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Inflation Expectations in Turkey: Statistical Evidence from the Business Tendency Survey

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Abstract

In Turkey, the importance placed on public's expectations about future economic and financial conditions has risen in recent years within the upcoming fully-fledged policy of inflation targeting framework; in accordance, information on expectations of future inflation could be inferred from surveys of expectations. This paper examines the inflation expectations of firms in the manufacturing sector in Turkey, assessing the Central Bank of the Republic of Turkey's Business Tendency Survey data. The focus of this paper is a wide-ranging analysis of the characteristics of the inflation expectations of firms rather than their formation. The paper not only evaluates the performance of inflation expectations (whether they are in line with realizations and how they react to the shifts in the economy) but also handles the characteristics of their distribution. Besides, the paper attempts to see how expectations vary across sub-sectors and to analyze their relationship with other expectations.

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1. Introduction

Inflation expectations have a central role in macroeconomic theory, by giving direction to consumption, saving and investment decisions of economic agents (Lyziak 2003). The adoption of inflation targeting framework accentuates the use of inflation expectations in monetary policy decisions. Inflation expectations function as forecasts for future inflation, enhancing the tools of central banks in their policy strategies and serve to evaluate the credibility of the central banks' policies. The diminishing gap between inflation expectations and realized inflation reveals the growing gain of credibility (Kershoff 2000).

In Turkey, the importance placed on public's expectations about future economic and financial conditions started to grow in recent years, along with the outlook for adopting a full-fledged inflation targeting policy in the near future. Accordingly, the attention towards the surveys of expectations, which is one of the tools commonly used to identify the pattern of the future inflation, highly increased. By 2004, the number of surveys conducted by the Central Bank of Turkey is three; Business Tendency Survey relating to manufacturing industry, Survey of Expectations relating to financial and real sectors (see Table 3 in Appendix for details) and Consumer Tendency Survey (in cooperation with the Turkey's State Institute of Statistics) relating to consumers. As (Kershoff 2000) states surveying different groups, such as business executives, households and financial market participants, is superior to just quizzing society as a whole, as the difference in these groups' expectations unveil important information.

This paper examines inflation expectations of manufacturing industry, assessing the "Business Tendency Survey" (BTS) data of the Central Bank of the Republic of Turkey. The aim of this study is to give a general outlook of inflation expectations of firms rather than to concentrate on their formation (that is whether the expectations are rational or not)[1]. We pursue our study with a detailed analysis of the survey data with putting emphasis on different aspects in a more general manner, such that how they perform in sub-sectors, whether they are in line with the realizations of the real economy, how they evolve over time and how they are related to other tendencies and expectations.

[1] For detailed discussion on the quantification and the expectation formation of the BTS, see (Uygur 1989), (Oral 2002) and (Karadaş & Öğünç 2003).

The plan of this paper is as follows: in Section 2 we give a brief history of the survey and some preliminary information on the data. In Section 3, general features about the performance of the quantitative inflation expectation series are discussed and the distribution of the data is inspected. In this section, we show how the median expectation, standard deviation, skewness and kurtosis change over time, besides the behaviors of expectations are displayed using kernel densities. Section 4 is devoted to the cross-correlation analysis of the expectations and the realizations, while in Section 5 the bias in the expectations is tested. In Section 6, we follow a basic cross-sectional descriptive analysis and examine the variation of the expectations among subgroups. In Section 7, a logistic model analysis is carried out using July 2004 data to uncover the relations between the inflation expectations and other expectations such as those concerning demand, output, production and cost. Finally, in the last section the main findings of the study are summarized and concluding remarks are presented.

2. Business Tendency Survey

Business Tendency Survey conducted by the Central Bank of the Republic of Turkey (CBRT) was launched in December 1987 with the aim of monitoring the tendencies and expectations of the business executives on the recent past and the future course of the economy. The respondents are the executives of the industrial enterprises ranked among the "First 500 Industrial Enterprises of Turkey" and the "Next 500 Major Industrial Enterprises of Turkey" lists, prepared by the Istanbul Chamber of Industry, who have accepted to participate in the survey.[2] The average number of respondents has currently reached 500 firms per month, corresponding to a response rate of 50 percent. According to the analysis of consistency, the Cronbach reliability coefficient of the BTS is 0.817 (Oral 2002), indicating a satisfactory level of consistence.

The monthly BTS comprises questions regarding the tendencies and expectations about the general course of economy, investment, domestic and foreign demand, production, inventory and wholesale inflation. In particular, BTS contains three questions concerning future inflation. First, one asks for the inflation trend over the next three-months in a three-scaled categorical (three-point Likert scale) form, i.e. up, same, down. The other two questions are in quantitative form and ask for the expectation of wholesale price inflation for the year-end and for the coming twelve

[2] Though the population consists of both the private and public firms in the manufacturing sector, the private firms form the majority of the population (more than 90 percent), and only their data is analyzed.

months. In fact the two main questions analyzed in this study are: the one providing the inflation trend in the next three months (categorical observations) and the other providing quantitative point estimates about the inflation rate in the next twelve months. Since the coverage of the survey was broadened to contain questions concerning inflation in January 1999, our data on inflation expectations start from this date. The other questions of the BTS that are subject to this study are the expectations of current and future trend of demand, production and stocks. These questions are used as explanatory variables in logistic regression models as discussed later in Section 7.

3. General Features of the Quantitative Inflation Expectations

In this section, general features of the quantitative inflation expectation series are discussed[3]. These data are especially important since they reflect the expectations of wage and price-setters. Figure 1 shows the co-movement of the expected and realized inflation series, synchronized to allow comparability. It is observed that the year-on-year wholesale price inflation and its expectation follow a similar pattern during 2000. Since the economic crisis in February 2001.[4] could not be foreseen in 2000, the expectations are far lower than the realizations in the post-crisis period. As the economy recovers, from the second quarter of 2002 the realizations and expectations tend to move together again. With the on-going implicit inflation targeting that started in 2002, the annual inflation rate decreased below 10 percent by 2004, while the expectations seem to adapt to the decline in inflation rates.

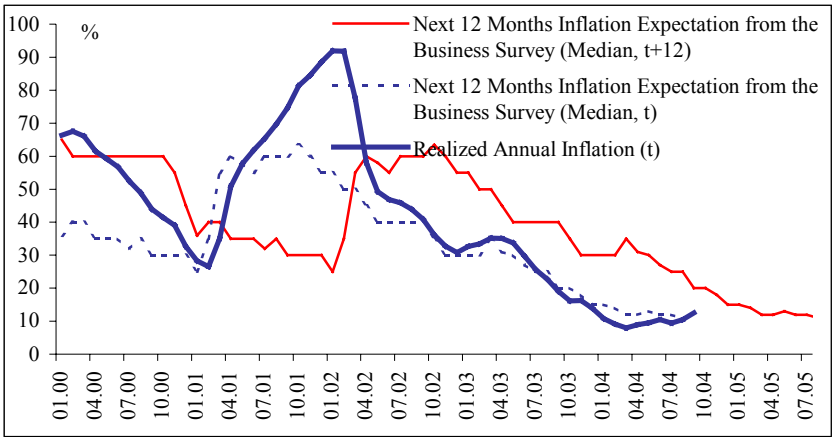
Generally, even there is a tendency of the expected and the realized inflation series to move together, there is a distinctive gap between these two series: over the whole period (except the crisis), the expectation series lies above the realized inflation. In fact, this is a common problem in expectation surveys. For example, (Brischetto & Brouwer 1999) report that consumer price inflation expectation is systematically two points higher than the realized inflation on average in Australia. When one considers that the average rate of WPI inflation in the last decade was above 60 percent in Turkey (which is extremely higher than that of Australia), higher discrepancies in Turkish data may be tolerated. Besides, over the recent period characterized by relatively lower inflation rates, the gap between expected

[3] The data series can be found on the Central Bank of the Republic of Turkey official web site (www.tcmb.gov.tr), Electronic Data Delivery System.
[4] The Turkish economy was hit by turmoil in the banking sector in November 2000, that turned into an economic crisis in February 2001. Overnight interest rates increased severely and the fixed exchange rate regime that had collapsed, was replaced by a floating exchange rate regime.

and realized inflation is diminishing gradually. To this end, a test for bias is carried out in Section 5.

Another issue worth considering on this discrepancy problem is the fact that the respondents may have some difficulties in answering questions regarding future inflation, especially in a period of adaptation to lower inflation rates. Although realized inflation rates decreased progressively after the implementation of the disinflation program, the expectations insisted to stand higher than realized figures; as the respondents might have placed relatively more weight to their past and current experience than their future prospects, showing a backward-looking attitude. In Figure 1, when expectations are plotted at the time forecasts were made (t), rather than at the end of the forecast horizon (t+12), we observe that the forecasts are in line with the current rates of inflation. This supports that the forecasts are influenced by the current realizations.

Fig. 1. Expected and Realized Inflation Rates (January, 2000 - July, 2005)

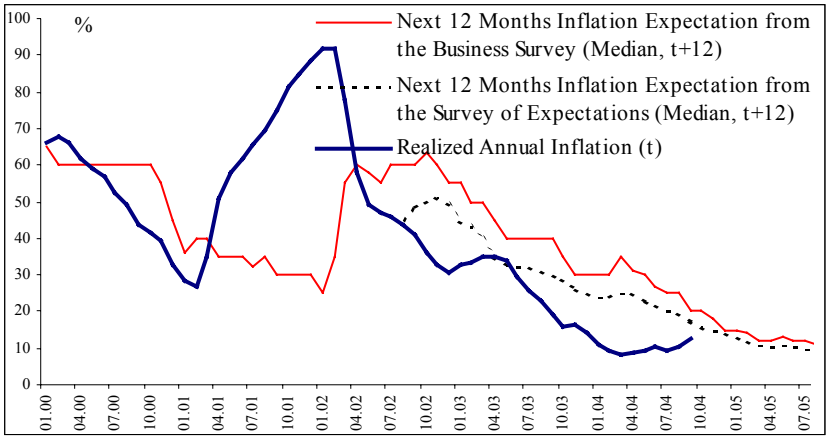


Another survey, which is also conducted by the CBRT, is named The Survey of Expectations (SE). It has started more recently, in August 2001. The purpose of SE is to find out expectations of experts and decision makers from financial and real sectors of the economy in the short-term, not only on inflation figures but also on interest rates, exchange rates, growth rates and current account balance.

In Figure 2, inflation expectation series from the SE and the BTS are compared. Here, the 12-month ahead inflation expectation series from the SE is the expectation of consumer price inflation, while the one from the BTS is the expected wholesale price inflation. Even so, it is observed that the movements of the two series are

quite similar. Although the respondents are from different segments of the economy, the inflation expectations from the two surveys have a parallel pattern, indicating that the responses to the surveys are consistent in nature.

Fig. 2. Comparison of Inflation Eexpectations from Two Surveys (January, 2000 - July, 2005)



After comparison, we examine various descriptive statistics of the quantitative next twelve months inflation expectations. Karl Pearson showed that the first four moments characterize a distribution, that is, these first four moments (accordingly mean, standard deviation, skewness and kurtosis) provide information about the shape of the distribution. Pearson defined two non-dimensional quantities β_1 and β_2 coefficients, based upon four moments (μ_i, i = 1, 2, 3, 4) about the mean as:

$$\beta_1 = \frac{\mu_3^2}{\mu_2^3} \text{ and } \beta_2 = \frac{\mu_4}{\mu_2^2} \tag{3.1}$$

The skewness, which is defined to be $\sqrt{\beta_1}$, characterizes the degree of asymmetry of a distribution (i.e. measures the departures from the symmetry), whereas the kurtosis defined as $\beta_2 - 3$ measures the flatness of the distribution, both referring to the shape of the distribution. The normal distribution, as a mean of comparison, has $\beta_1 = 0$ (corresponding to zero skewness) and $\beta_2 = 3$ (corresponding to zero kurtosis). In this study, we examine the distribution of inflation expectations according to the first four moments.

Figure 3 gives the mean and the median of the quantitative next twelve months inflation expectation at the time the forecasts were made. As seen in the figure, the mean and the median do not differ significantly over the whole period; however the median, which is less sensitive to extreme observations, tends to lie under the mean.

In the literature it is proved that if there is a suspicion about the symmetry, it is more robust to rely on the median instead of the mean as a descriptive measure. Therefore in case of Turkey where there were persistent high inflation rates, it may be more accurate to consider the median as a measure of inflation expectation rather than the mean.[5]

Fig. 3. Mean and Median of Inflation Expectations (January, 1999 - July, 2004)

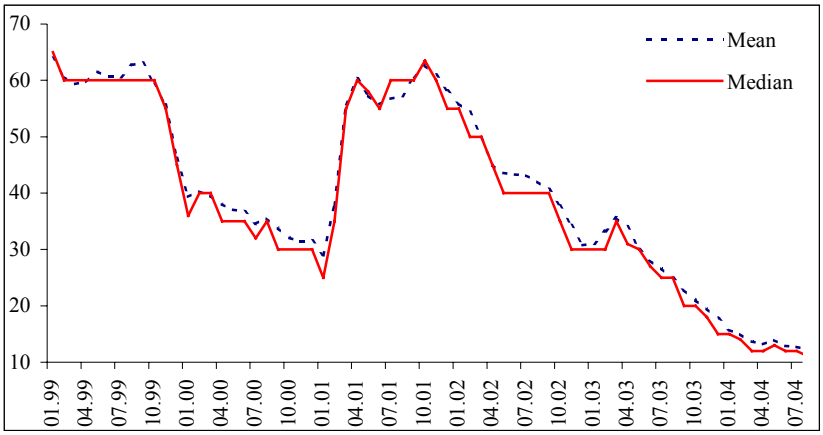
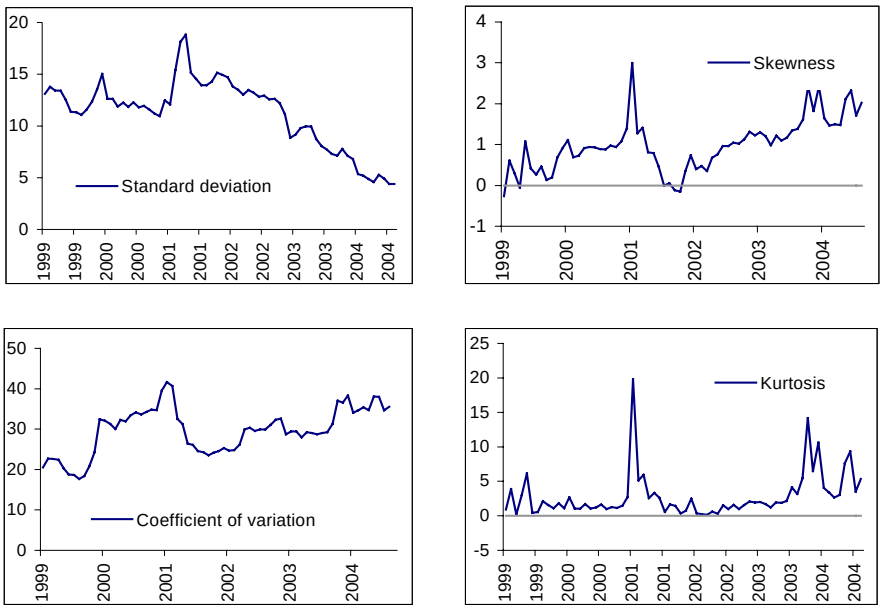


Figure 4 shows how the standard deviation, coefficient of variation, skewness and kurtosis of the expectations change over time. The series of standard deviation follows a decreasing trend, justified by the downward trend of the inflation rate (and also of its expectation) in the recent years. This may appear as if the uncertainty of expectations has reduced considerably in the last two years. But is that really the case? From 2002, as the rate of inflation reduced, smaller standard deviations were obtained, since the standard deviation measure is not a scale-free parameter. Here instead of analyzing the pattern of the standard deviation, a standardized measure, the coefficient of variation, which is the ratio of the standard deviation to the mean, is evaluated. As seen from the figure, as a measure of uncertainty, the coefficient of variation series has increased after the period of financial and economic turbulence of 2001. The increase in the coefficient of variation over the last period of low inflation shows that even though participants became more precise, data did not yet gain homogeneity.

[5] Each month, the CBRT calculates several descriptive statistics (including the mean, the median, the mode and the trimmed mean) and chooses the most suitable statistic for location.

Fig. 4. Descriptive Statistics of Inflation Expectations (January, 1999 - July, 2004)



The graph of the coefficient of skewness indicates that the distribution of inflation expectations is not symmetric (which violates the normality), it is skewed to the right almost over the whole inspected period (the coefficient of skewness is above zero). Moreover, if we concentrate over the last year, we see that skewness increased. This increasing trend can be interpreted from two aspects. Firstly, it indicates that there is a tendency of the expectations to move to lower values, as the frequency of higher values has fallen. Secondly, even the decreasing pattern of realized inflation grows stronger, it is clear that there are some respondents who still resist in giving high inflation expectations. In our belief, the second argument plays the dominant role for the increasing skewness, rather than the former.

The last descriptive statistic to be considered is the kurtosis of inflation expectations. In our case it is seen that generally the distribution has kurtosis > 0 ($\beta_2 > 3$), indicating that the curve is more peaked than a normal curve, or in other words leptokurtic.

Consequently, it is evident that the distribution of inflation expectations is far from being normal. The next issue is thus trying to concentrate more on the distribution of the inflation expectations. But there are over sixty sets of monthly data in the studied period, and presuming that the distributions are not likely to

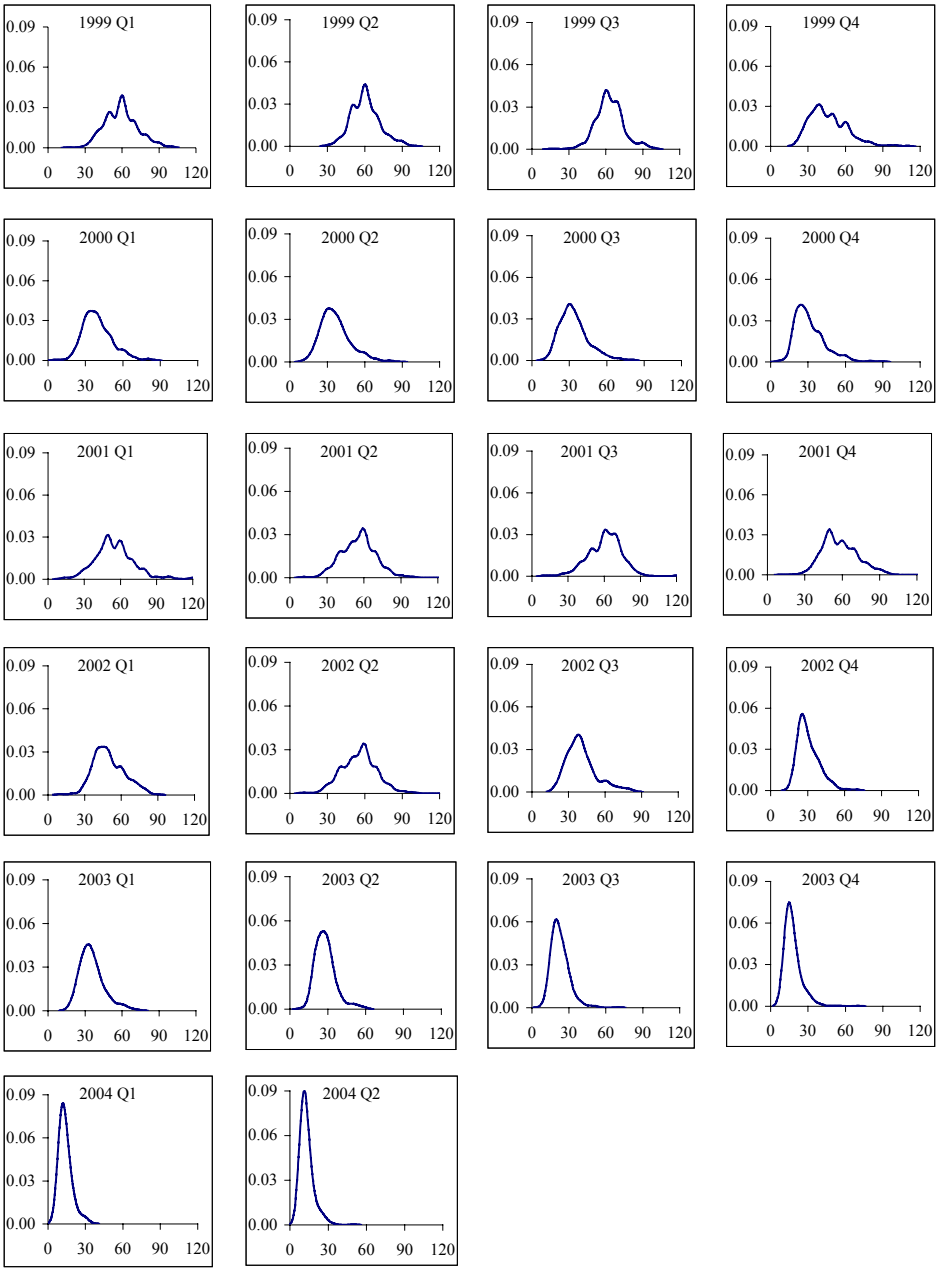
change a lot in the short-term (for example monthly), it is not practical to fit a distribution to the survey data each month. Therefore, only quarter-end data are analyzed. In order to examine the distributional pattern of the inflation expectations, we approximated probability densities of the expectations using kernel density function.

As (Silverman 1986) states the kernel density smoothens the boxes of a histogram by bumps where less weight is given on observations further from the point being evaluated. Namely, the density of a series X is given by:

$$f(x) = \frac{1}{Nh} \sum_{i=1}^{N} K\left(\frac{x - X_i}{h} \right) \tag{3.2}$$

where the kernel function K determines the shape of the bumps while the smoothing parameter h determines their width. As often suggested in the literature, we have employed the normal kernel function. At this point, a crucial issue is the choice of the smoothing parameter h. A bandwidth based on the data can be used to find h, nevertheless in our context, the use of a unique bandwidth over the whole period is thought to be more appropriate to provide the comparability between the density functions, and the choice of h=3 is found to be suitable for the entire data set. Figure 5 shows the kernel densities thereby obtained. From an overall view, the distribution of the expectations seems asymmetric and it is clear that the shape of the distribution does not stay the same over the period 1999-2004.

Fig. 5. Kernel Densities of Inflation Expectations



Some important features regarding the evolution of the distribution of the inflation expectations are as follows:

- The flatness of the distribution may be a sign for the degree of disagreement within the respondents. The distribution of expectations seems to be more fat-tailed from 1999 to 2002 that corresponds to a more turbulent period economically, in which the respondents may have some difficulty to predict the rate of inflation so that they respond within a wider range. In 2000, there is significant number of pessimistic respondents who give high rates of inflation that justifies the right skewness. The economic crisis of February 2001 makes the flatness continual until the amelioration of the economic conditions.

- In 1999 and in 2001 the distributions of expectations could be considered to be nearly symmetric if they had unique modes. Nevertheless, the expectations have no single mode in 1999 and in 2001, supporting also the extent of serious disagreement among the respondents.

- From 2003, it is clear that there is a shift characterized by a decrease of the dispersion and an increase of the sharpness revealing the raise of agreement. As a reflection of more stable economic conditions, the respondents feel more comfortable in foreseeing the future rate of inflation. If it had not been the extreme points at the right tail, the distribution would move closer to a symmetric one.

Briefly, it can be deduced that expectations adjusted to the change in the regime. Recently, as the disinflation process is continuing and the rate of inflation moves towards one-digit numbers for the first time in its history, there is a significant shift of the expectations to lower values, while the disagreement among the respondents declines.

4. Correlation of Expectations with the Realized Rates of Inflation

The qualitative question of the BTS about inflation expectation is the one asking for the next three months trend in a three-point Likert scale (up, same, down). Here, one can pose a question about how this expectation series should be treated regarding the time horizon. The reference series that is to be compared with this expectation series is not as clear as it is in the previous case. If the month in which the respondent is answering the question is t, one can think of several possible situations:

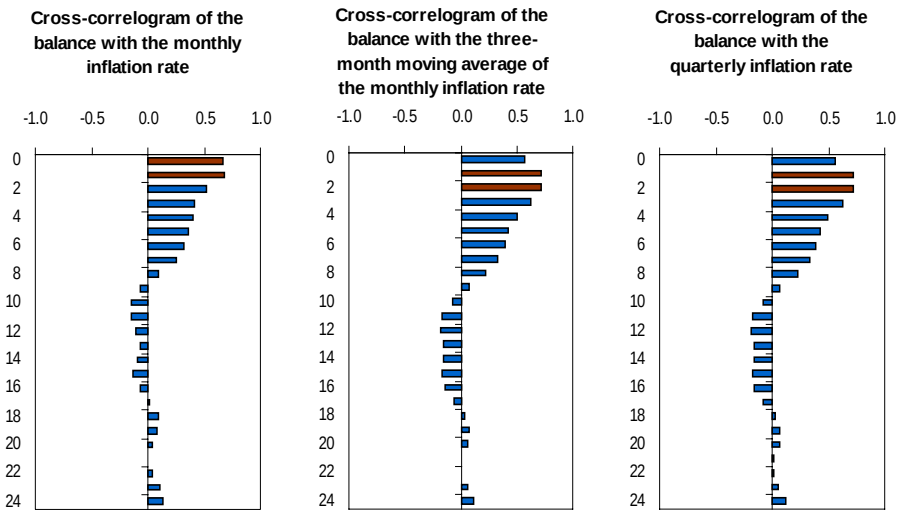
- the respondent may be telling his expectations of three months ahead, which refers to the $(t+3)^{th}$ month.

- the respondent may be telling an average expectation of the three months, that is (t+1), (t+2), $(t+3)^{th}$ months collectively, like a trend.

- or if we consider that the last announced data belong to the previous month, that is (t-1), the respondent may think of the "next three months" as (t), (t+1), (t+2).

For comparison, expectation of next three months inflation trend is identified by a balance, which is calculated as the difference between proportions of "up" and "down" answers. It is expected that if the price level rises, then the number of respondents expecting higher inflation rate will tend to increase.[6] Here, the balance representing the percentage of respondents expecting higher inflation in the next three months less the percentage of respondents expecting lower inflation in the next three months is a meaningful quantitative measure for inflation expectations. This simple transformation not only smooths the expectation series but also forms a more reliable data set.

Fig. 6. Cross-correlogram of the balance and the rates of inflation (May, 1997 - July, 2004)



[6] In fact, this assumption is the basis of quantification of the survey data. For details, see (Uygur 1989).

Figure 6 shows the graph of the cross-correlations between this balance and different reference series of realized rate of WPI inflation. Looking to the correlation of the balance with the monthly rate of inflation, the highest correlation is observed for the t^{th} and $t+1^{th}$ lags: hence, it may be said that the respondents have some difficulties of pre-seeing the trend of inflation in the next three months. Then we also compared the balance with the three-month moving average and the quarterly inflation rate. The cross-correlation analysis shows that the highest correlation occurs at the $t+1^{th}$ and $t+2^{th}$ lags of inflation rates, which gives clues about the respondents' understanding of inflation trend in the next three months; the respondents seem to consider a relatively shorter horizon when making forecasts.

5. Testing for Bias in the Expectations

While analyzing inflation expectations in such detail, it wouldn't be proper not mentioning the biasedness problem. There is a wide literature on the tests of rationality of inflation expectations, but since the focus of this paper is not the formation of expectations we will only emphasize on the unbiasedness that will permit to see how good the respondents are at forecasting and to detect whether there is a tendency of overpredicting the inflation rate. (Mankiw et.al. 2003) give a simple test for bias by regressing the difference between the inflation rate and its expectation on a constant as:

$$\pi_t - \pi^e_{t-12} = \alpha \tag{5.1}$$

where π and π^e are the realized and expected rates of inflation respectively. If $\alpha = 0$ then the expectation is said to be unbiased.[7]

Though the quantitative expected inflation series starts from 1999, the turmoil in November 2000 followed by the crisis of February 2001 makes the estimation process harder. The economy starts to cool down in April 2001 with the government's precautions, as mentioned earlier. Yet, the analysis cannot give interpretable results until one year.[8] The number of observations is quite low in this case, but this procedure is only groundwork.

According to the test results, the constant α is found to be -16.691 (with t = -14.364) and it is undoubtedly not equal to zero, giving evidence for a highly

[7] Another well known representation of this equation is $\pi_t = \alpha + \beta \pi^e_{t-12}$, which refers to rationality. When this representation is used, the parameter test for $\beta=1$ is not rejected for the data.

[8] In the regression, the medians of the expectations are used. The regression period is from April, 2002 to July, 2004.

significant bias. The term suggests that the expectations lie 17 percent on average above the realized rate of WPI inflation after April 2002. The amplitude of the bias is quite strong and its negative sign confirms that the respondents tend to over-predict the inflation for the whole period, supporting our graphical observations from Section 3.

At this point, the question of the perceived rate of inflation arises. (Berk 1997) affirms that the inflation rate perceived by the respondents doesn't always have to coincide adequately and completely with official inflation figures. Adapting this idea to our case, we may think of the possibility that some of the executives of the private manufacturing industry may not always perceive the WPI inflation rate correctly. It is not unlikely for the executives to be influenced by the economic developments in their belonging sectors, and build their expectations accordingly.

6. Cross-sectional Analysis

In this section we focus on the year-end survey data and examine the five end-months cross-sectionally. For each month the quantitative inflation expectation data is divided into subcategories, and their associated means, medians and standard deviations are calculated. By means of this disintegration, we reveal the expected rate of inflation and its variation by subgroups. The cross-sectional inflation expectation data are analyzed following several breakdowns, which enable to form more homogeneous groups. The first one is the sectoral breakdown of the manufacturing industry; a second classification is made with the number of workers employed[9], and the last categorization is based on whether the enterprises are exporters or not. The related tables are given in the Appendix (Tables 4 and 5).

First, it is observed that expectations of exporting firms are systematically lower than the non-exporting ones over the examined period. A possible reason for this is that, exporting firms may be following economic conditions more attentively. Secondly, firms that employ higher number of workers have also lower inflation expectations. (Barta 1999) gives a quite simple explanation regarding the firm size: "In a bigger company there are professionals, or even a department for planning and economic analysis, while in a smaller entity it is less frequent or absent. The person who provides answers to the questionnaire is generally the head of department, with a broader insight of the processes." Thirdly, when a cross tabulation is made, it is

[9] According to the Turkish Treasury's definition of "Small or Medium Scaled Enterprises", the enterprises employing more than 250 workers (with some other qualifications) are said to be small or medium scaled. We also apply the same condition for the size of the firms in this study.

observed that the firms that both are exporters and have more than 250 employees are even more optimistic than the former two (see Table 1 for data of December 2003). Nevertheless, the differences between the means and medians of these subgroups are not significant statistically.[10]

Table 1
Inflation expectations by number of workers and exporters (December, 2003)

				Mean	Median	Standart Deviation	n
Exporter	Yes	Number of workers	< 250	17.947	15.5	6.094	38
			> 250	18.563	17.5	5.715	16
	No		< 250	18.070	16.0	6.828	158
			> 250	17.418	15.0	7.140	208

When inflation expectations by sub-sectors are examined, it is trickier to evaluate the results. Even though the expectations of some sub-sectors seem to be quite different from the whole, it is not fully appropriate to comment on the behavior of all sectors due to sample size restrictions. When sectors having small sample sizes are ignored, it is observed that inflation expectations of food and textiles industries are relatively higher than the other sectors' expectations, whereas expectations of stone and soil industry are lower. The explanation for the differences between sub-sectors is not apparent; however the characteristics that differ from sector to sector (such as the widespreadness of firms in the country and the variety of products manufactured) surely play an important role.

7. Logistic Regression Model

In this section we analyze the qualitative inflation expectation regarding to the next three months, of July 2004, using logistic regression. As mentioned earlier, the categories of this question are in a three-point Likert scale form, i.e. up, same, down. Usually when the levels of the dependent variable follows an ordering, the appropriate way to proceed would be using an ordered logistic regression, but here we applied an unordered logistic regression since it seemed to be more feasible in connection with what we are expecting from the analysis.

The multinomial logistic regression model estimates the natural logarithmic odds (logit) of a qualitative dependent variable with three or more categories, as a linear function of a set of explanatory variables, using maximum likelihood estimation. If the categories of the dependent variable are ordered, ordered logits are used. Else a

[10] The equality of means and medians are not rejected with 0.783 and 0.347 probabilities respectively.

reference category is chosen and the logits are formed as the log odds of being in a non-redundant category versus the reference category of the dependent variable; in this context, the choice of the reference category is an important issue. In both cases, each logit is modeled in a separate equation.

Forming the logits, we chose the reference category to be "same" (expected inflation over the next three month is the same), because we are not only interested in whether there is a change in the inflation expectations, but we also desire to examine the direction of the change. We find similar kinds of categorization, especially in social sciences within the equity theory. As explained by (Demaris 1992), the equity theory qualitatively distinguishes between two types of inequity (positive and negative). Likewise in our case, while the response "same" represents the neutral state, "down" or "up" responses represent the violation of the equity. Accordingly in the multinomial logistic model, we have two logit equations; first one refers to the odds of down/same, and the second to the odds of up/same, both representing the type of inequity (i.e. upward or downward) in the expectations of future inflation. The selection of "same" as the reference category allows the examination of different effects of different types of inequity on the outcome.

The aim of this analysis is to find out the relations between inflation expectations and other expectations concerning demand, output, production cost, etc.[11] The explanatory variables are other expectations from the BTS[12], and they are also questions with three-point Likert scale answer categories. These questions are classified under six different groups; namely demand, production, cost/prices, general, stocks and credit (See Table 6 in Appendix). We know that a categorical variable is represented with number of categories less one number of variables in regression. Thus, each three-scaled question is represented by two variables on the right hand side of the logit equations. But since the number of variables doubles, analyzing more than one question at a time becomes difficult, and from this respect, univariate analysis seems more convenient.

Each multinomial logistic regression model contains two logit equations in which the log odds of inflation expectations are regressed on a three-scaled question Xi from the BTS:

[11] (Barlas and Saraçbaşı 2003) follow a similar analysis using log-linear models.
[12] See also (Ece D.et.al 2004).

$$\text{logit } 1 = \log(\theta_1) = \log\left(\frac{Inflation:"Down"}{Inflation:"Same"}\right) = \beta_0 + \beta_1(X_i:"Down") + \beta_2(X_i:"Up") \quad (7.1)$$

$$\text{logit } 2 = \log(\theta_2) = \log\left(\frac{Inflation:"Up"}{Inflation:"Same"}\right) = \beta_0 + \beta_1(X_i:"Down") + \beta_2(X_i:"Up") \quad (7.2)$$

Within the model, the first explanatory variables correspond to the respondents saying "down" for question Xi, whereas the second variables denote the respondents with answer category "up" for question Xi.

The regression models are summarized and reported in Table 6 of the Appendix. They are listed from the most significant to the least significant according to Chi-square values referring to their log-likelihood.[13] Apparently, the models referring to demand and production have greater log-likelihood, are more significant statistically; therefore the demand and production variables are more associated with inflation expectations than the stock and cost/price variables. In fact, the last four models, which of three are related to cost and prices, are far from being significant at 5 percent level of significance. The top five models according to significance ranking are reported in Table 2 in detail. Four out of five models refer to demand, whereas the other refers to production.[14]

[13] Each of the models has 4 degrees of freedom.

[14] The analysis is done using the data of July 2004. However since seasonal factors in agriculture affect the WPI figures in summer, in order to justify the results, the multinomial logistic regression analysis is repeated for another month, January 2004, in which similar results are obtained.

Table 2
Multinomial Logistic Regression Models (July 2004)

Model	Logit	Variable	β	Wald		θ
1	1	Intercept	-2.617	-7.979	*	
		Goods sold = "Down"	3.781	8.574	*	43.84
		Goods sold = "Up"	-0.518	-0.483		0.596
	2	Intercept	-2.355	-8.121	*	
		Goods sold = "Down"	0.746	1.072		2.108
		Goods sold = "Up"	3.280	8.609	*	26.575
2	Logit	Variable	β	Wald		θ
	1	Intercept	-1.902	-7.925	*	
		Output volume = "Down"	3.349	7.280	*	28.475
		Output volume = "Up"	0.015	0.028		1.015
	2	Intercept	-1.762	-7.796	*	
		Output volume = "Down"	0.376	0.457		1.457
		Output volume = "Up"	2.158	6.765	*	8.651
3	Logit	Variable	β	Wald		θ
	1	Intercept	-2.411	-8.642	*	
		Total amount of orders received = "Down"	3.315	8.267	*	27.529
		Total amount of orders received = "Up"	2.411	2.794	*	11.143
	2	Intercept	-1.138	-6.982	*	
		Total amount of orders received = "Down"	0.384	0.837		1.468
		Total amount of orders received = "Up"	2.812	4.326	*	16.64
4	Logit	Variable	β	Wald		θ
	1	Intercept	-1.85	-6.424	*	
		Level of sales revenues = "Down"	1.85	5.125	*	6.357
		Level of sales revenues = "Up"	-0.813	-1.226		0.444
	2	Intercept	-1.27	-5.619	*	
		Level of sales revenues = "Down"	-0.271	-0.629		0.763
		Level of sales revenues = "Up"	1.197	3.800	*	3.312
5	Logit	Variable	β	Wald		θ
	1	Intercept	-1.761	-7.623	*	
		New orders = "Down"	2.86	5.789	*	17.455
		New orders = "Up"	0.831	2.175	*	2.297
	2	Intercept	-1.556	-7.340	*	
		New orders = "Down"	1.808	3.305	*	6.095
		New orders = "Up"	1.556	4.987	*	4.741

* Statistically significant at 5 percent level.

Examining these models, the main resulting points obtained are as follows:

- The covariate in the first model having the maximum log-likelihood (whose relation is the strongest with the inflation expectation) is the volume of goods sold in the domestic market in the last three months, and stands for domestic demand. According to this model's odds values, the participants saying that their volume of goods sold in the domestic market increased (decreased) are much more likely to expect that the inflation rate will have an upward (downward) trend in the next three months, compared to the respondents saying that their volume of goods sold remained the same.

- Analogous results are obtained from other models containing demand indicators. The third model examines the relation between expectations of inflation and the total amount of orders received. The respondents saying that their total amount of orders received in the current month has increased (decreased) are more likely to expect that the inflation rate will increase (decrease) in the near future, with respect to those saying that their total amount of orders received in the current month is the same. In the fourth model, the relation between the level of sales revenues is examined. According to this model, the odds of expecting lower inflation is higher among the respondents who expect a fall in the level of sales revenues, than that of the ones who expect same level of sales revenues. Finally the new orders received from the market are analyzed in the fifth model. Here we spot that the odds of expecting higher inflation with respect to same, does not change much between the levels of this variable.

- The model that has the second largest likelihood is the one in which inflation expectations have been regressed on a "production" variable, the volume of output in the last three months. The model suggests that the respondents that state their output volume has fallen (risen) in the last three months, are more likely to give optimistic (pessimistic) answers about the future inflation rate, than the respondents that state their output volume has not changed.

8. Conclusion

In Turkey, surveys of expectations gained much attention in recent years, but less effort is spent for analyzing the data in detail. Since expectations of future inflation and other economic and financial conditions are fundamental for making policy decisions, to gauge the usefulness of surveys within the inflation-targeting

framework, we analyzed the Business Tendency Survey data, an important source reflecting the real sector's tendencies.

The findings are expressive from all aspects. It is observed that, there is a tendency of the expected and the realized inflation series to move together, indeed a characteristic gap is spotted between the two series. Over the inspected period, the expectation series lies above the realized inflation, which is a common problem in analogous surveys' data. However, it is clear that the difference is getting smaller over the last period, while moving towards relatively low inflation rates.

The distributional features of the inflation expectations expose its asymmetry almost over the whole inspected period. Particularly in the last year, even though expectations have shifted to lower values while the degree of disagreement among the respondents has fallen, the existence of some respondents insisting not to adapt their answers to the current conjuncture disturbs the symmetry.

The study also intends to reveal the differences of inflation expectations between subcategories. Over the examined period, the expectations of exporting firms are systematically lower than the non-exporting firms. Moreover, the firms that employ higher number of workers tend to have lower inflation expectations.

Logistic regression model results demonstrate that the inflation expectations of firms are strictly related to their demand and output expectations. It is observed that the manufacturing industry executives build their inflation expectations mostly relying on their expectations of volume of goods sold in domestic market, new received orders and output volume.

To conclude, we believe that this kind of analysis is valuable for emerging important information concerning inflation expectations and well knowing the properties of such survey data would amplify the effectiveness of the usage of surveys in policy making.

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APPENDIX

Table 3
Inflation Expectations in Surveys Conducted by the Central Bank of Turkey by 2004

Business Tendency Survey	
Survey population	Senior managers from the private sector enterprises
Average number of respondents	500
Starting date	May 1997
Periodicity	Monthly
Quantitative question(s) of inflation	Expected rate of inflation (WPI) in the next 12 months
	Expected rate of inflation (WPI) by the end of the year
Qualitative question(s) of inflation	Expected change in inflation (WPI) in the next 12 months
Survey of Expectations	
Survey population	Experts and decision makers from financial and real sectors
Average number of respondents	80
Starting date	August 2001
Periodicity	Twice a month
Quantitative question(s) of inflation	Expected rate of inflation (CPI) of the current month
	Expected rate of inflation (CPI) for the next 2 months
	Expected rate of inflation (CPI) by the end of the year
	Expected rate of inflation (CPI) for the next 12 months
Qualitative question(s) of inflation	-

Table 4
Inflation Expectations of Firms by Breakdown in Year-Ends

	December 1999				December 2000				December 2001				December 2002				December 2003			
Realization																				
Year-end	62.908				32.66				88.564				30.84				13.942			
Next year-end	32.660				88.564				30.840				13.942				13.840			
	Mean	Median	Stdev	n	Mean	Median	Stdev	n	Mean	Median	Stdev	n	Mean	Median	Stdev	n	Mean	Median	Stdev	n
Expectation																				
Overall	46.26	45	15.03	436	31.55	30	12.47	480	58.13	55	14.71	517	30.78	30	8.848	452	17.75	15	6.801	443
Exporter*																				
Yes	45.43	44.5	15.070	334	30.73	28	12.3	377	57.97	55	14.838	404	30.444	30	8.862	369	17.699	15	7.005	366
No	49.48	48	15.15	80	34.18	30	12.85	93	60.150	60	13.950	80	32.050	30	8.041	60	18.130	15.5	5.937	54
Number of workers*																				
<250	48.92	45	16.27	185	33.52	30	13.14	219	59.45	60	15.627	245	31.606	30	9.291	216	18.046	16	6.677	196
>250	44.02	40	13.83	229	29.58	25	11.58	251	57.18	55	13.629	239	29.718	28	8.099	213	17.500	15	7.043	224
Sector																				
Mining	51.250	52.5	10.94	8	36.556	34	10.285	9	71.286	70	12.234	7	33.286	36	8.460	7	18.750	15	6.875	8
Food	46.934	46	13.55	61	32.987	30	12.195	77	60.275	60	14.668	80	30.471	30	7.751	70	18.841	18	6.861	63
Textiles	49.548	47.5	17.41	104	33.086	30	14.351	105	59.886	60	16.452	114	32.802	30	10.980	101	18.255	15	6.912	102
Wood	50.000	52.5	19.58	4	33.571	33	9.034	7	60.250	60	18.858	8	38.600	38	10.002	10	20.667	20	7.773	12
Paper products	46.941	38	20.97	17	32.444	30	10.651	18	55.556	60	18.030	18	28.889	29	4.772	18	15.647	14	5.601	17
Chemicals	43.302	40	13.81	63	31.667	30	10.749	57	56.467	55	14.283	75	29.043	26	8.254	69	17.000	15	5.844	68
Stone	43.364	40	13.23	33	26.395	25	8.104	43	55.116	55	7.847	43	29.000	25	7.294	41	15.513	15	3.852	39
Metals	42.300	40	12.87	30	35.262	31	15.566	42	58.132	60	13.642	38	30.944	28	8.642	36	18.433	18	5.164	30
Machinery - vehicle	45.571	45	13.6	112	29.051	25	11.730	117	57.081	55	14.606	124	30.229	29.5	8.078	96	17.717	15	8.442	99
Energy	53.750	50	20.57	4	32.000	30	7.583	5	53.000	50	11.595	10	30.000	30	5.774	4	16.400	15	3.507	5

* The firms, which do not have profile information, are not considered

Table 5
Inflation Expectations of Firms by Sector, Number of Workers and Export Status in December 2003

Exporter	Number of workers	Sector	Mean	Median	Stdev	n
No	< 250	Mining				x
		Food	17.917	15	5.518	12
		Textiles	19.000	17	10.149	3
		Wood	20.000	-	-	1
		Paper products	18.500	18.5	9.192	2
		Chemicals	15.000	15	3.000	3
		Stone	17.444	16	5.364	9
		Metals				x
		Machinery - vehicle	20.667	20	8.664	6
		Energy	13.500	13.5	2.121	2
	> 250	Mining	29.000	-	-	1
		Food	15.000	15	-	2
		Textiles	22.500	22.5	10.607	2
		Wood				x
		Paper products				x
		Chemicals	22.500	22.5	3.536	2
		Stone	16.400	15	4.393	5
		Metals				x
		Machinery - vehicle	15.333	14	4.163	3
		Energy	20.000	-	-	1
Yes	< 250	Mining	18.500	15	7.681	4
		Food	16.941	18	3.897	17
		Textiles	20.393	18	7.795	28
		Wood	23.000	21	4.761	4
		Paper products	17.200	14	8.927	5
		Chemicals	17.028	15	6.439	36
		Stone	14.667	15	2.784	9
		Metals	18.429	19	4.686	14
		Machinery - vehicle	18.103	16	8.338	39
		Energy	17.500	17.5	3.536	2
	> 250	Mining	17.500	17.5	3.536	2
		Food	21.037	20	8.899	27
		Textiles	17.361	15	6.416	61
		Wood	19.429	14	9.693	7
		Paper products	14.300	14.5	2.406	10
		Chemicals	15.840	15	3.826	25
		Stone	14.267	14	2.764	15
		Metals	18.357	16	5.917	14
		Machinery - vehicle	17.340	15	9.063	47
		Energy				x

Table 6
Summary Table for Multinomial Logistic Regression Analysis of the Qualitative Inflation Expectations in July 2004[15]

Model	Variable in Model	Chi-square	Category
1	Volume of goods sold in the domestic market (current trend)	239.651	Demand
2	Output volume (current trend)	142.263	Production
3	Total amount of orders received	118.534	Demand
4	Level of sales revenues	77.910	Demand
5	New orders received from the domestic market (future trend)	62.715	Demand
6	Capacity utilization	57.009	Production
7	Opinion about the general course of business	53.916	General
8	Employment (current trend)	50.434	Production
9	Volume of goods sold in the domestic market (future trend)	49.943	Demand
10	Output volume (future trend)	36.102	Production
11	Investment expenditures	31.312	Demand
12	Export possibilities	28.398	Demand
13	Raw material stocks (current trend)	24.214	Stocks
14	Employment (future trend)	17.823	Stocks
15	Monthly stocks of finished goods	13.850	Stocks
16	Average price for new orders (current trend)	12.586	Cost/Prices
17	Raw material stocks (future trend)	10.519	Stocks
18	Average price for new orders (future trend)	6.718	Cost/Prices
19	Average unit cost (current trend)	4.428	Cost/Prices
20	Expectation for the credit interest rate	3.567	Credit

[15] The models are ranked according to the Chi-square values referring to their log-likelihood.