

*Research and Monetary Policy Department*  
*Working Paper No:08/01*

---

---

**Expectations, Communication and  
Monetary Policy in Turkey**

Soner BAŞKAYA  
Hakan KARA  
Defne MUTLUER

March 2008

*The Central Bank of the Republic of Turkey*

---



# **Expectations, Communication and Monetary Policy in Turkey<sup>\*</sup>**

**Soner Bařkaya<sup>+</sup>**

**Hakan Kara<sup>+</sup>**

**Defne Mutluer<sup>+</sup>**

March 2008

## **Abstract**

This study analyzes the behavioral aspects of inflation expectations in Turkey by utilizing data from a panel of survey respondents, and draws implications for the formulation of monetary policy and communication strategy. Our results lend support to the view that the survey respondents take the inflation targets and the official forecasts of the Central Bank of Turkey into account in forming their expectations. We show that inflation expectations during the rapid disinflation episode of 2002-2005 were firmly anchored by the announced targets. Yet, the weight attached to past inflation and the sensitivity of inflation expectations to variables such as exchange rates and the risk premia seem to have increased in recent years. We also show that there is significant heterogeneity in the expectation formation process. Real sector attaches a greater weight to past inflation than the financial sector, suggesting that more effort should be devoted to communicating quantitative policy objectives to the real sector. Moreover, the financial sector appears to be relatively more sensitive to variations in volatile variables such as exchange rates, risk premium and short-term inflation surprises, implying that communication to financial markets should keep emphasizing the medium-term policy perspective of the monetary policy.

---

<sup>\*</sup> The views expressed are those of the authors and should not be attributed to the Central Bank of Turkey. We would like to thank Erdem Bařçı, Oya Celasun, Refet Gürkaynak, Hande Kückük-Tuđer and Fethi Ögünç for useful contributions.

<sup>+</sup> Central Bank of Turkey, corresponding author: [hakan.kara@tcmb.gov.tr](mailto:hakan.kara@tcmb.gov.tr)

## **I. Introduction**

Turkey implemented an ambitious disinflation program in the post-2001 crisis period, bringing inflation down from almost triple digits to single digits between 2001 and 2005. Encouraged by this success, the Central Bank of Turkey (CBT) decided to implement a full-fledged inflation targeting regime at the beginning of 2006. The regime faced its first stress test in the first half of 2006, when the economy was hit by a series of adverse shocks, drifting inflation away from the target. Although the CBT reacted decisively by significantly tightening monetary policy, inflation stayed at relatively high levels due to lagged effects of the accumulated shocks. Breaching the targets by a large margin in the first two years of the new regime increased the role of expectations management in sustaining the disinflation process, as manifested by the prolonged gap between expectations and the target.

Understanding the expectation formation process is one of the key prerequisites for the design of an effective communication and monetary policy. This study analyzes the factors affecting the inflation expectations in Turkey by using individual level survey data for the period between 2003 and 2007. Using the Turkish economy as a background, we try to answer the following questions: How do agents form their inflation expectations? Are there systematic differences across agents? How do monetary policy and economic developments affect the process of expectation formation? Has the expectation formation process changed over time, and if so what are the possible explanations for these changes? The answers to these questions would provide useful information for understanding the expectations channel of monetary policy as well as for developing an effective means of communication strategy.

There is a firm consensus among central bankers that inflation expectations should be monitored closely and that they should be anchored.<sup>1</sup> Identifying the determinants of inflation expectations is key for a central bank to evaluate the functioning of the economy, the risks surrounding the attainability of inflation targets, and the credibility of monetary policy. Therefore, the questions we address above are directly related to the conduct of monetary policy. Expectations of private agents typically enter the information set of central banks in constructing the inflation forecasts and determining the policy stance. Furthermore, responses of expectations to economic shocks or policy changes may convey useful information regarding central bank credibility and monetary policy formulation. In addition, the

---

<sup>1</sup> For example, Mishkin (2007) recently argued that the extent to which inflation expectations are anchored has first-order implications for inflation realizations and overall economic performance.

identification of the degree of forward/backward looking behavior in different sections of the economy may be vital for the design of the communication strategy by central banks.

Our results show that agents, when forming their expectations, pay attention to inflation targets (and forecasts), past realizations of inflation rates, economic activity, variations in the foreign exchange rates, and the country risk premium. What is more, the process of expectation formation seems to be highly variable through time. We identify a clear behavioral shift after June-2006 period when inflation unexpectedly moved back to double digits after the economy was hit by a portfolio shock in the form of a sudden capital outflow: the rolling regressions indicate that agents attach a greater weight to lagged inflation through time, and also there seems to be an increase in the sensitivity to variables such as exchange rates and the risk premium.

At first sight, expectations of the real sector may appear to be the only relevant component for the inflation dynamics and monetary policy, given that the real sector expectations would likely to be a better representative of the actual price setters. However, exploring financial sector's expectations is also important for at least two reasons. First, understanding financial sector's expectations would enhance the ability of the monetary authority to shape up (at least the short to medium end of) the term structure of interest rates, and hence would increase the effectiveness of monetary policy. Second, if the financial agents' expectations display high sensitivity to volatile variables, this may result to overreaction in asset prices in response to noisy information. Therefore, understanding the behavioral aspects of the different sections of the economy may be useful for the monetary policy design and inflation dynamics.

Accordingly, we ask whether expectation formation process vary across different sections of the economy. We find that there is significant heterogeneity in the expectation formation, in the sense that the financial sector and the real sector expectations respond quite differently to the developments in macroeconomic variables. For example, real sector expectations seem to be more backward looking than those of the financial sector, in the sense that the coefficient of the past inflation in explaining the real sector's inflation expectations are higher than that of the financial sector. Moreover, financial sector appears to be relatively more sensitive to volatile variables such as the exchange rate and the risk premium. Economic activity is a significant explanatory variable for both sectors, even increasingly so after the adoption of full-fledged inflation targeting in 2006.

We believe that these results provide useful information not only for the design of monetary policy, but also for highlighting the role of sector specific behavioral variations in formulating the communication strategy. Assuming that real sector expectations serve as a better proxy for actual price setting behavior, the finding of an increased backward-looking component for the real sector needs particular attention, as it could mean that further disinflation would be more costly than it had been during the 2002-2005 period. Moreover, the observed heterogeneity in expectation formation process implies that sector-specific communication may be helpful: for the real side of the economy, insignificance of targets in driving inflation expectations suggests that more effort should be exerted in communicating quantitative policy objectives to the real sector. As to the financial sector, sensitivity to more volatile variables such as inflation surprises, exchange rates, and the risk premium suggests that communication to financial markets should keep focusing on emphasizing a medium-term policy perspective.

Our results reveal that the real sector and financial sector differ in terms of their degree of attention to inflation surprises, as well. In particular, we find that the real sector has been inattentive to short-term inflation surprises throughout the entire period. On the other hand, we show that short-term upward inflation surprises lead to increases in one-year ahead inflation expectations of the financial sector before June 2006, whereas in post June-2006 period we do not observe such a behavior. Interestingly, this behavioral shift coincides with CBT's decision to publish a monthly technical note on inflation developments.<sup>2</sup> In other words, our findings lend support to the view that communicating inflation developments in a more timely and detailed fashion in the post-June 2006 period might have been, to some extent, successful in smoothing the reaction of financial agents in response to short-term inflation surprises that may arise from temporary and/or one-off factors.<sup>3</sup>

The rest of the paper is structured as follows. The next section briefly reviews the related literature. Section 3 presents the main features of the survey we use and provides some additional motivation for employing individual data. In Section 4, we describe the dataset and presents details of the empirical analysis. Section 5 analyzes the factors affecting inflation expectations and the evolution of the expectations formation process in light of economic

---

<sup>2</sup> Following the turbulence in May-June 2006, Central Bank of Turkey started to publish a detailed note on inflation developments, each month shortly after the announcement of the monthly price indices. The main motivation was to guide the financial agents on interpreting inflation data by taking out the noisy information.

<sup>3</sup> This argument is valid only if most of the unexpected movements in inflation were temporary during the post-July 2006 period. In fact, inflation measured by CPI excluding food, energy and tobacco items displayed a smooth and declining path while headline inflation displayed a relatively volatile pattern, suggesting that shocks were mainly of temporary nature in this period.

developments and the monetary policy practice in Turkey. In Section 6, we provide a general assessment of the results and their policy implications, leaving Section 7 to present the concluding remarks.

## **II. Literature**

There is a vast literature on the analysis of survey-based inflation expectations. Most of these studies focus on the rationality hypothesis, testing whether the agents make systematic errors in forecasting inflation or whether they incorporate all available information in their expectations formation mechanism. Studies on the macroeconomic determinants of inflation expectations, on the other hand, are relatively scarce and have mostly been conducted for developed countries. One of the pioneering studies in this area is Figleski and Wachtel (1981) in which the authors analyze the determinants of inflation expectations of individual respondents in inflation surveys. Their results document that the determinants of inflation expectations may differ over time and across individuals. Gramlich (1983) show that the households and economists incorporate different pieces of information on macroeconomic variables, when they form their inflation expectations in United States. He shows that inflation expectations are related to the variables such as fiscal policy, supply shocks and political factors.

Pesaran (1985) finds that the simple adaptive expectations model is not sufficient to capture the dynamics of inflation expectations in Britain. He further shows that various macroeconomic measures of demand and supply conditions improve the explanatory power of simple models in explaining the inflation expectations. Lee (1994), by using industry level data from Britain, shows that the determinants of inflation expectations may vary across industries. Lee (1994) also shows that the response of inflation expectations in England to realized inflation is high when the inflation increases and low when the inflation slows down.

Levin, Natalucci, and Piger (2004) use the data from United States, Australia, Canada, New Zealand, Sweden, and United Kingdom to show that the realized inflation have an impact on survey based expectation measures. On the other hand, they provide some evidence that the longer-term inflation expectations are less responsive to past inflation in inflation targeting countries than those not targeting inflation. They also argue that inflation targeting

has a significant role in anchoring long-run inflation expectations.<sup>4</sup> On a related matter, Johnson (2002) shows that the expected inflation in inflation targeting countries declines with the announcement of targets even after controlling for country effects, year effects, ongoing inflation reduction and the business cycle. In another related study, Minella et al. (2003) focus on the role of credibility of the inflation targets to anchor expectations in Brazil. Bevilaqua, Mesquita and Minella (2007) and Cerisola and Gelos (2005) show how the expectation formation process changed in Brazil with the implementation of the inflation-targeting regime.

A particular question of interest is how monetary policy statements shape the inflation expectations. On this aspect, Johnson (1997), by using data on inflation expectations in Canada, argues that the clearness of the monetary policy announcements and the credible revisions of the targets can affect the inflation expectations and the duration of unexpected disinflation. On a related matter, Croushore and Koot (1994) show that there is a considerable positive relationship between Federal Reserve Bank's Greenbook forecasts and median inflation forecasts of the private sector professionals. Under certain circumstances, they interpret the results as Federal Reserve Bank having the credibility to disinflate the economy at a lower cost than suggested by traditional models.

The literature on the analysis of quantitative inflation expectations in Turkey is quite recent. Using the Consensus Survey of Forecasters, Celasun, Gelos and Pratti (2004) show that fiscal variables such as the primary budget surplus or debt burden are important in forming inflation expectations in Turkey. Employing aggregated time series data from the Expectations Survey for the period between 2001 and 2007, Kara and Küçük-Tuğer (2008) recently show that despite the rejection of the classical rationality tests, time-varying parameter estimates indicate that mean inflation forecasts of private agents in Turkey has improved over time in terms of their unbiasedness and efficiency. By using aggregated time series data between 2001 and 2007, Kara and Ögünç (2007) argue that both the inflation targets and the realization of inflation are significant in explaining the behavior of inflation expectations. They also show that exchange rates and the sovereign risk premium are both significant in explaining the variations in expectations.

---

<sup>4</sup> See also Castelnuovo et al. (2003) for the finding that the inflation targeting anchors long-term inflation expectations.

Our scope differs from these studies in many dimensions. Unlike previous studies, we explicitly focus on the potential use of heterogeneities in designing an effective strategy for the central bank communication. We show that the sectoral differences in inflation expectation formation may offer an opportunity to assess the effectiveness of certain aspects of communication. Moreover, unlike the studies in Turkey and for the emerging markets in general, we use the evidence from a panel of survey respondents in a way that allows us to avoid any bias that would emerge from the aggregation of individual expectations.

### III. Some Basic Observations

Empirical exercises in this study are conducted using the “Survey of Expectations”, which is a widely cited survey on inflation expectations in Turkey. The survey is conducted bimonthly since August 2001. In the first and third weeks of the corresponding month, survey participants are asked for their consumer price inflation expectations at various horizons as well as expectations about interest rates, exchange rates, current account balance and GDP growth rate.<sup>5</sup> Our study uses the longest available fixed-horizon maturity for inflation expectations, which is the 12-month ahead forecast.<sup>6</sup> Roughly 120 forecasters are currently surveyed while the average response rate is about 60 percent. On average, 72 percent of respondents are from the financial sector whereas 25 percent are participants from the real sector. The rest of the panel consists of other professional agents.<sup>7</sup>

To get an initial insight, it may be worthwhile to review some basic statistical facts on the inflation expectations. Figure 1 depicts the one-year ahead inflation expectations and the realizations. Agents seem to have overestimated inflation during the rapid disinflation period of 2001-2005, possibly because the respondents had difficulties in adapting their expectations in a rapid disinflation period.<sup>8</sup> On the contrary, the post-2006 period is characterized mostly by under-predictions, perhaps owing to the portfolio shock in May-June 2006 and the

---

<sup>5</sup> See the Appendix for a sample questionnaire.

<sup>6</sup> A question on longer-term inflation expectations (24-month ahead) has also been available since May 2006. In addition to inflation expectations for 12 month-ahead, which is the horizon used in this study, the survey also asks respondents’ quantitative CPI inflation expectations for the current month, the month ahead and two months ahead as well as their expectation of year-end inflation.

<sup>7</sup> Given this decomposition, the aggregate results are largely dominated by the responses of the financial sector as far as central tendencies are concerned.

<sup>8</sup> See Kara and Küçük-Tuğer (2008).



subsequent supply-side shocks which led to higher inflation relative to what was expected 12-months in advance.<sup>9</sup>

It is also interesting to observe that the “disagreement” among survey respondents, measured by the cross-sectional variance of the forecasts, stayed quite stable over time, except for some temporary fluctuations during March 2003 (beginning of the Iraq War), and May 2006 (global liquidity shock), both of which were accompanied with large exchange rate movements (Figure 3). March 2003 and May 2006 episodes appear to be associated with sudden increases not only in the first two moments of the distribution, but also in the level of asymmetry and peakedness (Figure 4).<sup>10</sup> These observations suggest that either agents’ estimates of the exchange rate pass-through coefficients or their expectations on the durability of exchange rate movement display strong heterogeneity.

### **Motivation for Using Disaggregated Data**

The use of the disaggregated data is a particular strength of this study. First, as argued in the literature, using aggregated data may lead to misleading conclusions about the relationship between variables for various reasons, such as the aggregation bias or changes in the decomposition of the sample. In the literature, there are a considerable number of studies, such as Pesando (1975), Friedman (1980), Brown & Maital (1981) and Caskey (1985), conducting the tests of rationality and the analysis of expectation formation by using the mean of the forecasts. However, this approach was challenged by a number of studies, which highlighted the possibility that the forecasts of different agents may have different biases canceling each other; hence, aggregated time series data may be misleading about the rationality of individual expectations or individuals’ expectation formation mechanism (see, for example Keane and Runkle (1990), Bonham and Cohen (2001)).<sup>11</sup> Therefore, focusing on the individual data has the potential to provide more reliable results, especially when behavioral relationships are concerned.

Using disaggregated data also allows us to identify heterogeneities in the expectation formation process. Moreover, the use of the individual-based data removes possible concerns

---

<sup>9</sup> Between the years 2002 and 2005, the proportion of respondents with forecasts exceeding the realized inflation is more than 90 percent while it is only 7.3 percent in 2006.

<sup>10</sup> See also Barlas-Özer and Mutluer (2005) for general features (including moments and kernel distributions) of the quantitative next twelve months inflation expectations, obtained from the Business Tendency Survey, another survey conducted by CBT.

<sup>11</sup> Interestingly, the kurtosis of inflation expectations seems to have increased substantially in the post-2005 period. These observations suggest that conducting a time series analysis of inflation expectations using an aggregated measure such as mean or median would run the risk of losing some valuable information that is embedded in individual responses.

about our relatively short time span. The panel data also allows us to focus on shorter moving windows in rolling regressions without facing a weak power due to small sample size; therefore, we are able to identify how expectation formation changed over time in response to policy and macroeconomic developments.

## **IV. Methodology**

### **Constructing the Panel**

The response rates of the participants of the Survey of Expectations display a diverse pattern throughout the sample period, varying between 5 % and 95 %. We focus on a group of individuals whose participation rate is relatively steady over time, since doing so will decrease the probability that the decomposition of the sample is correlated with the variations in inflation expectations. Moreover, due to the possibility that the individual errors are correlated with each other across time as well as with the errors of the other individuals, we need to make necessary corrections in the estimates of the standard errors, which requires us to focus on a balanced panel. Since none of our respondents have a response rate of 100 %, we need to fill in the missing values.<sup>12</sup> In this practice, we face a trade-off between the sample size and the degree of noise resulting from the fill-in procedure. Having this in mind, we take the individuals whose response rate throughout the sample period is above 60 %.<sup>13</sup> The final form of the panel used in this study comprises 59 respondents, 47 of whom are from the financial sector and the rest is from the real sector. Therefore, we have a sectoral decomposition that has a reasonable representation of the entire sample.

Our sample covers the period of rapid disinflation between 2002 and 2005 under “implicit inflation targeting”, as well as the post-2005 period under the full-fledged inflation-targeting regime, where the disinflation process was interrupted by a series of concurrent shocks. We disregard the data on year 2002, the first year of the survey, because this period could possibly be associated with problems regarding respondents’ perceptions of the surveys.<sup>14</sup> Accordingly, empirical analysis has been carried out for the period between January 2003 and December 2007.

---

<sup>12</sup> Missing values are filled according to a regression where the independent variable is the median inflation expectations.

<sup>13</sup> For robustness, we also applied cut-offs at 50% and 70%, which have not affected our results qualitatively.

<sup>14</sup> Kara and Küçük-Tuğer (2008) show that expectation formation was highly biased and inefficient at the beginning of the survey, while the degree of bias and inefficiency has declined considerably through time.

## The Empirical Model

The main objective of our empirical analysis is to determine to what extent and how survey participants use readily available information in forming their inflation expectations, as well as to assess whether there are systematic heterogeneities across agents in the expectation formation process. In order to draw implications for monetary policy, we focus on the expectation series for the longest available horizon, which is the 12-month ahead inflation expectation. The individual 12 month-ahead inflation expectation at time  $t$  is denoted as  $\pi_{it,t+12}^e$ .

In general, agents are expected to form their expectations by incorporating a wide-range of variables that would convey information about future inflation. One such variable, which is directly observable by the survey respondents, is the realization of the inflation rate itself. Also, public signals about the future inflation rates such as official inflation targets ( $target_{t+12}$ ) or the forecasts of the CBT have the potential to guide the private agents. Therefore, we use both the past inflation and the targets as potential explanatory variables for the inflation expectations. Relative weight of past inflation versus target inflation, i.e., the coefficient of forward versus backward looking measures, may convey information about various factors, such as the credibility of the Central Bank's forecasts (and targets) or the stickiness in inflation expectations.

In addition, for a small open economy like Turkey, the exchange rate may have an important role in expectation formation through its impact on the prices of the imported goods. In fact, recent studies on inflation dynamics in Turkey find that although exchange rate pass-through has declined considerably during the implementation of the inflation targeting period, it is still sizeable.<sup>15</sup> Exchange rate may also serve as a coordinating device among different agents in forming their inflation expectations, especially in an economy like Turkey, which historically experienced several forms of exchange rate targeting regimes. Accordingly, we used the monthly percentage change in the exchange rate of YTL against USD, ( $USD\_ch$ ), as one of the right hand side variables in the regression (a positive value for  $USD\_ch$  indicates depreciation).

Another potential determinant of inflation expectations is the market's sentiment and the risk attitude towards the Turkish economy, which we call as the "risk premium". In particular,

---

<sup>15</sup> See Kara, Küçük-Tuğer, Özlale, Tuğer, and Yücel (2007) for some evidence on the role of exchange rates in Turkish inflation dynamics.

variations in the risk premium may signal changes in the perceived credibility of economic policies and hence carry some information on the potential volatility in financial markets. Since we are unable to measure market sentiment directly, we use the EMBI+ Turkey (the difference between Turkish Government’s sovereign bond yields and the US bond yields) as a proxy.<sup>16</sup> Technically, the EMBI spread corresponds to the sovereign credit risk, or in more familiar terms, the default risk. However, we interpret it as a composite index, which comprises macroeconomic soundness indicators such as fiscal balance, current account, political stability, etc. Besides these domestic components, the EMBI spread also responds to global factors such as investor’s risk appetite.<sup>17</sup> Therefore, we think such a measure can provide valuable information in testing whether overall market sentiment is a significant component in explaining inflation expectations in Turkey.

Contemporary models of inflation dynamics involve a relationship between inflation and real marginal costs, which is often related to a measure of output gap. In fact, studies on Turkish inflation dynamics suggest that the relationship between the economic activity and inflation has become more visible in recent years, especially after the adoption of the inflation targeting regime.<sup>18</sup> In order to test whether economic agents utilize this relationship, we decided to use a measure of economic activity as an additional explanatory variable for inflation expectations. Since we work with monthly data, the industrial production index is a natural candidate as a proxy for economic activity, as it is announced at monthly frequency and monitored by most economic agents in the economy. Accordingly, we incorporate in our model the seasonal adjusted industrial production “gap”, which is detrended using the HP filter ( $ip_{t-2}$ ).

Therefore, our empirical model is specified as follows:

$$\pi_{it,t+12}^e = \beta_0 + \mu_i + \beta_1\pi_{t-1} + \beta_2target_{t+12} + \beta_3USD\_ch_{t-1} + \beta_4embi_{t-1} + \beta_5ip_{t-2} + \varepsilon_{it} \quad (1)$$

The lag structure of the right hand side variables is chosen with respect to information constraints at time  $t$ . In other words, taking account the time lags in the flow of data, we use the latest figures available to the respondents by the time of the survey.

---

<sup>16</sup> In regressions, we use monthly averages of the daily EMBI spread of Turkey preceding the expectation survey. This variable is shown by  $embi_{t-1}$ .

<sup>17</sup> See Kanli (2007) for some evidence on the relationship between the EMBI+ Turkey and a measure of global risk appetite—the VIX index.

<sup>18</sup> See Kara, Ögünç, Özlale and Sarıkaya (2007) for some evidence on the changing relationship between output gap and inflation in Turkey.

Recall that the variable *target* in equation (1) corresponds to officially announced inflation targets. Considering that the CBT has been publishing inflation forecasts since 2006, alternatively, one could replace the variable *target* by the CBT's one-year ahead inflation forecast, namely *targetstar*, and thus estimate the following equation:<sup>19</sup>

$$\pi_{it;t+12}^e = \beta_0 + \mu_i + \beta_1\pi_{t-1} + \beta_2\text{targetstar}_{t+12} + \beta_3\text{USD\_ch}_{t-1} + \beta_4\text{embi}_{t-1} + \beta_5\text{ip}_{t-2} + \varepsilon_{it} \quad (2)$$

Accordingly, we estimate the equations (1) and (2) separately for the real and the financial sectors and see whether there are heterogeneities in the expectation formation processes. In order to avoid any bias due to time invariant individual characteristics that may be correlated with the independent variables, we use individual fixed effects, denoted by  $\mu_i$ .

## V. Determinants of Inflation Expectations: Empirical Results

### Targets versus Realizations

Estimated coefficients in Equation (1) and (2) are presented in Table 2. The results suggest that agents pay attention to both the targets and the realization of inflation. For the 2003-2007 period, each 1-percentage point change in the realized annual inflation is associated with an approximately 0.39 percentage point change in the expected inflation. On the other hand, a 1-percentage point change in the target is associated with a 0.36 percentage point change in the expected inflation in the same direction.

Considering the fact that there was a rapid disinflation in the 2003-2004 period, we found it worthwhile to repeat the same exercise for the post-2004 and post-2005 periods, where the inflation rate has been more stable. Our results reported in Table 2 indicate that the coefficient of the inflation target has become significantly lower in recent years, whereas the role of past realization of inflation has not changed considerably. The finding that the explanatory power of the targets have declined may not be surprising, given that the targets have been breached by a large margin in the years 2006 and 2007.

At first sight, these results may imply that official announcements on future inflation serve as weak anchors. However, using the target values in itself to infer such statements may be somewhat misleading as it neglects one important operational detail: From 2006 on, the CBT started to publish quantitative inflation forecasts. Under this framework, the forecasts—not the targets—represent the forward-looking signals of the monetary authority, especially when the expectation horizon is one year, which is shorter than the policy horizon of the

---

<sup>19</sup> See the next section for more explanation on using the official inflation forecasts as a right hand side variable.

CBT.<sup>20</sup> In other words, CBT forecasts may be interpreted as “intermediate targets”. Accordingly, Table 2 reports estimation results of Equation (1) along with Equation (2). Recall that Equation (1) uses a composite variable, which comprises the targets up to 2006 and the official forecasts thereafter, while Equation (2) uses only the pre-announced official targets. As shown in the second panel of Table 2, when we use the official forecasts after 2006, we find that the expectations appear to be more forward looking than backward looking for the whole sample, although the extent of forward-looking behavior seems to have been declining in recent years.<sup>21</sup>

A strong relationship between the forecasts of the CBT and the inflation expectations lends support to the view that official inflation forecasts serve as an intermediate anchor, whenever targets fail to do so. Therefore, one may take these results as a support for CBT’s ability to steer expectations by using official forecasts published in the inflation report. However, one should also take into account the possibility that, although we tried to control all the relevant variables in our estimations, still, we cannot completely rule out the possibility that an independent common factor may be driving the expectations and the forecasts in the same direction in a way that generates a higher correlation between the official forecasts and the market expectations. Therefore, one should be careful in interpreting the extent of the causal relationships implied by our results.

We repeat the same exercise for the financial and real sector separately. The weight attached by both sectors to past inflation is about the same size. However, we find a significant degree of heterogeneity for the weight attached to forward looking signals, namely official targets and forecasts. Respondents from the real side of the economy seem to put less weight to the target than the financial sector. In fact, we find that the real sector respondents are almost inattentive to the targets in the 2005-2007 period. However, it is worthwhile to note that this may also be a result of the low variation in inflation targets in recent years, as the target path has been relatively flat, especially during 2006 and 2007 compared to the steep path in the 2002-2004 period.

---

<sup>20</sup>The policy horizon is the period by which the central bank expects inflation to return to its target following the combination of a shock and the appropriate monetary policy response. CBT has announced a policy horizon of about 2 years on average.

<sup>21</sup> Since inflation target path is available only in annual frequency, monthly values for the inflation target ( $target_{t+12}$ ) is computed by taking a monthly linear interpolation of year-end targets. In the same vein, since inflation forecasts are available at only quarterly frequency, one-year ahead monthly forecasts of the CBT is constructed as the monthly linear interpolated quarterly forecasts of the CBT reported in the Inflation Reports after 2006. Moreover, the realized inflation rate ( $\pi_{t-1}$ ) is taken as the most recent annual inflation rate readily available to agents.

Next, we ask the following question: Do agents understand how the CBT constructs the inflation forecasts? Under the hypothesis that the CBT is transparent and predictable, release of the revised inflation forecasts at each quarter should not come as a surprise to the economic agents. To test this hypothesis, we conduct the following exercise: We focus on the episodes of the announcement of a new inflation forecast, i.e. release of the quarterly inflation reports. We regress the change in the inflation expectations on the change in CBT's inflation forecasts just before and after the release of the 9 inflation reports that have been published so far. Since expectation survey is conducted bi-monthly, this means we focus on a time window of 15 days. In addition to the inflation forecasts, we also control for the changes in the past inflation, exchange rate and the EMBI spread. Our estimations show that the changes in the inflation forecasts and changes in the inflation expectations within 15-day windows are not significantly correlated (Table 3).<sup>22</sup> These findings may suggest that either CBT's revisions to the inflation forecasts are predictable, or agents are inattentive to the forecasts. However, given the strong historical co-movement of inflation expectations with the targets and the forecasts, we are inclined to conclude that it is the former rather than the latter.

Finally, to see how backward looking and forward looking coefficients changed over time, we estimated Equation (2) using 24-month moving windows, where the sample length has been kept constant but the starting point of the sample has been shifted one month at a time. The results of this exercise, shown in Figure 6.b. and 7.b., suggest that the financial turbulence in May-June 2006 has marked a substantial change for the extent of forward/backward looking behavior, both for the real sector and the financial sector. We find that the relationship between official targets/forecasts and the inflation expectations is significantly lower compared to pre-June 2006 period (Figure 8.b.).<sup>23</sup>

The weight attached to past inflation, which had become almost negligible in early 2006, seems to have increased significantly during the March-June 2006, as inflation consistently surprised on the upside following the sharp rise in food and energy prices and the portfolio shock in the May-June period. On the other hand, it is worth to note that the weight agents attach to past inflation has been declining since early 2007, possibly owing to the decisive reaction of the CBT and the gradual decline in inflation. However, there is an asymmetric

---

<sup>22</sup> However, our hypothesis is invalid if the agents are inattentive to the forecasts. Therefore, we believe that it may be worth to exert more research effort in identifying the role of official forecasts in driving inflation expectations.

<sup>23</sup> When we repeat the same exercise with the targets only, rather than the forecast and the targets, the coefficient of the target becomes even lower in recent years. We do not report these results for the sake of brevity.

reaction, in the sense that the reduction in this coefficient is not as sharp as its rise in the March-June 2006 period.

### **The Exchange Rate**

Our estimates reveal that an increase in the depreciation of Turkish lira leads to higher inflation expectations. However, Figure 6.c. suggests that there are differences in the magnitude of the effect over time and across sectors. We observe that the variations in the exchange rate in general play a role on the financial sector expectations, whereas real sector does not seem to use the exchange rates directly in forming their inflation expectations (Figure 7.c.).

A particular question of interest for monetary policy is whether there are asymmetries in the agents' response to the exchange rates, in the sense that whether appreciations are as significant as depreciations in explaining the changes in expectations. In order to test this hypothesis, we decompose exchange rate movements into appreciation and depreciation components. The results shown in Figure 9 indicate that the agents mainly consider depreciation of YTL when updating their expectations, whereas they are almost inattentive to appreciation of YTL. Therefore, we cannot reject the hypothesis that agents' expectations respond to exchange rates in an asymmetric manner.

### **The Risk Premium (As Measured by the EMBI+ Turkey)**

Our results show that there is a positive relationship between inflation expectations and the EMBI spread both for the financial sector and the real sector (Table 2). This relationship suggests that the information contained in the risk premium, such as the market's risk perceptions and the overall sentiment towards Turkish economy, leads to revisions in the inflation expectations. Moreover, rolling regressions indicate that, the coefficient of the EMBI spread has displayed a gradual decline until 2006. It should be noted that Turkey's risk premium has been on a declining trend in this period. On the other hand, May 2006 appears to set a break point for the relationship between the EMBI spread and the inflation expectations, as can be seen in Figure 6.d. and 7.d. The effect of the EMBI Spread on the inflation expectations has remained at high levels in the post-May 2006 period. Finally, it is worth noting that there has been another surge in the estimated coefficient on the EMBI spread in the last quarter of 2007, which coincides with the turbulence in mature markets originating



from the US mortgage crisis. The evolution of the coefficient of the EMBI spread given in Figure 7.d. suggests that the degree of market's attentiveness to the global risk perceptions in expectation formation may depend on the level of the risk itself.

### **The Economic Activity**

We find that there does not exist a significant relationship between the industrial production gap (measured by the percentage deviation of the industrial production from the trend value computed by the HP filter) and the inflation expectations in the pre-2006 period, i.e., before the adoption of the inflation targeting regime. On the other hand, a rise in the production gap is associated with an increase in the expected inflation in the post-2006 period. In particular, considering the results presented in Figure 6.e., we find that a 1-percentage increase in industrial production above its long-run trend is associated with an approximately 4-5 basis points increase in the 12-month ahead inflation expectations in post-2006 period.

There may be several explanations for the observed significance of the economic activity in driving inflation expectations. For example, the stable economic environment might have rendered the relation between real activity and inflation more visible such that the information content of the real economic activity about the future inflation rates might have increased. Also, the CBT's active communication policy might have contributed to the strengthening relationship between the economic activity and the inflation expectations. The CBT, after the adoption of the explicit inflation targeting regime, started emphasizing in its policy notes and periodical reports the prominent role of economic activity in determining the medium term inflation outlook.

### **Surprise Inflation**

If expectations are well anchored, inflation expectations should not react to short-term transitory movements in inflation. Therefore, a question of particular interest is whether surprise inflation affects the expectation formation process. In order to answer this question, we make use of the variation across survey participants in terms of their forecast errors for monthly inflation. We define short-term inflation surprise as the difference between the realization for the current month's inflation and each survey participant's forecast, where the positive figures indicate a higher than expected inflation. We decompose the inflation surprises into upward surprises (i.e. inflation realization being above the expectation) and

downward surprises (i.e. inflation realization being below the expectation) and add these two new variables to Equation (2) as additional explanatory variables.<sup>24</sup>

The results presented in Table 4 indicate that, for the financial sector, the upward surprises on monthly inflation lead to higher 12-month ahead inflation expectations in the period between 2003 and June 2006. We find that a 1-percentage point of surprise on the upside leads to a 0.3 percentage point increase in 12-month ahead inflation expectations. On the other hand, in the period after July-2006, we observe that the upward inflation surprises do not have a significant effect on the inflation expectations.

One possible explanation for the observed behavioral change in the financial sector's expectations may be that the CBT might have been relatively more successful in guiding the financial markets about the decomposition of short-term and medium-term inflation dynamics after mid-2006. Following the turbulence in May-June 2006, Central Bank of Turkey started to publish a detailed note on inflation developments, shortly after the announcement of the monthly price indices. The main motivation was to guide the financial agents on interpreting inflation data by taking out the noisy information. The observation that upward monthly inflation surprises ceased to have significant effect on 12-month ahead inflation expectations after July 2006 suggests that the active communication policy of the CBT through publishing such reports might have helped in better anchoring medium-term expectations.<sup>25</sup>

On the other hand, this new communication tool does not seem to have an impact on the real sector's expectations as the real sector appears to pay significant attention to inflation surprises after the post July-2006 period.

---

<sup>24</sup> The implicit assumption we make here is that the real sector and financial sector views the inflation deviations equally temporary or equally permanent.

<sup>25</sup> Most of the unexpected movements in inflation were temporary during the post-July 2006 period. Inflation measured by CPI excluding food, energy and tobacco items displayed a smooth and declining path while headline inflation displayed a relatively volatile pattern in this period.

## **VI. General Assessment of the Results and Policy Implications**

Our results in general suggest that the relative importance of the variables in guiding expectations do not stay constant over time. The literature on the determinants of inflation expectations provides some explanations to the question of why responsiveness to certain variables changes over time. Akerlof et al. (2001) argue that the degree of attention to a particular variable in expectations formation may depend on the level of the variable. For example, the agents may be incorporating actual inflation in their wage and price setting only when the realized inflation rate is necessarily high. As a result, the effect of realized inflation on the inflation expectations may be high, during inflationary episodes. Similarly, Figlewski and Wachtel (1981), by using individual level data from Livingston survey, show that agents not only behave adaptively in forming expectations in United States, but also the degree of adaptive behavior depends on the level of inflation.

The results presented in Section 4 indicate that the determinants of the inflation expectations not only vary through time but also across sectors. These variations provide us with the opportunity to assess the effectiveness of the particular features of the central bank communication. Given the likely differences between the real sector and the financial sector in terms of their incentives to collect and disseminate information, any behavioral change across sectors may serve as important pieces of information to assess how the CBT's actions are perceived. The finding that the expectation formation of the financial sector and the real sector differ from each other—especially in the degree of backward looking behavior and sensitivity of expectations to short-term news—may have important implications for the communications strategy conducted by the CBT.

As noted above, we find that the real sector pays more attention to past realization of inflation. In fact, if it is costly for the real sector to collect information about forward looking signals about inflation, then it may be rational for them to pay considerable attention to inflation realizations, which is available at almost no cost. However, assuming that the response of the real sector serves as a better proxy for the price setting behavior, the higher is the weight the real sector attaches to past inflation, the more costly it may be to disinflate for a central bank. The insignificance of targets in driving inflation expectations suggests that more effort should be exerted in communicating quantitative policy objectives to the real sector.

On the other hand, we observe that the financial sector appears to be quite responsive to the variations in the data related to financial environment, such as the exchange rate and the

risk premium. We also observe that the financial sector has responded to the short-term inflation surprises significantly in the period before July 2006. By its nature, the financial sector may have more incentives relative to the real sector to assess the general macroeconomic developments and the developments in overall inflation, not only because it may be important for them to price the financial assets, but also since financial agents may need to disseminate at regular frequencies their analysis of the economic development to the investors. Such incentives may lead to a higher information-updating frequency for the financial sector compared to the real sector. Moreover, the financial sector's reaction to the flows of new information may be amplified by a behavior that was once described by Keynes as one that would be observed in a *beauty contest*.<sup>26</sup> It is not difficult to imagine situations where the financial agents may interact strategically in the bond market or in increasing the number costumers who may view the information content of financial institutions' investor reports as a key ingredient to choose between financial intermediaries. In such a case, a financial institution may find it sub-optimal to deviate from the inflation expectations of the other institutions. As a result, we may observe that some agents react to short-term news not because they view them as relevant, but because the others view them as relevant for inflation expectations. To avoid such a behavior, central banks may serve as a coordinating device by publishing reports that may help the market players to identify the temporary shocks and short-term economic developments that may be irrelevant for the medium term inflation outlook.

As it can be judged from the Turkish experience in May-June 2006 period, there is a value in effectively communicating the short-term inflation developments, especially when the data contains a lot of noisy information. Our results suggest that CBT might have reduced the degree that the financial sector responds to the short-term inflation surprises, once it started publishing the monthly Price Developments report. Another important implication of our results for the monetary policy is that the central banks may affect the degree that the agents pay attention to the key determinants of inflation, such as the output gap, by communicating effectively its monetary transmission mechanism. Therefore, communication

---

<sup>26</sup> Beauty contest example, as used by Keynes (1936), refers to a strategic environment where an individual would win a prize by choosing 6 most beautiful women that would be chosen by general public as most beautiful among 100 photos published in a London newspaper. Given the nature of the contest, no one would vote for those whom he finds beautiful, but rather for those whom the others find beautiful.

<sup>27</sup> The implicit assumption we make here is that the real sector and financial sector views the inflation deviations equally temporary or equally permanent. Alternatively, the assumption that the real sector does not outperform real sector in terms of decomposing the inflation movements into temporary and permanent components would also be sufficient to link our results with inattentiveness.

in itself may strengthen the policy transmission once it is perceived as credible by the economic agents.

In sum, our analysis provides new insights about the expectations formation, heterogeneity across different sections of the economy, and the central bank communication. However, there are also a couple of points associated with survey based inflation expectations in general, which may require us to exercise some caution in interpreting these results. First, we need to have a better understanding of how inflation expectations affect the actual price setting behavior of the agents. Answering this question possibly requires a different sample and different questions from what the CBT's Survey of Expectations currently uses. Second, it is necessary to focus on the question of whether the survey participants would alter their behavior when they need to forecast inflation with self-motivation. Since it is less costly for the respondents to make forecast errors in answering the survey compared to forecast errors in price setting or in other economic and financial decisions, they may have less incentive to allocate their resources for answering the survey questions. Therefore, it is particularly important to utilize other measures of inflation expectations, such as extracting information from asset prices, as a complementary to survey-based inflation expectations.

Finally, it is worth emphasizing that we need a more detailed assessment of the perception of the survey respondents with respect to the relevant price measure. For example, it is highly likely that survey respondents' answer to the expectation about inflation may be contaminated by the (mis)perception of the question as the expected *inflation rate for the own industry*.<sup>28</sup> Such a behavior may be more prevailing among the respondents from the real sector, as the developments related to price dynamics in their industry may have a relatively higher weight in their information set than the average price level in the economy. This also suggests that it could be useful for the monetary authority to actively communicate the difference between the inflation in a certain sector and the headline inflation.

---

<sup>28</sup> As an example of how individual perceptions may affect the inflation expectations, Bryan and Venkatu (2001a, 2001b) show that women in United States expect on the average 2 percentage point higher inflation than men possibly because they mostly deal with their family's purchases of food, the inflation rate for which is higher than the inflation for the other consumer items.

## VII. Summary and Concluding Remarks

This study has focused on survey-based inflation expectations in Turkey with a particular emphasis on the heterogeneities in expectation formation. We also shed light on how policy and other economic developments affect this process over time. Our findings indicate that the financial sector and the real sector display significant heterogeneities in the expectation formation and their attentiveness to the economic news. In particular, we find that the real sector is more backward looking, whereas the financial sector is quite sensitive to the short-term variations in financial data.

We also find that the financial market turbulence in the May-June 2006 period had a significant impact on the expectation formation mechanism in Turkey. For example, there is a notable increase in the degree of backward looking behavior in expectations formation, especially for the real sector. In addition, the sensitivity of the markets' expectations to the country risk premium in the aftermath of the adverse global shock seems to have increased after June 2006. These results may also suggest that the degree of market's attentiveness to the changes in the overall risk perceptions depends on the level of the risk itself.

Recent studies on the central communication have focused on the impact of central bank actions and signals on the financial markets. This study, by focusing on the impact of communication policy and macroeconomic variables on the inflation expectations, may serve as a complementary to the existing literature on central bank communication. We present evidence on how central bank communication under inflation targeting might have affected the expectation formation mechanism. Our results suggest that communication about the monetary policy transmission mechanism after the adoption of fixed decision dates in 2005 might have helped the agents to understand the relationship, at least in qualitative terms, between the economic activity and the future inflation. We show that the financial sector, which updated their medium term inflation expectations upwards following adverse short-term inflation surprises in pre-June 2006 period, have become inattentive to the short-term inflation surprises, after the CBT started publishing a detailed note on monthly inflation developments, which identifies the "noise" in the monthly inflation data.

We argue that identifying sectoral heterogeneities in the inflation expectations may be important for designing an effective communication strategy. Our findings suggest that more effort should be exerted in communicating quantitative policy objectives to the real sector. As to the financial sector, sensitivity to more volatile variables such as inflation surprises,

exchange rates and risk premium suggests that communication to financial markets should further focus on emphasizing a medium-term policy perspective.

Perhaps one of the most striking implications of the findings in our study is the rise in the degree of backward-looking component for the real sector inflation expectations. Assuming that the real sector expectations are an important input into the actual price setting behavior, this finding could mean that further disinflation could be more costly than it had been during the 2002-2005 period. On the other hand, it should be noted that the time elapsed under the explicit inflation targeting regime is only two years and the observed behavioral shift may be just a reaction to the state of the business cycle. Therefore, more time is needed to verify this conjecture.

Finally, analyzing the behavior of survey-based expectations may not be enough for assessing true inflation dynamics. One may need to have a better understanding of how inflation expectations affect the actual price setting behavior. Accordingly, more research effort is needed to understand the link between actual inflation and inflation expectations.

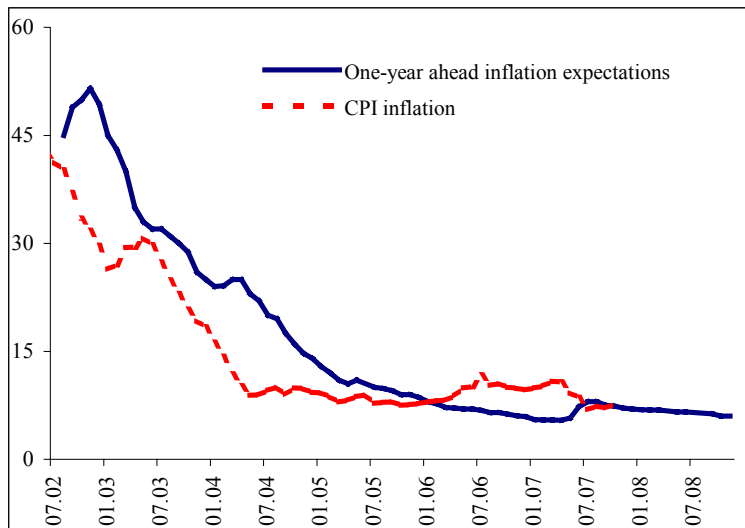
## References:

- Akerlof G.A., Perry, G. and Dickens W.T., 2001, "Options for Stabilization Policy: A New Analysis of Choices Confronting FED", *Brookings Policy Brief*, No: 69
- Barlas-Özer Y., and Mutluer D., 2005, "Inflation Expectations In Turkey: Statistical Evidence from the Business Tendency Survey", *Central Bank Review*, 5(2), 73-97.
- Bevilaqua, A.S., Mesquita, M. and Minella, A., 2007, "Brazil: taming inflation expectations," Central Bank of Brazil, Research Department, *Working Papers Series No: 129*.
- Bryan, M.F. and Venkatu, G., 2001a, "The demographics of inflation opinion surveys," *Economic Commentary, Federal Reserve Bank of Cleveland*, October.
- Bryan, M.F. and Venkatu, G., 2001b, "The curiously different inflation perspectives of men and women", *Economic Commentary, Federal Reserve Bank of Cleveland*, November.
- Brown, B. Y. and Maital, S., 1981, "What do economists know? An empirical study of experts' expectations", *Econometrica*, 49(2), pp. 491-504.
- Caskey, J., 1985, "Modeling the formation of price expectations: A Bayesian approach," *American Economic Review*, 75(4), pp. 768-776.
- Castelnuovo, E., Nicoletti-Altimari, S., Palenzuela, F., 2003, "Definition of Price Stability, Range and Point Inflation Targets: the Anchoring of Long-Term Inflation Expectations," in Issing, O., ed., *Background Studies for the ECB's Evaluation of its Monetary Policy Strategy*. Frankfurt-am Main, Germany: European Central Bank.
- Celasun O., Gelos R. G. and Pratti A., 2004, "Obstacles to Disinflation: What is the Role of Fiscal Expectations?" *Economic Policy*, vol. 19(40), pages 441-481.
- Crisola, M. and Gelos, G.G., 2005, "What Drives Inflation Expectations in Brazil?: An Empirical Analysis," *IMF Working Paper No. 05/109*.
- Davies, A. and Lahiri, K., 1995, "A new framework for analyzing survey forecasts using three-dimensional panel data," *Journal of Econometrics*, 68, 205-227.
- Figlewski S. and Wachtel P., 1981, "The Formation of Inflationary Expectations," *Review of Economics and Statistics*, Vol. LXIII (1)
- Friedman, B., 1980, "Survey evidence on the rationality of interest rate expectations," *Journal of Monetary Economics*, 6, pp. 453-465.
- Gramlich, Edward M, 1983. "Models of Inflation Expectations Formation: A Comparison of Household and Economist Forecasts," *Journal of Money, Credit and Banking*, Vol. 15(2), pp. 155-73
- Johnson, D.R., 1997, "Expected inflation in Canada 1988-1995: an evaluation of Bank of Canada credibility and the effect of inflation targets," *Canadian Public Policy*, 23, 223-258
- Johnson, D.R., 2002, "The effect of inflation targeting on the behavior of expected inflation: Evidence from an 11 country panel", *Journal of Monetary Economics*, Vol. 49, pp.1521-1538
- Johnson, D.R., 2003, "The Effect of Inflation Targets on the Level of Expected Inflation in Five Countries", *Review of Economics and Statistics*, Vol. 85(4), pp.1076-1081
- Kanlı, İ. B., 2008, "Asymmetric impacts of global risk appetite on the risk premium for an emerging market," *Physica A, (forthcoming)*.

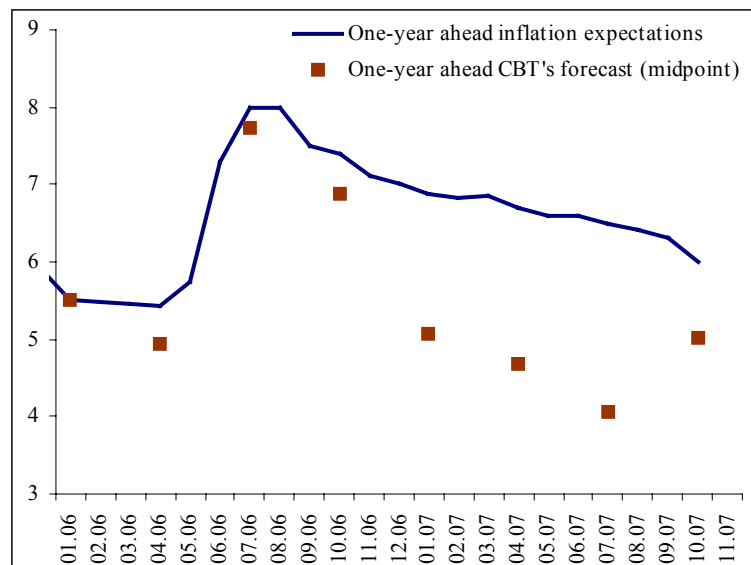


- Kara, H. and Küçük-Tuğer, H., 2008, "Inflation Expectations in Turkey: Learning to Be Rational," *Applied Economics*, (forthcoming).
- Kara, H., Küçük-Tuğer, H., Özlale, Ü., Tuğer, B., and Yücel, E. M., 2007, "Exchange rate regimes and pass-through: Evidence from the Turkish economy," *Contemporary Economic Policy*, 25(2), 206-225.
- Kara, H. and Ögünç, F., 2007, "Inflation targeting and exchange rate pass-through: The Turkish Experience," *Emerging Markets Finance and Trade* (forthcoming).
- Kara, H., Ögünç, F., Özlale, Ü. and Sarıkaya, Ç., 2007, "Estimating the output gap in a changing economy", *Southern Economic Journal*, 74(1), 269-289.
- Karadaş, E. and Ögünç, F., 2003, "An analysis of private manufacturing industry's inflation expectations," *Central Bank Review*, 3(2), pp. 57-83.
- Keynes, John Maynard (1936). *The General Theory of Employment, Interest and Money*. London: Macmillan
- Keane, M. P. and Runkle, D. E., 1990, "Testing the rationality of price forecasts: new evidence from panel data," *American Economic Review*, 80, pp. 714-735.
- Kohn, D.L., 2003, "Comment on Goodfriend: "Inflation Targeting in the United States?" in Woodford M., and Bernanke, B. eds., *Inflation Targeting*, Boston, NBER.
- Lee, K., 1994, "Formation of Price and Cost Inflation Expectations in British Manufacturing: A Multisectoral Analysis", *Economic Journal*, Vol. 104, p. 372-385
- Levin, A., Natalucci F., and Piger J., 2004, "The Macroeconomic Effects of Inflation Targeting," Federal Reserve Bank of St. Louis, *Review*, vol. 86 (July), pp. 51-80.
- Mishkin, F. S., 2007, "Inflation Dynamics", *National Bureau of Economic Research Working Paper*, No: 13147.
- Minella, A., de Freitas P. S., Goldfajn I., and Muinhos M.K., 2003, "Inflation Targeting in Brazil: Constructing Credibility Under Exchange Rate Volatility," *Journal of International Money and Finance*, Vol. 22, pp. 1015-40.
- Pesando, J., 1975, "A note on the rationality of the Livingston price expectations," *Journal of Political Economy*, 83(4), pp. 849-858.
- Pesaran, H., 1985, "Formation of inflation expectations in British manufacturing industries," *Economic Journal*, Vol. 95, pp. 948-975
- Pesaran, M.H., and Weale, M., 2005, "Survey Expectations," *Cesifo Working Papers*, 1599.

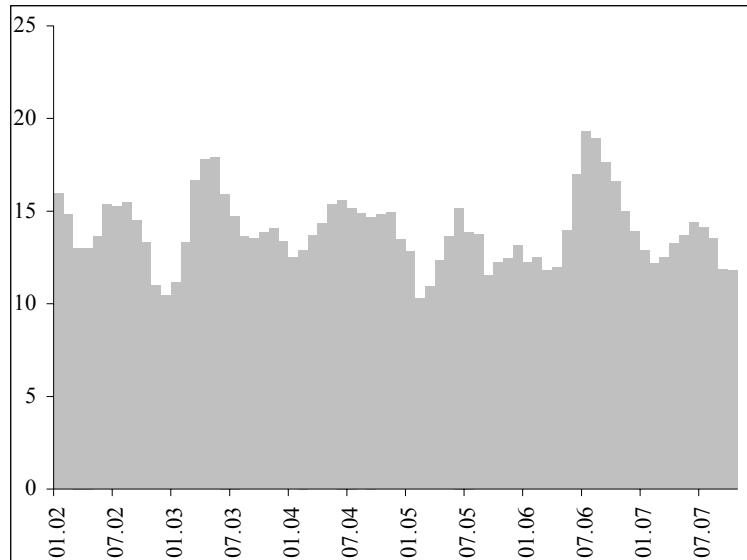
**Figure 1. Evolution of inflation expectations**



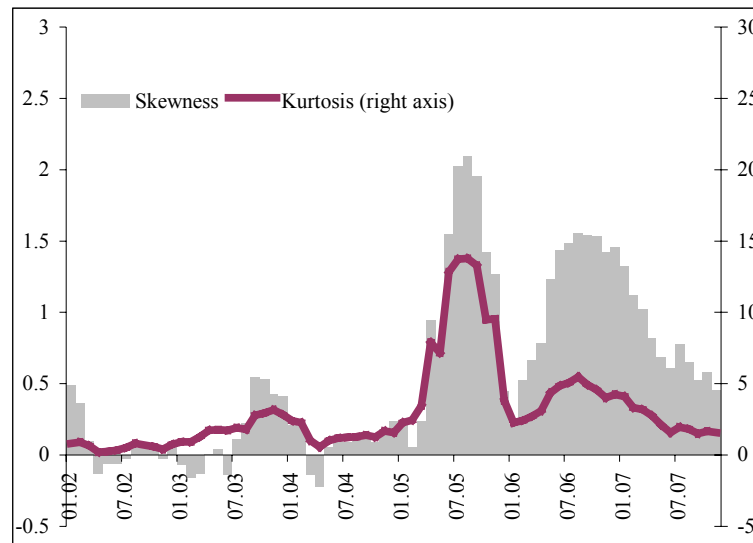
**Figure 2. Inflation expectations and the CBT's forecast**



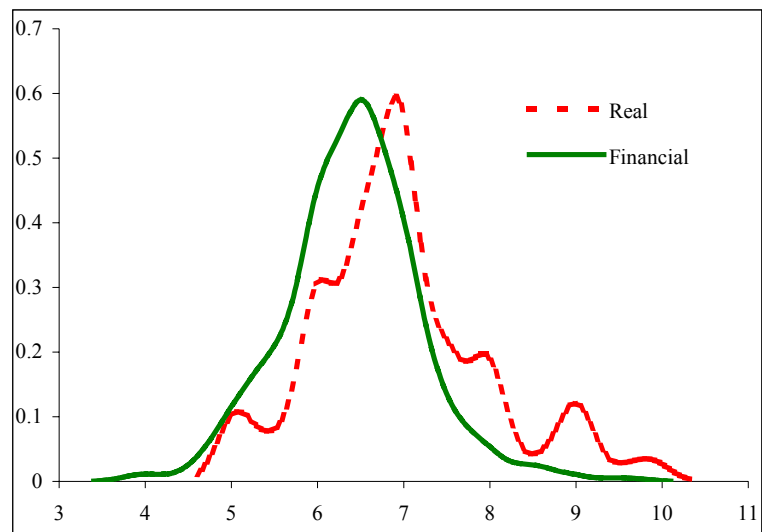
**Figure 3. Coefficient of variation of inflation expectations**



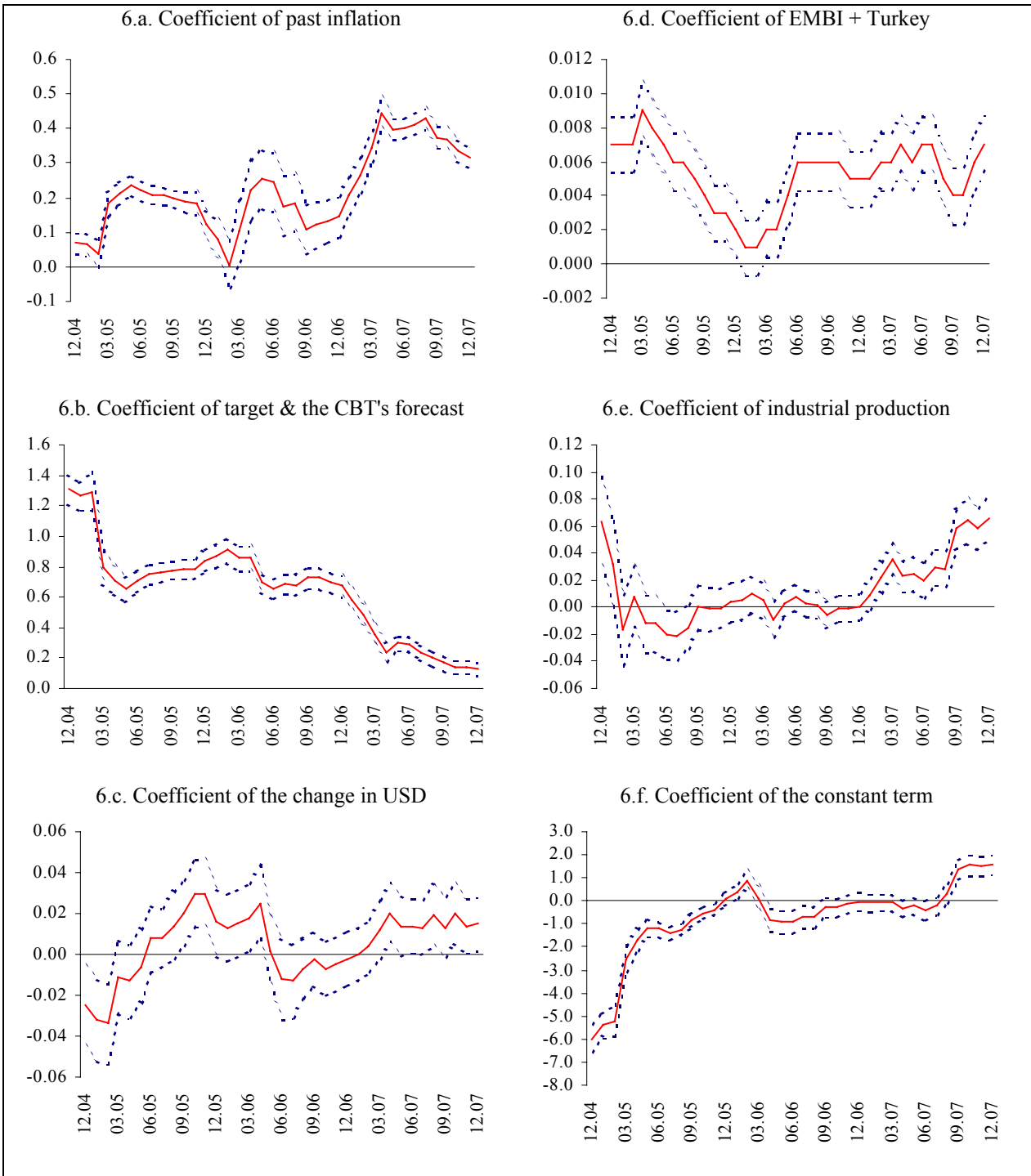
**Figure 4. Evolution of higher moments of inflation expectations**



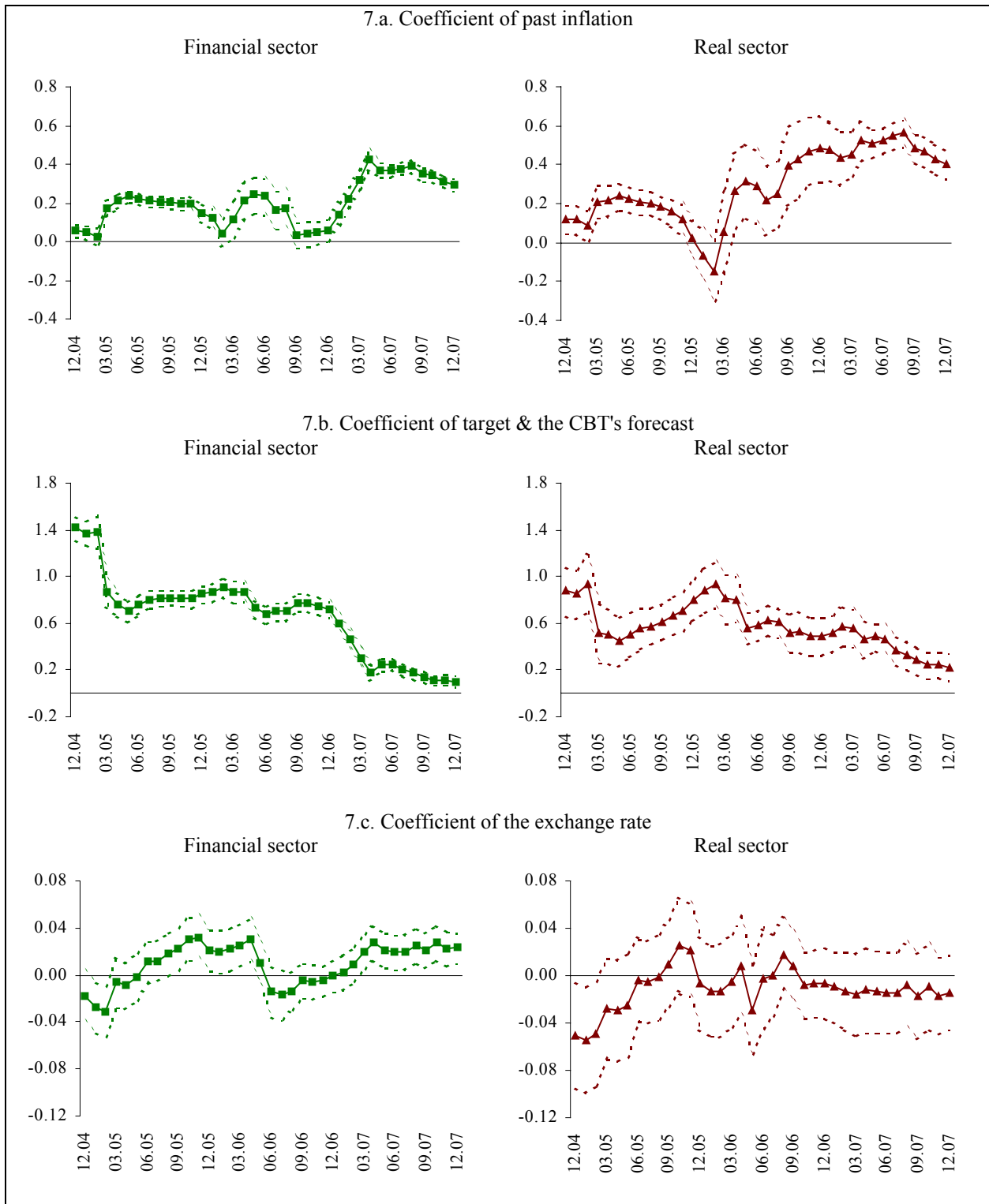
**Figure 5. Kernel densities of 12-month ahead inflation expectations in 2007**



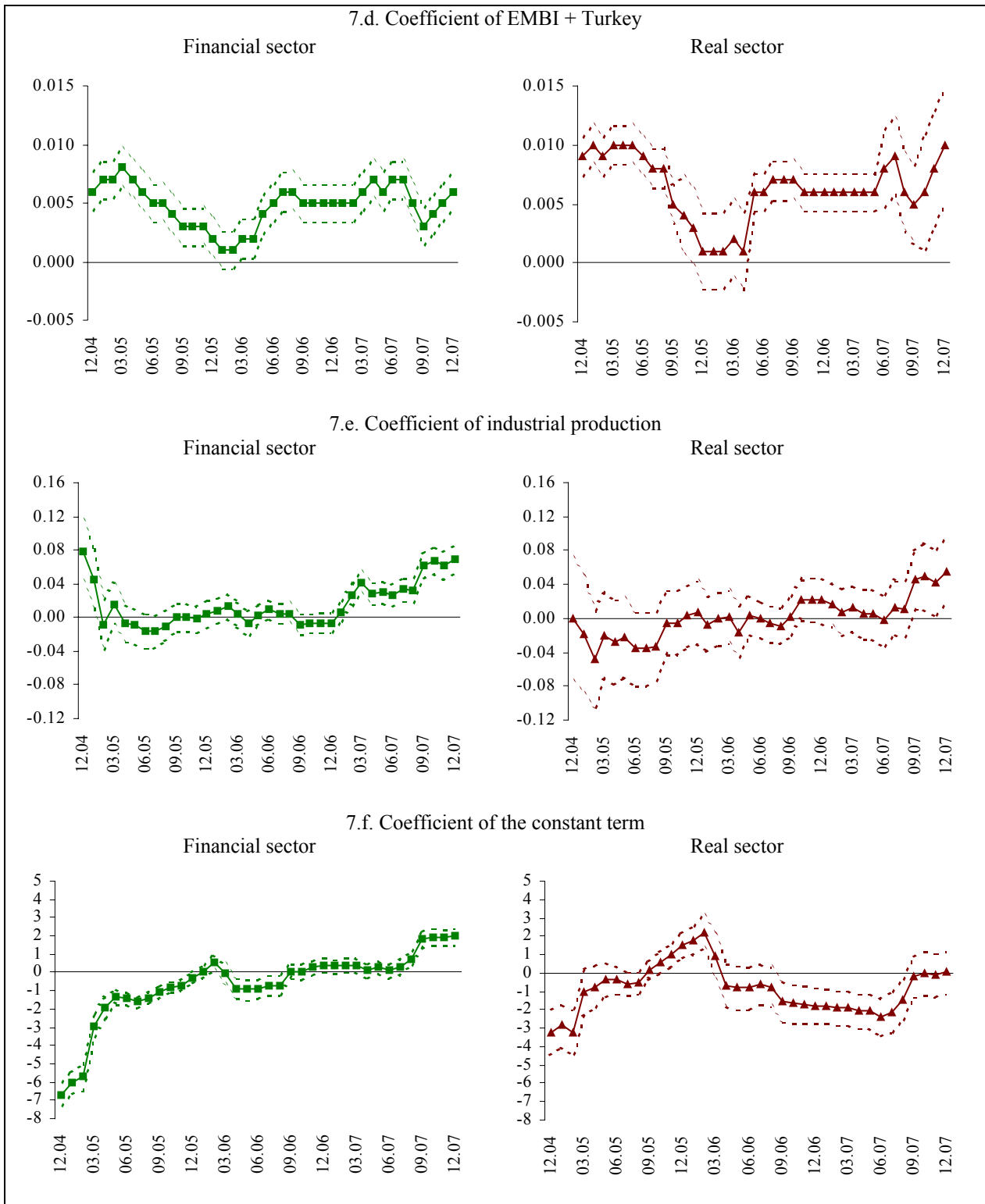
**Figure 6. 24-month rolling regressions for the entire sample**



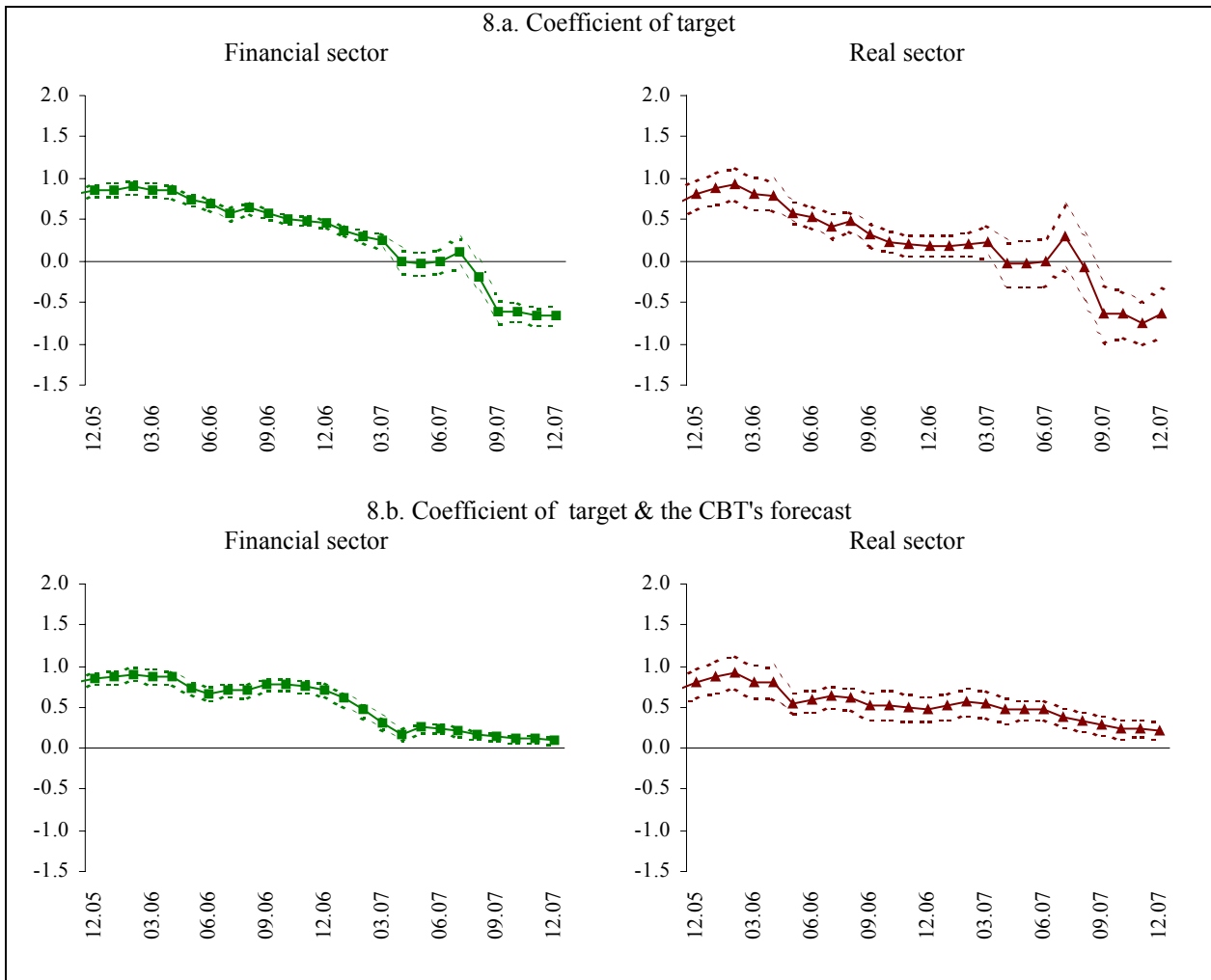
**Figure 7. 24-month rolling regressions for the financial and the real sectors**



**Figure 7. (cont.) 24-month rolling regressions for the financial and the real sectors**

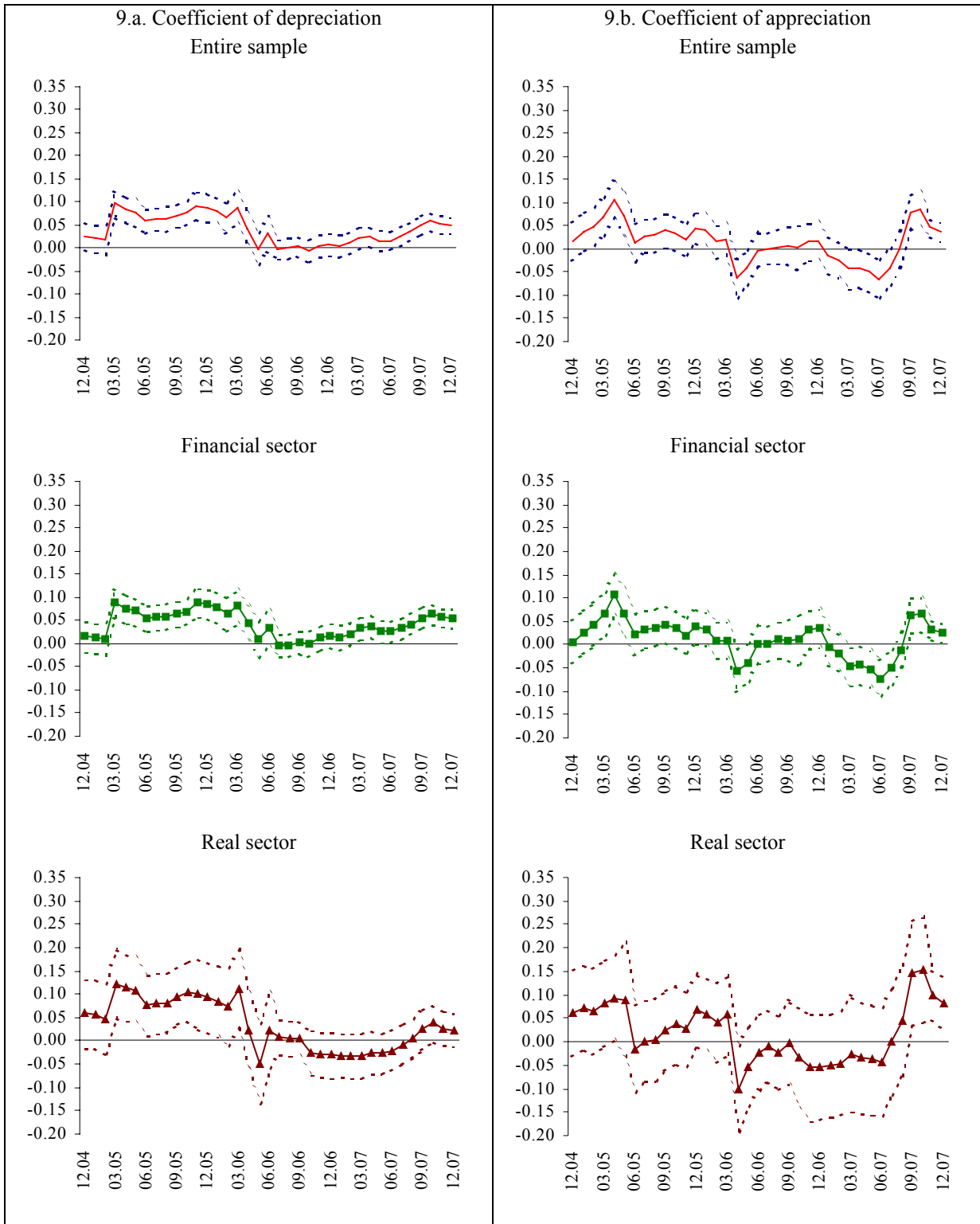


**Figure 8. Official target's behavior**





**Figure 9. Behavior of depreciation and appreciation**



**Table 1: Summary measures for forecast performance**

Survey Periods	Number of data points	Mean Error (ME)			Mean Absolute Error (MAE)			Root Mean Square Error (RMSE)		
		Entire	Financial	Real	Entire	Financial	Real	Entire	Financial	Real
<b>All</b>	<b>63</b>	<b>-4.0</b>	<b>-3.8</b>	<b>-4.0</b>	<b>5.9</b>	<b>5.6</b>	<b>5.8</b>	<b>7.8</b>	<b>7.5</b>	<b>7.7</b>
		<i>(-23.9)</i>	<i>(-22.7)</i>	<i>(-23.9)</i>	<i>(42.1)</i>	<i>(40.7)</i>	<i>(42.2)</i>	<i>(54.2)</i>	<i>(52.1)</i>	<i>(54.5)</i>
Prior 2004	29	-9.8	-9.3	-9.7	9.8	9.3	9.7	11.0	10.7	10.9
		<i>(-60.0)</i>	<i>(-57.1)</i>	<i>(-60.1)</i>	<i>(60.0)</i>	<i>(57.1)</i>	<i>(60.1)</i>	<i>(72.8)</i>	<i>(69.5)</i>	<i>(73.3)</i>
After 2004	34	0.9	0.9	0.9	2.5	2.5	2.5	3.0	2.9	3.0
		<i>(7.0)</i>	<i>(6.7)</i>	<i>(7.0)</i>	<i>(26.9)</i>	<i>(26.8)</i>	<i>(27.0)</i>	<i>(30.3)</i>	<i>(30.3)</i>	<i>(30.3)</i>

\* The error is defined as the difference between realized and expected inflation. Summary measures expressed in parentheses are percent errors relative to the realized inflation rates.

**Table 2. Macroeconomic Determinants of Inflation Expectations**

	Target			Target Star		
	Entire sample					
	2003:01- onwards	2004:01- onwards	2005:01- onwards	2003:01- onwards	2004:01- onwards	2005:01- onwards
Past Inflation	0.387 (0.008)**	0.406 (0.013)**	0.449 (0.016)**	0.287 (0.010)**	0.28 (0.017)**	0.297 (0.016)**
Target / Target & the CBT's Forecast	0.361 (0.020)**	0.297 (0.019)**	0.174 (0.025)**	0.548 (0.027)**	0.463 (0.025)**	0.288 (0.023)**
Change in USD	0.039 (0.008)**	0.021 (0.007)**	0.008 (0.008)	0.003 (0.007)	-0.013 (0.006)*	-0.01 (0.007)
Embi (+) Spread	0.008 (0.001)**	0.007 (0.001)**	0.006 (0.001)**	0.008 (0.000)**	0.006 (0.001)**	0.005 (0.001)**
Industrial Production	0.05 (0.009)**	0.066 (0.007)**	0.053 (0.007)**	0.001 (0.010)	0.031 (0.006)**	0.026 (0.007)**
Constant	-0.43 (0.067)**	0.166 (0.140)	0.566 (0.186)**	-1.114 (0.075)**	0.034 (0.139)	1.234 (0.184)**
Observations	3422	2773	2065	3422	2773	2065
Number of id	59	59	59	59	59	59
R-squared	0.94	0.79	0.42	0.94	0.79	0.46
	Financial sector					
	I	II	III	IV	V	VI
Past Inflation	0.385 (0.009)**	0.403 (0.013)**	0.422 (0.017)**	0.281 (0.011)**	0.289 (0.018)**	0.262 (0.017)**
Target / Target & the CBT's Forecast	0.411 (0.021)**	0.348 (0.019)**	0.214 (0.027)**	0.592 (0.029)**	0.477 (0.027)**	0.288 (0.025)**
Change in USD	0.046 (0.009)**	0.025 (0.007)**	0.011 (0.008)	0.007 (0.008)	-0.014 (0.007)***	-0.008 (0.008)
Embi (+) Spread	0.008 (0.001)**	0.006 (0.001)**	0.005 (0.001)**	0.008 (0.001)**	0.007 (0.001)**	0.005 (0.001)**
Industrial Production	0.05 (0.010)**	0.066 (0.007)**	0.053 (0.008)**	-0.001 (0.010)	0.028 (0.007)**	0.022 (0.007)**
Constant	-0.65 (0.075)**	0.031 (0.148)	0.728 (0.195)**	-1.386 (0.083)**	-0.298 (0.149)*	1.449 (0.195)**
Observations	2726	2209	1645	2726	2209	1645
Number of id	47	47	47	47	47	47
R-squared	0.94	0.82	0.43	0.94	0.82	0.46
	Real sector					
	I	II	III	IV	V	VI
Past Inflation	0.394 (0.018)**	0.418 (0.033)**	0.554 (0.042)**	0.31 (0.022)**	0.245 (0.039)**	0.435 (0.040)**
Target / Target & the CBT's Forecast	0.167 (0.045)**	0.099 (0.055)***	0.018 (0.058)	0.377 (0.057)**	0.408 (0.061)**	0.288 (0.051)**
Change in USD	0.014 (0.017)	0.007 (0.017)	-0.007 (0.017)	-0.011 (0.016)	-0.009 (0.014)	-0.018 (0.016)
Embi (+) Spread	0.01 (0.001)**	0.009 (0.002)**	0.009 (0.002)**	0.009 (0.001)**	0.005 (0.001)**	0.005 (0.001)**
Industrial Production	0.049 (0.020)*	0.068 (0.017)**	0.055 (0.017)**	0.007 (0.021)	0.043 (0.016)**	0.04 (0.017)*
Constant	0.429 (0.135)**	0.695 (0.345)*	-0.067 (0.472)	-0.052 (0.149)	1.335 (0.316)**	0.392 (0.460)
Observations	696	564	420	696	564	420
Number of id	12	12	12	12	12	12
R-squared	0.93	0.68	0.45	0.94	0.7	0.49

Notes: (1) \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. (2) Target refers to the imputed 12-month ahead official target calculated by linearly interpolating CBT's year-end CPI target. (3) Target-star refers to constructed series, which has CBT's official targets in pre-2006 period and CBT's official forecasts in inflation reports in post-2006 period. (4) Robust standard errors are in parentheses.

**Table 3. Effect of inflation reports on expectations**

Change in inflation expectation	Entire sample	Financial sector	Real sector
Change in the CBT's forecast	0.038 (0.069)	0.037 (0.081)	0.051 (0.110)
Change in inflation	0.095 (0.052)***	0.038 (0.059)	0.299 (0.104)**
Change in USD	0.041 (0.029)	0.03 (0.033)	0.088 (0.051)***
Embi spread	-0.001 (0.002)	0.001 (0.002)	-0.007 (0.003)*
Constant	0.179 (0.404)	-0.188 (0.443)	1.606 (0.778)*
Observations	333	259	74
R-squared	0.03	0.02	0.2

Notes: (1) \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. (2) Change in inflation refers to the change in annual inflation. (3) Robust standard errors are in parentheses.

**Table 4. Effect of inflation surprises**

	Financial sector		Real sector	
	Before June 2006	After June 2006	Before June 2006	After June 2006
Past Inflation	0.176 (0.016)**	0.171 (0.021)**	0.188 (0.029)**	0.223 (0.048)**
Target & the CBT's Forecast	0.877 (0.037)**	0.254 (0.036)**	0.623 (0.076)**	0.489 (0.086)**
Change in USD	0.024 (0.012)*	0.025 (0.008)**	-0.033 (0.023)	-0.01 (0.019)
Embi (+) Spread	0.008 (0.001)**	-0.001 (-0.002)	0.01 (0.001)**	-0.001 (0.004)
Industrial Production	-0.037 (0.011)**	0.052 (0.018)**	-0.039 (0.022)***	0.000 (-0.051)
Downward surprise ( <i>Expectation &gt; Realized</i> )	-0.134 (0.123)	-0.171 (0.147)	0.245 (0.176)	-0.052 (0.209)
Upward surprise ( <i>Expectation &lt; Realized</i> )	0.309 (0.130)*	-0.176 (0.124)	0.11 (0.246)	-0.515 (0.238)*
Constant	-2.589 (0.129)**	4.028 (0.410)**	-1.246 (0.252)**	2.827 (0.852)**
Observations	1880	846	480	216
Number of id	47	47	12	12
R-squared	0.95	0.48	0.95	0.46

Notes: (1) \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. (2) Target & and the CBT's forecast refers to constructed series, which has CBT's official targets in pre-2006 period and CBT's official forecasts in inflation reports in post-2006 period. (3) Surprise variable is calculated as the realized monthly inflation minus the participant's monthly inflation expectation. (4) Robust standard errors are in parentheses.

## Appendix

### Questionnaire Form

<b>CENTRAL BANK OF THE REPUBLIC OF TURKEY</b> <b>STATISTICS DEPARTMENT</b> <b>GENERAL ECONOMIC STATISTICS DIVISION</b> <b>SURVEY OF EXPECTATIONS</b>																			
<b>QUERY CODE:</b> <input style="width: 50px; height: 15px;" type="text"/> <b>FIRST NAME:</b> <input style="width: 50px; height: 15px;" type="text"/> <b>LAST NAME:</b> <input style="width: 50px; height: 15px;" type="text"/>	<small>CONTACT ADDRESS:</small> TÜRKİYE CUMHURİYET MERKEZ BANKASI İDARE MERKEZİ, İSTATİSTİK GENEL MÜDÜRLÜĞÜ İSTİKLAL CADDESİ NO.10, ULUS 06100 ANKARA PHONE: (0312) 310 91 07 - 311 94 29 FAX: (0312) 309 00 18 E-mail: <a href="mailto:bekleni.anketi@tcmb.gov.tr">bekleni.anketi@tcmb.gov.tr</a>	<hr style="border: 1px solid black;"/> <b style="color: red;">Please return this survey no later than 6 pm in December 18, 2007</b> <hr style="border: 1px solid black;"/>			<b>Period of Survey: December 2007</b> <b>Term of Survey: 2</b>														
<small>All individual response information will be kept confidential. Please fill in the appropriate boxes. Provide only numbers (e.g. 1 or 1.7), NOT ranges (e.g. 3 – 4).</small> <b>Please leave the boxes of the questions empty, in case you don't want to answer.</b>																			
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"></td> <td colspan="3" style="text-align: center; border-bottom: 1px solid black;"><b>Monthly Inflation</b></td> <td colspan="3" style="text-align: center; border-bottom: 1px solid black;"><b>Annual Inflation</b></td> </tr> <tr> <td></td> <td style="text-align: center;"><small>December-07</small></td> <td style="text-align: center;"><small>January-08</small></td> <td style="text-align: center;"><small>February-08</small></td> <td style="text-align: center;"><small>End-year 2007 (January-December 2007)</small></td> <td style="text-align: center;"><small>After 12 Months (Dec.2007-Nov.2008)</small></td> <td style="text-align: center;"><small>After 24 Months (Dec.2008-Nov.2009)</small></td> </tr> </table>							<b>Monthly Inflation</b>			<b>Annual Inflation</b>				<small>December-07</small>	<small>January-08</small>	<small>February-08</small>	<small>End-year 2007 (January-December 2007)</small>	<small>After 12 Months (Dec.2007-Nov.2008)</small>	<small>After 24 Months (Dec.2008-Nov.2009)</small>
	<b>Monthly Inflation</b>			<b>Annual Inflation</b>															
	<small>December-07</small>	<small>January-08</small>	<small>February-08</small>	<small>End-year 2007 (January-December 2007)</small>	<small>After 12 Months (Dec.2007-Nov.2008)</small>	<small>After 24 Months (Dec.2008-Nov.2009)</small>													
What is your expectation of the CPI? %	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>													
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;"></td> <td style="text-align: center;"><small>March-2008</small></td> <td style="text-align: center;"><small>December-08</small></td> </tr> </table>							<small>March-2008</small>	<small>December-08</small>											
	<small>March-2008</small>	<small>December-08</small>																	
What do you expect for the annually compounded interest rate of the auction for the 6-month treasury bill? %	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>																	
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;"></td> <td style="text-align: center;"><small>March-2008</small></td> <td style="text-align: center;"><small>December-08</small></td> </tr> </table>							<small>March-2008</small>	<small>December-08</small>											
	<small>March-2008</small>	<small>December-08</small>																	
What do you expect for the annually compounded interest rate of the auction for the 5-year fixed rate YTL denominated government bond with semi annual coupon payments? %	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>																	
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;"></td> <td style="text-align: center;"><small>December-07</small></td> <td style="text-align: center;"><small>March-2008</small></td> <td style="text-align: center;"><small>December-08</small></td> </tr> </table>							<small>December-07</small>	<small>March-2008</small>	<small>December-08</small>										
	<small>December-07</small>	<small>March-2008</small>	<small>December-08</small>																
What is your expectation of the money market overnight annual simple interest rate? %	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>																
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="text-align: center;"><small>By the End of December, 2007</small></td> <td style="text-align: center;"><small>By the End of December, 2007</small></td> <td style="text-align: center;"><small>By the End of December, 2008</small></td> </tr> </table>							<small>By the End of December, 2007</small>	<small>By the End of December, 2007</small>	<small>By the End of December, 2008</small>										
	<small>By the End of December, 2007</small>	<small>By the End of December, 2007</small>	<small>By the End of December, 2008</small>																
What is your expectation of the dollar rate in the interbank foreign exchange market? <small>(New Turkish Lira-TRY) (Please indicate in four decimal)</small>	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>																
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;"></td> <td style="text-align: center;"><small>2007 (Jan.-Dec.2007)</small></td> </tr> </table>							<small>2007 (Jan.-Dec.2007)</small>												
	<small>2007 (Jan.-Dec.2007)</small>																		
What is your expectation of the annual current account balance? ( (+)Surplus, (-)Deficit ) (\$ Million)	<input style="width: 50px; height: 15px;" type="text"/>																		
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;"></td> <td style="text-align: center;"><small>2007 (Jan.-Dec.2007)</small></td> <td style="text-align: center;"><small>2008 (Jan.-Dec.2008)</small></td> </tr> </table>							<small>2007 (Jan.-Dec.2007)</small>	<small>2008 (Jan.-Dec.2008)</small>											
	<small>2007 (Jan.-Dec.2007)</small>	<small>2008 (Jan.-Dec.2008)</small>																	
What is your expectation of the GNP Growth Rate? ( (+) Increase, (-) Decrease ) %	<input style="width: 50px; height: 15px;" type="text"/>	<input style="width: 50px; height: 15px;" type="text"/>																	

Please send an e-mail to [bekleni.anketi@tcmb.gov.tr](mailto:bekleni.anketi@tcmb.gov.tr) in case there is a change in your e-mail address.  
Thank you for participating in our survey.