_{t,t+k}^f$ represent the CBRT's k-month ahead inflation targets and inflation forecasts respectively. As the official targets by the CBRT are announced only for the end of each calendar year, monthly inflation targets are obtained by linear interpolation between year-end inflation targets.⁶ As the measure of inflation forecasts, we use in this study is the center point of the CBRT's k-month ahead inflation forecasts of the most recent inflation report at time t. We also control for a number of macroeconomic variables denoted by the

⁴ The survey also asks for the participants' expectations about interest rates, exchange rates, current account balance, and GDP growth rate.

⁵ It should be noted that the choice of the survey period does not affect our main results.

⁶ The year-end inflation target was kept constant despite the upward revision in June 2008, while inflation targets for end 2009 and 2010 were revised from 4 percent to 7.5 percent and 6.5 percent, respectively. Accordingly, the 12-month ahead inflation targets for the June-December 2008 period was taken as 7.5 percent, whereas linearly interpolated values using the revised inflation target figures were utilized for the subsequent period. For the 24-month ahead inflation targets, linearly interpolated values using the revised inflation targets are used.

vector X , such as annual percentage change in the monthly average TL value of one US dollar and one euro basket exchange rate, risk premium measured by the monthly average level of EMBI + Turkey, the deviation of the seasonal adjusted industrial production from its trend obtained using HP filter and finally the annual change of crude oil prices. In the estimation process, it is seen that the explanatory variables in the model and time invariant characteristics of survey respondents are uncorrelated. Therefore, the model is estimated by using random effect estimation method. The lag structure of the variables is chosen with respect to information constraints at time t .

The key difference of this model from earlier studies on the behavior of inflation expectations is that it allows for the possibility that the sensitivity of inflation expectations to inflation realizations depend on the level of inflation by including the square of inflation realizations π_{t-1}^2 as a control variable. With such a specification, the sensitivity of inflation expectations to inflation realizations is given by $\beta_1 + 2\beta_2\pi_{t-1}$, where a positive and significant β_2 coefficient implies that the sensitivity of inflation expectations on inflation realizations increases with the level of inflation.⁷ On the other hand, β_3 represents the weight assigned to inflation targets/forecasts in the expectations formation.⁸

Finally, considering the CBRT's communication policy emphasizing the official inflation forecasts as the appropriate potential anchor for the 12-month ahead expectations and the targets as the appropriate potential anchor for the 24 month ahead expectations, we use official inflation forecasts and inflation targets for the regressions focusing on the behavior of the 12-month and the 24-month ahead inflation expectations respectively.⁹

3. Empirical Findings

3.1. The Results for the Entire Sample Period

Table 1 presents the estimation results obtained for the 12-month and the 24-month ahead inflation expectations for April 2006- May 2012 period. These results suggest that sensitivity of inflation expectations to both inflation realizations and inflation targets/forecasts are significant at both horizons. In particular, we observe that the 24-month ahead inflation

⁷ It should be reminded that in this model β_1 coefficient does not reflect the effect of inflation realization by itself.

⁸ It is possible that inflation expectations might be affected by inflation realizations and vice versa. However, it is thought that pass-through from inflation expectations to inflation realizations is valid in the long run. While this endogeneity problem does not change the relative value of the coefficients in the model, it might cause upward bias especially in the coefficient of past inflation. This should be in mind while interpreting coefficients.

⁹ This choice is also consistent with the empirical findings of Başkaya, Kara and Mutluer (2008).

expectations are more sensitive to the forward looking signals conveyed by the CBRT on the future path of inflation than 12-month ahead expectations. Keeping all other factors constant, we observe that 1 percentage point decline in the targets is associated with 0.56 percentage point decline in expected CPI inflation for 24-months ahead. On the other hand, 1 percentage point decline in the official forecasts translate into 0.31 percentage point decline in expected CPI inflation for 12-months ahead.

Table 1. Sensitivity of Inflation Expectations to Macroeconomic Variables

	12-month ahead expectations (1)	24-month ahead expectations (2)
π_{t-1}	-0.266*** (0.052)	-0.079 (0.049)
π_{t-1}^2	0.027*** (0.003)	0.011*** (0.003)
$\pi_{t,t+k}^f$	0.307*** (0.024)	
$\pi_{t,t+k}^h$		0.557*** (0.050)
$\Delta basket_{t-1}$	0.004* (0.002)	0.006*** (0.002)
$embi_{t-1}$	-0.000 (0.000)	-0.001** (0.000)
ip_{t-2}	0.004 (0.005)	0.007 (0.007)
Δoil_{t-1}	0.002*** (0.001)	0.002*** (0.001)
Observations	5879	5544
No of respondents	159	150
R²	0.348	0.215
$\beta_1 + 2\beta_2\pi_{t-1}$	0.188*** (0.016)	0.100*** (0.018)

Notes: (1) The sample period is April 2006-May 2012. (2) π_{t-1} : Annual inflation rate of the previous month, $\pi_{t,t+k}^f$: CBRT's k-month ahead inflation forecasts, $\pi_{t,t+k}^h$: CBRT's k-month ahead inflation targets, $\Delta basket_{t-1}$: Annual percentage change in the monthly average TL value of one US dollar and one euro basket, $embi_{t-1}$: Monthly average level of EMBI+ Turkey, Δoil_{t-1} : Annual change of crude oil price, ip_{t-2} : Deviation of the seasonal adjusted industrial production from its trend. The lag structure of the variables is chosen with respect to information constraints at time t . (3) $\beta_1 + 2\beta_2\pi_{t-1}$ gives the effect of inflation realizations at time $t-1$ on the expectations at time t . This effect is calculated at the average level of past inflation level for the estimation period (4) (*), (**), and (***) represent statistical significance at levels of 10, 5 and 1 percent, respectively, where robust standard errors clustered for survey respondent id are given in parentheses.

A particular observation regarding the sensitivity of inflation expectations to the inflation realizations is that the expectations became more sensitive to the inflation realizations at higher levels of inflation outturns, as suggested by positive and significant coefficient on the inflation-squared. The

magnitudes of estimates for the β_2 coefficient presented in columns 1 and 2 of the Table 1 also suggest that there is a higher degree of convexity in 12-month ahead expectations with respect to the inflation realizations. This implies that, in our sample period, the sensitivity of the 12-month ahead inflation expectations to inflation realizations has increased more rapidly than the sensitivity of the 24-month ahead inflation expectations. Finally, the last line of the Table 1 suggests that 1 percentage point increase in CPI inflation increases the 12-month ahead and the 24-month ahead inflation expectations by 0.19 and 0.1 percentage points respectively, when evaluated at the sample average of the annual CPI inflation rate in our sample period, i.e. 8.49 percent.

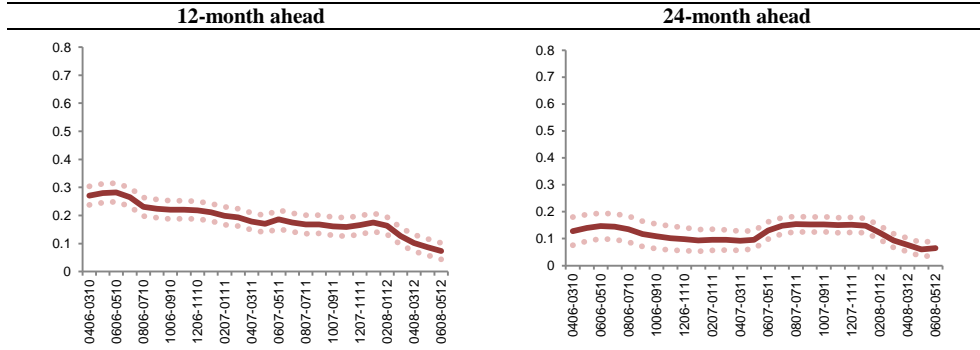
3.2. 48-Month Rolling Windows

For assessing the changing nature of the relationships between expectations and key macroeconomic variables, we estimate our model also using the 48-month rolling windows. First, we observe that the sensitivity of expectations to inflation realizations has been quite low. For the particular case of the 12-month ahead expectations, this sensitivity has steadily declined overtime and reached a similar magnitude with the sensitivity observed for the 24-month ahead expectations. The CBRT's intense communication efforts to inform the public about one-off movements in inflation preemptively might have some role in driving these results.¹⁰

Another important observation regarding the results in Figure 2 is that there is a notable decline in the sensitivity of both 12- and 24-month ahead inflation expectations to inflation realizations since the end of 2011. This particular period is associated with rapidly soaring inflation period as a result of one-off factors such as depreciation in the Turkish lira during the European Debt Crisis, the tax and administered price adjustments, and unprocessed food price hikes as well as a bold policy response by the CBRT with substantial monetary policy tightening and emphasis on the nature of these shocks. The results presented in Figure 3, indicating that the sensitivity of expectations to realized inflation rates has shown a significant decline since the end of 2011, are consistent with the interpretation that the CBRT's policy intentions and communication have been well-received by the economic agents. In fact, inflation expectations did not mark a sizable increase albeit the remarkably sharp and large hike in inflation.

¹⁰ Examples of such a communication constitute emphasis on the nature of the shocks in the MPC Meeting Summaries, Inflation Reports, and the presentations of the CBRT officials, as well as the Monthly Price Developments Report, published in the following day of the official CPI announcement, which aims at informing the public about the sources of changes in the latest CPI inflation figures.

Figure 2. Sensitivity of Inflation Expectations to Inflation Realizations
($\beta_1 + 2\beta_2\pi_{t-1}$, 48-month rolling windows)

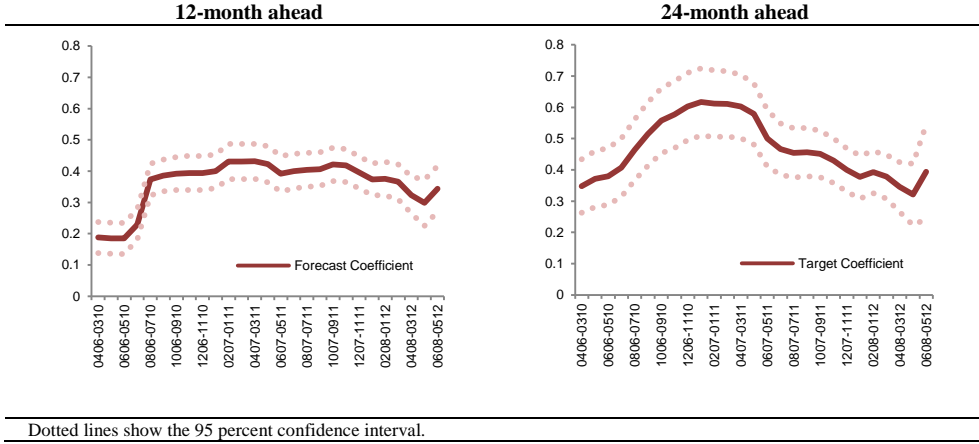


Dotted lines show the 95 percent confidence interval.

Finally, Figure 3 represents the sensitivity of 12-month and 24-month ahead inflation expectations to official inflation forecasts and to inflation targets respectively. These results reveal that there is no significant change in the sensitivity of 12-month inflation expectations to inflation forecast during the period when the CBRT increased its emphasis to price stability objective in its communication policy since the end of 2011. In the same period, the sensitivity of 24-month ahead expectations to the target has shown a limited decline through 2011. However, we observe that inflation expectations remained significantly sensitive to the targets even in a period when inflation displayed a sharp increase. More importantly, inflation targets remained to be a significant anchor even though the sharp increase coincided with a period in which the CBRT highlighted financial stability as a supplementary objective to the price stability in response to macro-financial risks that built up in the aftermath of the global economic crises.¹¹ Interestingly, following the period of the recent policy tightening and the increased emphasis on the short-lived nature of the inflation shocks, the sensitivity of the 24-month expectations to the inflation targets has started increasing again.

¹¹ See Başçı and Kara (2011) and Kara (2012) for a more detailed evaluation of this period.

Figure 3. Sensitivity of Inflation Expectations to Inflation Forecasts and Targets (β_3 , 48-month rolling windows)



Dotted lines show the 95 percent confidence interval.

4. Conclusion

This study assesses the evolution of inflation expectations in Turkey during April 2006- May 2012 period, particularly focusing on whether the sensitivity of expectations to inflation realizations change with the level of inflation rate. We also assess whether there has been a change in the nature of this relationship in the recent period where the inflation has shown a substantial increase rapidly due to one-off factors and the CBRT has in response conducted a considerable policy tightening along with a comprehensive policy communication. Our results show that inflation expectations are sensitive to the inflation realizations for the entire sample period. However, the sensitivity has declined since the end of 2011. Although our results do not provide a formal evidence for the link between this behavior and the CBRT's monetary policy conduct at this period, these findings lend support to the view that the CBRT was able to convince the public regarding its determination to maintain the price stability as well as the temporary nature of the surge in inflation. Therefore, these observations suggest that the CBRT has conducted an effective communication policy in this period.

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