Consumer Tendency Survey Based Inflation Expectations

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Abstract
The expectations obtained from surveys play an important role as leading indicators for the application of the monetary policies. The ability to measure inflation expectations is an integral part of central bank policy especially for central banks that are implementing inflation-targeting regime. A forward-looking perspective is essential to the success of inflation targeting. Therefore, a central bank having primary objective of price stability are interested in inflation expectations. Qualitative data on inflation expectations obtained from surveys can be quantified into numerical indicators of the expected rates of price change. This paper presents the results of different quantification methods such as Carlson-Parkin method, balance method, regression method put into action in order to estimate Turkish consumer inflation predictions based on monthly consumer surveys. Carlson-Parkin method quantifies qualitative survey data on expectations assuming aggregate expectations are normally distributed. In order to capture non-normality, stable distributions are also considered. The quantification techniques are compared with each other as well.

Key Words: Consumers, Inflation Expectations, Survey Data, Quantification Methods

1. Introduction

Inflation expectations play an important part in an inflation targeting regime. Consumers’ inflation expectations could potentially impact inflation via their influence on consumption and investment decisions. For a given path of nominal market interest rates, if households expect higher inflation, this implies lower expected real interest rates, making spending more attractive relative to saving.

Survey based data is used to obtain inflation expectations. Expectations obtained from surveys are not directly observable due to qualitative survey data. Direct measure of expectations is needed in order to analyze the behaviour of the inflation expectations. Therefore quantification techniques are needed to quantify survey expectations.

This paper focuses on inflation expectations obtained from Consumer Tendency Survey (CTS) of the CBRT (Central Bank of the Republic of Turkey) and Turkish Statistical Institute (TurkStat). The variables have only been presented in the form of qualitative statistic. Qualitative survey can only provide a direction of change for a given variable instead of an exact figure. Therefore, expectations collected as qualitative survey data are converted into quantitative estimates of the variables under consideration. There are different methods to quantify the qualitative survey results. The main aim of this paper is to quantify the inflation expectations of the consumers. The study is composed of four

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sections. The aims of the study are presented in the introduction part. The detailed knowledge about the survey and the explanation of the quantification methods are given in the second section. The quantified inflation expectations are given in the third section. Finally, the conclusion part gives the final results.

2. Consumer Tendency Survey and Quantification Methods

2.1 Consumer Tendency Survey
TurkStat and CBRT have jointly launched a study within the framework of “Consumer Survey” Protocol in 2003. Consumer Tendency Survey (CTS), which is the source for the consumer confidence index, was annexed to Household Labour Force Survey in the form of a module. The pilot study of the survey was carried out with the aim of testing the questionnaire design and method implemented between April 2003 and December 2003. During the pilot-test period, a number of modifications were made in the questionnaire design and some methods were tested in sample-selection. Following an eight-month pilot-test period, it was decided to announce the survey results on a monthly basis.

CTS has been constructed in order to find out consumer tendencies and expectations for general economic course, job opportunities, personal financial standing and market developments in order to assess their expenditure behavior as well as their expectations, and therefore deciding monthly consumer tendencies in the short-run. CTS covers four fields in measuring consumer tendencies and expectations that are Personal Financial Standing, General Economic Situation, Expenditures and Price Expectations.

The target population used for the survey is the individuals at the age of 15 and above having a job in rural and urban areas of Turkey that provide income. Therefore, the survey covers all individuals at the age of 15 and above who are employed as samples in Household Labour Force Survey meeting these criteria. The survey includes all settlements (rural and urban) in Turkey. The results of the previous month are announced following the first working day of the 16th of each month through web sites of CBRT and TurkStat.

2.2 Quantification Methods
Inflation expectations have an important role in modern macroeconomic theory. The importance of expectations has been emphasized by the recent inflation experiences of most countries. Direct measurement of expectations can be made through the tendency survey data. The quantitative expectations data are gathered in some surveys. However, the respondents indicate whether prices will fall, rise or remain unchanged for some months ahead in the other surveys. The data gathered from these surveys do not have a mean value because they are qualitative. There are several techniques to quantify the qualitative survey data (Batchelor, 1982). Different quantification methods such as Carlson-Parkin method, balance method, regression method have been considered with the aim of quantifying survey data on inflation expectations.

2.2.1 Probability Method
The probability method which is well known as Carlson-Parkin method (Carlson and Parkin, 1975) was first employed by Theil (1952). The original method has been derived for a trichotomous survey, i.e. the survey participants have three possible answer categories. In this context, the price expectations having three categories such as ‘price will increase’, ‘price will decrease’ and ‘no change in price’ (Batchelor and Orr, 1988)
are used. However, in this study, the price question that is used from CTS has five possible answer options. Therefore the pentachotomous case will be considered. The price question in CTS can be given as follows:

In comparison to the realizations, how do you expect that prices will develop over the next 12 months?

1. Increase more rapidly
2. Increase at the same rate
3. Increase at a slower rate
4. Stay about the same
5. Fall
6. No idea

The CP method assumes that respondents standing at time t (month) have formed an expectation \( \pi_{t+1} \) about inflation in the t+1 months when answering the survey. The individual subjective probability distributions can be aggregated to give the joint probability distribution \( f(x_{t+1} | \Omega_t) \), where \( x_{t+1} \) is the future percentage change of prices at time t for the period t + 1 and \( \Omega_t \) the information set at time t. It is assumed that this distribution has finite first and second order moments and that \( E[x_{t+1} | \Omega_t] = \pi_{t+1}^e \), where \( \pi_{t+1}^e \) is the expected value of \( x \) at time t for the period t+1. Another assumption on the pentachotomous case can be given as follows:

There exists an interval \((-\delta_t^L, \delta_t^U)\) around 0, with \( \delta_t^L, \delta_t^U > 0 \), such that the participants report ‘no change’ in prices if the price change expected by them lies within this interval. There exists also an interval \((\pi_t^p - \delta_t^L, \pi_t^p + \delta_t^U)\) around the subjective mean perceived inflation rate \( \pi_t^p \), with \( \delta_t^L \) and \( \delta_t^U > 0 \), such that the individuals report that prices ‘increase at the same rate’ if the expected price change is covered by this interval. The participants answer therefore in the following manner:

Prices will
fall, if \( x_{t+1} \leq -\delta_t^L \)

stay about the same, if \(-\delta_t^L < x_{t+1} \leq \delta_t^U \)
increase at slower rate, if \( \delta_t^L < x_{t+1} \leq \pi_t^p - \delta_t^L \)
increase at same rate, if \( \pi_t^p - \delta_t^L < x_{t+1} < \pi_t^p + \delta_t^U \)
increase more rapidly, if \( \pi_t^p + \delta_t^U \leq x_{t+1} \).

The proportions of the total response, denoted as \( iA_{t+1} \) ‘fall’, \( iB_{t+1} \) ‘stay about the same’, \( iC_{t+1} \) ‘increase at slower rate’, \( iD_{t+1} \) ‘increase at same rate’ and \( iE_{t+1} \) ‘increase more rapidly’ are written in terms of the aggregated probability distribution as

\[
P(x_{t+1} \leq -\delta_t^L) = \int_{-\infty}^{-\delta_t^L} f(x_{t+1}) dx_{t+1} = F(-\delta_t^L) = iA_{t+1}
\]

\[
P(-\delta_t^L < x_{t+1} \leq \delta_t^U) = \int_{-\delta_t^L}^{\delta_t^U} f(x_{t+1}) dx_{t+1} = F(\delta_t^U) - F(-\delta_t^L) = iB_{t+1}
\]
A standardized variable is used with a specified distribution function. It is assumed that the indifference intervals are symmetric, i.e. $\delta^U_t = \delta^L_t = \delta_t$ and $\epsilon^U_t = \epsilon^L_t = \epsilon_t$. However, time-variation is allowed for the intervals. The equations above give solution to the unknown parameters:

$$
\pi_{t+1}^e = \pi_t^p \left( a_{t+1} + b_{t+1} - c_{t+1} - d_{t+1} \right) q_{t+1}
$$

$$
\sigma_{t+1} = -\pi_t^p 2 q_{t+1}
$$

$$
\delta_t = \pi_t^p \left( a_{t+1} + b_{t+1} - c_{t+1} - d_{t+1} \right) q_{t+1}
$$

$$
\epsilon_t = \pi_t^p \left( c_{t+1} - d_{t+1} \right) q_{t+1}
$$

where $q_{t+1} = a_{t+1} + b_{t+1} - c_{t+1} - d_{t+1}$. The parameters depend on the choice of the distribution and the perceived inflation rate, $\pi_t^p$. The distribution function can be chosen as Normal (Carlson and Parkin, 1975). However, the normal distribution may not be appropriate for the price expectations. To capture the deviation from normality; logistic, uniform, central-t which are more peaked than the normal distribution and chi-square distribution which is positively skewed are employed (Nielsen, 2003). In addition to these well-known distributions, Stable distribution is also applied in order to quantify qualitative data. There are several reasons for using a stable distribution to describe a system. The most important reason is the Generalized Central Limit Theorem which states that the only possible non-trivial limit of normalized sums of independent identically distributed terms is stable. The second reason is many large data sets exhibit heavy tails and skewness. Economic and financial data sets are poorly described by a Gaussian model, but can be well described by a Stable distribution.

Since densities and distributions are not known in closed form for most stable distributions (exceptions being the normal, Cauchy and Levy distributions), they are usually defined by their characteristic functions (Mitchell, 2002):

$$
\phi_x(t) = E(e^{it}) = \exp \left\{ -\left[ \frac{\pi \alpha}{2} \right] \left[ 1 + i \beta \text{sgn}(t) w(t, \alpha) \right] \right\}
$$

where

$$
w(t, \alpha) = \begin{cases} 
- \tan \left( \frac{\pi \alpha}{2} \right) & , \; \alpha \neq 1 \\
\left( \frac{2}{\pi} \right) \ln |t| & , \; \alpha = 1 
\end{cases}
$$

$-\infty < t < \infty, 0 < \alpha \leq 2, |\beta| \leq \min(\alpha, 1 - \alpha), c > 0, -\infty < \delta < \infty.$
A stable distribution has four parameters; \( \alpha, \beta, \delta \) and \( \gamma \) \((\gamma = c^\delta)\). \( \alpha \) is called characteristic exponent and interpreted as a shape parameter. The Normal distribution is stable with \( \alpha=2 \) and is the only stable distribution which second and higher absolute moments exist. When \( \alpha<2 \), absolute moments of order equal to and greater than \( \alpha \) do not exist while those of order less than \( \alpha \) do. The distribution becomes heavy tailed. The tail thickness increases as \( \alpha \) decreases. \( \delta \) and \( c \) are the location and scale parameters respectively. When \( \beta \) (skewness parameter) is positive (negative), the distribution is skewed to the right (left). If \( \beta \) is zero, the distribution becomes symmetric about \( \delta \) (location parameter). As \( \alpha \) approaches to 2, the distribution approaches to a Normal distribution regardless of \( \beta \) (Fama and Roll, 1968).

A variety of measures for the scaling parameter, \( \pi^p_t \), have been used in the literature. As it should reflect the observed inflation rate, the most recent rate available to the survey participants, i.e. \( \pi_{t-1} \), where \( \pi_t \) is the officially published inflation rate, can be used for the scaling parameter. Due to the delay in publication the lagged inflation is considered rather than \( \pi_t \). A second possibility is the mean of the actual inflation rate over the whole observed period, but this would imply that the participants base their decisions in part on information that is not available at the time the decision is made. Therefore not the mean over the whole sample can be used, but instead the mean over the period that precedes the time of the decision. This is the running mean of inflation from the beginning of the sample to the point where expectations are surveyed. Another choice can be the linear interpolation between the average value of inflation over the first half of the sample and that over the second half of the sample after those values are assigned to the first and last months in the sample, respectively (Millet, 2006).

In contrast to original Carlson-Parkin approach, where the scaling parameter is estimated by imposing unbiased expectations, an important advantage is that it does not impose unbiasedness. Second advantage is that the response thresholds are permitted to vary over time (Forsells and Kenny, 2002).

2.2.2 Regression Method


If the percentage change in prices, \( \pi_t \), is composed of a weighted combination of respondents having experienced increasing (superscript +) or falling (superscript –) prices, then

\[
\pi_t = \sum w^+_i \pi^+_i + \sum w^-_i \pi^-_i
\]  

(2)

where \( w^+_i (w^-_i) \) is the weight on the ith respondent reporting an increase (decrease) during period t.

Assume that all firms reporting an increase (decrease) give the same increase (decrease) up to a random disturbance, that is, \( \pi^+_i = \alpha + v^+_i \) and \( \pi^-_i = -\beta + v^-_i \). It follows that

\[
\pi_t = \alpha R_t - \beta \bar{F}_t + \varepsilon_t
\]

\[
\varepsilon_t = \sum w^+_i v^+_i + \sum w^-_i v^-_i
\]

where it is assumed that \( w^+_i \) and \( w^-_i \) are equal for all i and t.
Pesaran (1987) assumes that during inflationary periods, there exists an asymmetrical relationship between the rate of change of individually experienced prices and overall inflation, depending on the direction of change reported:

\[ \pi^+_{ij} = \alpha + \lambda \pi^+ + v^+_{ij}, \alpha \geq 0, 0 \leq \lambda \leq 1 \]  
\[ \pi^-_{ij} = -\beta + v^-_{ij}, \beta \geq 0 \]  

where \( v^+_{ij} \) and \( v^-_{ij} \) are independent white-noise processes. After substituting the relations in (3) & (4) into (2) above, we get

\[ \pi_i = \frac{\alpha R_t - \beta F_t + \epsilon_t}{(1 - \lambda R_t)} \]  

where \( R_t \) and \( F_t \) denote the percentages of respondents reporting price rises or falls in their answer to the perceptions question, respectively. Once the coefficients from equation (5) have been recovered, it is possible to apply them to the survey proportions relating to expectations this time, thereby deriving a measure of inflation expectations:

\[ \pi_e^{i+1} = \frac{\hat{\alpha} R_e^{i+1} - \hat{\beta} F_e^{i+1}}{(1 - \hat{\lambda} R_e^{i+1})} \]  

The assumption is that the estimated relationship between survey data and inflation holds not only for realizations, but also for expectations. This can be thought to be a strong assumption. Pesaran (1987) points out that a regression like (5) “is not a causal explanation of price changes but simply identifies the relationship between two different sources of information (namely official statistics and survey results), and serves as a ‘yardstick’ by means of which categorical responses concerning the direction of future changes in prices can be converted into quantitative measures”. Pesaran (1984) further recommended correcting for the residual autocorrelation in equation (5) by imposing an AR structure on the error term:

\[ \pi_i = \frac{\alpha R_t - \beta F_t + \rho_1(1-\lambda R_{i+1})\pi_{i+1} - \alpha R_{i+1} - \beta F_{i+1}) + \rho_2(1-\lambda R_{i+2})\pi_{i+2} - \alpha R_{i+2} - \beta F_{i+2})}{(1 - \lambda R_t)} + \epsilon_i \]  

2.2.3 Balance Method

Balance method is the easiest technique to quantify qualitative data. The calculation of the balance statistic is compiled in accordance with the balance method of European Union (User Guide, 2003). The possible outcomes are -1, -0.5, 0, 0.5 and 1 for a pentachotomous survey. These outcomes are associated with the sample proportions \( tA_{i+1}, tB_{i+1}, tC_{i+1}, tD_{i+1}, tE_{i+1} \) respectively, which are defined in the section 2.2.1.

The expected mean of this random variable, denoted as \( \pi_{i+1}^b \), is then for a pentachotomous survey defined as:

\[ \pi_{i+1}^b = -1* tA_{i+1} - 0.5* tB_{i+1} + 0* tC_{i+1} + 0.5* tD_{i+1} + 1* tE_{i+1} \]
\[ = tE_{i+1} + 0.5* tD_{i+1} - 0.5* tB_{i+1} - tA_{i+1} \]

3. Quantified Expectations

The expected inflation question of CTS is quantified in order to get quantitative inflation expectations of the consumers. The methods described above are used to obtain the quantified expectations series. The latest officially published inflation rate belongs to
March 2011, so the survey period used in the study covers the period from December 2003 to April 2010. Then inflation expectations can be calculated for the period from November 2004 to March 2011 and compared with the realizations.

The probability method is employed to the inflation expectations gathered from CTS by using different distribution functions. Normal distribution is used in many studies since it is easy to handle. However, normal distribution may not be suitable with the empirical findings. Therefore, chi-square distribution, central t-distribution and Stable distribution are also applied in addition to normal, logistic and uniform distributions.

To account for the peakedness of the actual price changes, logistic and central-t distributions are used. To model the asymmetric behaviour of price changes, chi-square distribution is used. To capture not only the asymmetric behaviour but also the heavy tailed pattern, Stable distribution is applied. A grid search is used in order to derive quantified expectations series via different Stable distribution across different $\alpha$ and $\beta$ values ($\alpha$ in the range 0.1 to 2 and $\beta$ in the range -1 to 1 at intervals of 0.05). The accuracy of each estimated series is calculated by comparing against the realization.

Four different choices for the scaling parameter are applied. First one is the most recent rate available to the survey participants, i.e. $\pi_{t-1}$, where $\pi_t$ is the officially published inflation rate. The second choice used is the linear interpolation between the average value of inflation over the first half of the sample and that over the second half of the sample after those values are assigned to the first and last months in the sample. The third option is the running mean of inflation from the beginning of the sample to the point where expectations are surveyed. The final choice is the mean of the actual inflation rate over the whole observed period. The forecasting performances of different models can be seen in Table 1. Four measures of scaling parameter are analyzed for each distribution and running mean of inflation has the least error values for all distributions except for chi-square distribution.

When the performances are compared with each other for the probability method, Stable distribution having parameter values 0.30 for $\alpha$ and -0.25 for $\beta$ with the linear interpolation as threshold parameter shows the best performance due to low mean absolute error, mean square error and theil U statistics (Table 1).
Table 1: Three Statistical Criteria to compare the Quantification Methods

<table>
<thead>
<tr>
<th>Distributions</th>
<th>Threshold Parameter</th>
<th>MAE*</th>
<th>MSE**</th>
<th>TU1***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Distribution</td>
<td>Most recent inflation rate</td>
<td>3.2898</td>
<td>15.8759</td>
<td>0.4582</td>
</tr>
<tr>
<td></td>
<td>Linear interpolation</td>
<td>2.4995</td>
<td>8.4202</td>
<td>0.3337</td>
</tr>
<tr>
<td></td>
<td>Running mean of inflation</td>
<td>2.3537</td>
<td>8.3760</td>
<td>0.3228</td>
</tr>
<tr>
<td></td>
<td>Mean of the actual inflation rate</td>
<td>2.7740</td>
<td>10.2919</td>
<td>0.3689</td>
</tr>
<tr>
<td>Uniform Distribution</td>
<td>Most recent inflation rate</td>
<td>3.3737</td>
<td>16.7022</td>
<td>0.4700</td>
</tr>
<tr>
<td></td>
<td>Linear interpolation</td>
<td>2.5662</td>
<td>8.8733</td>
<td>0.3426</td>
</tr>
<tr>
<td></td>
<td>Running mean of inflation</td>
<td>2.4242</td>
<td>9.9778</td>
<td>0.3446</td>
</tr>
<tr>
<td></td>
<td>Mean of the actual inflation rate</td>
<td>2.8429</td>
<td>10.7996</td>
<td>0.3779</td>
</tr>
<tr>
<td>Logistic Distribution</td>
<td>Most recent inflation rate</td>
<td>3.2250</td>
<td>14.5285</td>
<td>0.4383</td>
</tr>
<tr>
<td></td>
<td>Linear interpolation</td>
<td>2.5735</td>
<td>8.7223</td>
<td>0.3396</td>
</tr>
<tr>
<td></td>
<td>Running mean of inflation</td>
<td>2.2611</td>
<td>7.2071</td>
<td>0.3087</td>
</tr>
<tr>
<td></td>
<td>Mean of the actual inflation rate</td>
<td>2.7933</td>
<td>10.0175</td>
<td>0.3640</td>
</tr>
<tr>
<td>Central-t distribution</td>
<td>Most recent inflation rate</td>
<td>3.2126</td>
<td>15.2122</td>
<td>0.4485</td>
</tr>
<tr>
<td></td>
<td>Linear interpolation</td>
<td>2.4310</td>
<td>8.0111</td>
<td>0.3255</td>
</tr>
<tr>
<td></td>
<td>Running mean of inflation</td>
<td>2.2954</td>
<td>7.9299</td>
<td>0.3238</td>
</tr>
<tr>
<td></td>
<td>Mean of the actual inflation rate</td>
<td>2.7054</td>
<td>9.8449</td>
<td>0.3608</td>
</tr>
<tr>
<td>Chi-square distribution</td>
<td>Most recent inflation rate</td>
<td>1.6905</td>
<td>5.6456</td>
<td>0.2732</td>
</tr>
<tr>
<td></td>
<td>Linear interpolation</td>
<td>1.8500</td>
<td>5.0477</td>
<td>0.2584</td>
</tr>
<tr>
<td></td>
<td>Running mean of inflation</td>
<td>1.9360</td>
<td>6.3207</td>
<td>0.2891</td>
</tr>
<tr>
<td></td>
<td>Mean of the actual inflation rate</td>
<td>1.5259</td>
<td>3.4798</td>
<td>0.2145</td>
</tr>
<tr>
<td>Balance Method</td>
<td></td>
<td>17.7834</td>
<td>480.3493</td>
<td>2.5204</td>
</tr>
<tr>
<td>Regression Method</td>
<td></td>
<td>1.1807</td>
<td>2.0375</td>
<td>0.0163</td>
</tr>
<tr>
<td>Stable Distribution</td>
<td></td>
<td>1.3933</td>
<td>2.9161</td>
<td>0.0504</td>
</tr>
</tbody>
</table>

The detailed information about forecast performance summary statistics is summarized in Appendix.

* $MAE = \frac{\sum_{i=1}^{n} |P_i - P_i^e|}{n}$ (mean absolute error of prediction)

** $MSE = \frac{\sum_{i=1}^{n} (P_i - P_i^e)^2}{n}$ (mean square error of prediction)

*** $TU1 = \left[ \frac{\sum_{i=1}^{n} (P_i - P_i^e)^2}{\sum_{i=1}^{n} (P_i)^2} \right]^{1/2}$ (Theil’s inequality coefficient)

where $P_i$ and $P_i^e$ denote actual inflation and inflation expectations respectively.

Figure 1 illustrates the expectations derived via different distributions. It can be concluded that the best fit to actual values of inflation can be attained by the expectations derived from Stable distribution. Therefore, we can conclude that Stable distribution fits better for the Turkish case.
The question of price expectations in CTS has five categories. The proportions are added in order to get three-category options. ‘Fall’ option is equal to $A_{t+1}$, ‘Same’ option is equal to $B_{t+1}$ and ‘Rise’ option is equal to $C_{t+1}+D_{t+1}+E_{t+1}$. After having three-option categories, the model given in equation (7) is applied. The question of inflation perceptions does not exist in CTS, so the regression model is constructed for the expected inflation question. The results are given in Table 2 and Figure 2.

Table 2: Regression Model

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Pesaran AR(12) Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha$</td>
<td>-0.076*</td>
</tr>
<tr>
<td>$\beta$</td>
<td>-0.164*</td>
</tr>
<tr>
<td>$\lambda$</td>
<td>2.033*</td>
</tr>
<tr>
<td>$\rho$</td>
<td>-0.624*</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.49</td>
</tr>
</tbody>
</table>

* Significant at 5 % level.

12-month lagged inflation rate is used in order to avoid overlapping of periods for the error term. All the parameters in the model are found to be significant.
The balance method can be seen in Figure 3. The figure indicates that there is no similar pattern with realizations in tendency.

The comparisons of the models can be seen in Figure 4. The best model for quantified price expectations can be said to be the regression model. Although the best model is regression model, the determination coefficient of the model is low and it makes us think about consumers’ basket price movements rather than CPI. The survey responses do not align closely with the CPI. While making their forecasts, consumers can think about their own baskets such as food or energy prices rather than consumer prices.
Figure 4: Comparisons of Expectations obtained by Different Methods

Figure 5 points out that consumers’ inflation expectations are affected by past inflation and consumers cannot foresee the future inflation. This result also indicates that consumers are backward-looking. This co-movement can also be seen in Carlson-Parkin method (except chi-square and Stable distribution) in Figure 6. Current CPI is the latest officially published inflation rate known at the survey period. For instance, the current CPI is the yearly inflation rate of November 2003 corresponding to November 2004 in the figures 5 and 6.

Figure 5: Balance Method and Current CPI
The expectations derived from Carlson-Parkin method is chosen to demonstrate the change in expectations, i.e. whether expectations become more forward looking after the inflation targeting regime. The survey period used in the study covers the period from December 2003 to April 2010. The data can be divided into 2 parts such as “Before Inflation Targeting Regime” and “After Inflation Targeting Regime” according to the survey period used in the study. The survey period between December 2003 and December 2005 for the “Before IT Regime” and the survey period between January 2006 and April 2010 for the “After IT Regime” is used. The first differences of inflation expectations ($\Delta \pi_t$) and current CPI inflation ($\Delta \pi_{t-1}$) (Current CPI is the latest officially published inflation rate known at the survey period) are investigated.
The linear regression is as follows:

\[ \Delta \pi_t = c + \lambda \Delta \pi_{t-1} + \varepsilon \]

**Table 3:** Change in Expectations before and after Inflation Targeting Regime

<table>
<thead>
<tr>
<th></th>
<th>Constant (c)</th>
<th>(\lambda)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Whole Period</strong></td>
<td>-0.04 [-0.57]</td>
<td>0.16 [1.86]*</td>
</tr>
<tr>
<td><strong>Before Inflation Targeting</strong></td>
<td>-0.16 [1.07]</td>
<td>0.29 [1.25]</td>
</tr>
<tr>
<td><strong>After Inflation Targeting</strong></td>
<td>0.02 [0.32]</td>
<td>0.11 [1.31]</td>
</tr>
</tbody>
</table>

*Significant at 10% level.

The coefficient of the change in current inflation is found to be significant for the whole period. Although no significant effect of current inflation on expectations could be found for each sub period, it can be said that the coefficient of current inflation decreases after the inflation targeting regime. The important thing that should be mentioned here is that the number of observations is limited like 22 for 1st period whereas the 2nd period covers 52 observations. Thus, one should give notice to the findings in Table 3 in the light of this information.

4. Conclusion

Surveys are useful because they provide independent (or relatively non-model dependent) measures of inflation expectations, a key variable that a central bank can use in its design of an optimal monetary policy geared toward the achievement of price stability.

This paper has attempted to analyze the qualitative inflation expectations gathered from the survey data. The survey results are examined and the qualitative inflation expectations are quantified by using different methods such as Carlson-Parkin method, balance method, regression method. These methods are compared by using several statistical criteria, like mean square error, mean absolute error and Theil’s inequality coefficient.

Carlson-Parkin method is applied for the pentachotomous survey question. In this approach, one advantage is that the scaling parameter is not estimated by imposing unbiased expectations. Another advantage is that the thresholds are permitted to vary over time. Different distributions are applied and expectations obtained by Stable distribution show the best performance due to statistical criteria. Therefore, it can be concluded that Stable distribution fits better for the Turkish case among the other distributions. The balance method is applied and it is found that consumers are backward-looking. Thirdly, nonlinear regression model is constructed to get the inflation expectations series.

Finally, the expectations derived from three different techniques are analyzed and the nonlinear regression model is found to be the closest one to realizations. Although,
regression method outperforms the other two methods, one conclusion from the set of experiments is that there is still a large gap between consumer expectations and realizations. This gap is probably caused by the basket people have in mind compared to what the CPI is tracking. Another important result is that consumers are backward-looking. As a final remark, we point out that one should pay attention to these findings while working on the consumers’ inflation expectations.

Appendix

It has been commonplace in the literature to compare different quantification methods on the basis of their forecasting performance (Smith and McAleer, 1995; Mankiw et al., 2003). Some standard forecast performance summary statistics consist of Mean Absolute Error (MAE) and Root Mean Square Error (RMSE). MAE is the measure that gives information on the average size of forecast errors; regardless of they are positive or negative. However, MAE has a weakness considering the viewpoint of a policy-maker using forecasts as a decision guide. If there are nonlinearities, one or two forecasts very far from the actual outcomes could be more damaging from a policy viewpoint than a larger number of forecasts not so far from the actual outcomes. RMSE, which squares errors before averaging them, is a measure that penalizes the forecaster who makes some large errors more heavily than the forecaster who makes mainly small errors (Bowles et al., 2007). In literature, researchers use these statistics in order to make the comparisons and to figure out the best quantification method even if the expectations are found not to be rational and have a backward-looking nature (Lyziak, 2003). In this study, we try to find out which method forecasts the actual inflation with the least error by means of these summary statistics. Then, the chosen method would be the best one for our analysis.

References


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