

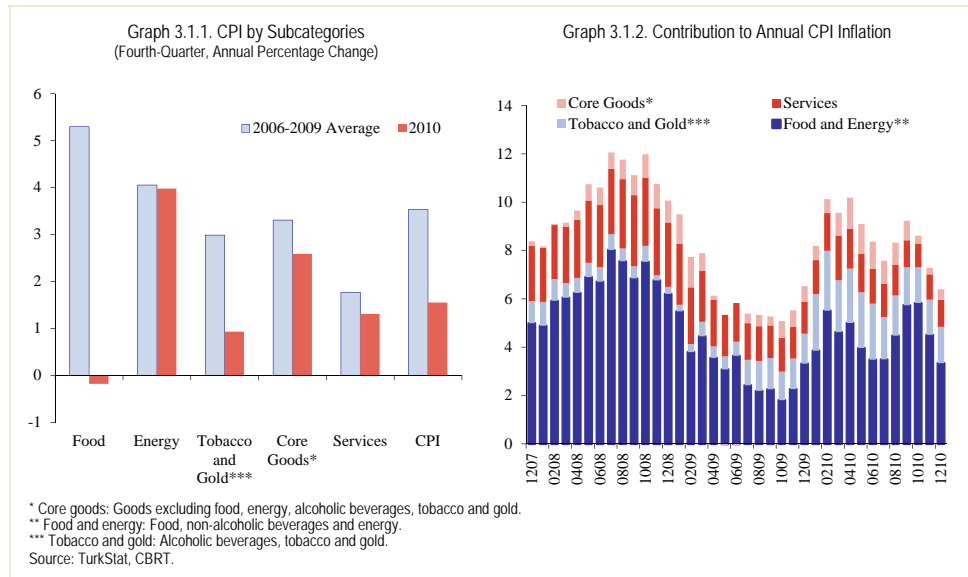
3. Inflation Developments

3.1. Inflation

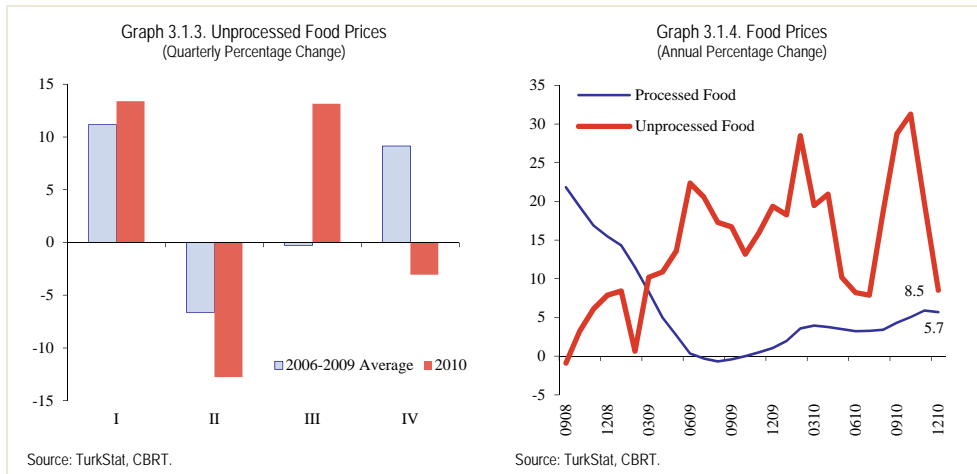
Consumer prices were up 1.55 percent during the final quarter of 2010, while annual inflation decreased to 6.4 percent. Thus, the annual consumer inflation has largely met the 2010 target of 6.5 percent. Core inflation indicators remained on track with medium-term targets. By subcategories, the rate of change was down from the average of previous years across all goods and services (Graph 3.1.1).

Food prices remained to be the key driver of consumer prices in the fourth quarter (Graph 3.1.1). After soaring at an unprecedented rate amid higher unprocessed food prices during the third quarter, food prices slowed in the last quarter owing to the downward correction in unprocessed food prices. Thus, having increased by 4.67 percentage points over 2010, the contribution of food prices to annual inflation declined to 1.94 percentage points at the end of the year (Graph 3.1.2). Meanwhile, after remaining stable during the second and third quarters, energy prices were up in the last quarter amid higher international oil prices and exchange rate developments.

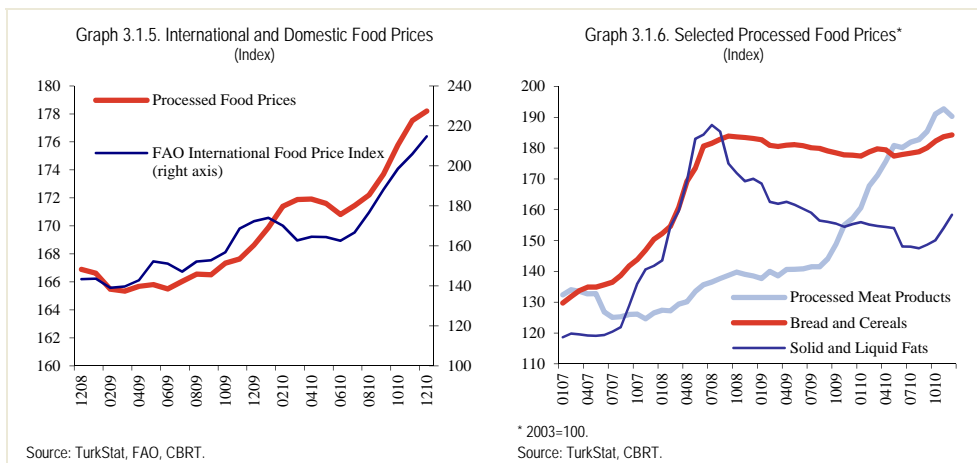
Although domestic demand is on a strong uptrend, aggregate demand conditions have yet to put significant upward pressure on inflation. In fact, prices of durable goods fell in the fourth quarter, while prices of core goods (goods excluding food, energy, alcoholic beverages, tobacco and gold) were flat in seasonally adjusted terms. The annual rate of increase in prices of services remained unchanged from the previous quarter. Accordingly, core inflation indicators stayed at historical lows. However, core inflation indicators are expected to register slight increases in coming months due to rising import prices in Turkish lira in the fourth quarter.



The extreme volatility in unprocessed food prices increased over 2010 (Box 3.1). Quarterly price changes differed significantly from seasonal averages (Graph 3.1.3). Especially, during the second half of the year, prices diverged from seasonal patterns. Despite having historically fallen during third quarters, unprocessed food prices recorded the largest increase in the history of the index during the third quarter of 2010 due to high fresh fruit and vegetable prices. Given the fruit and vegetable production forecasts for 2010 and confirming that food prices do not diverge from overall consumer prices in the long run, the October Inflation Report stated that fruit and vegetable prices were rising only temporarily and would see a correction in the final quarter, bringing annual food inflation back on a downward track. Indeed, increases in fruit and vegetable prices were followed by larger-than-expected decreases during the fourth quarter (Graph 3.1.3). Moreover, with new import regulations, red meat prices also declined after a continued series of increases. Accordingly, the annual unprocessed food inflation dropped by 20.2 percentage points quarter-on-quarter to 8.52 percent (Graph 3.1.4).



Processed food prices were up similar to the international food prices during the fourth quarter (Graphs 3.1.4 and 3.1.5). The run-up in processed meat prices continued into the fourth quarter owing to the lagged effects of rising unprocessed meat prices in previous quarters (Graph 3.1.6). Meanwhile, having increased markedly amid higher global wheat prices, domestic wheat prices put upward pressure on prices of bread and cereals. In addition, prices for solid and liquid fats increased during the final quarter due to rising international prices of oil crops such as sunflower.



As a result, the uptrend in processed food prices was balanced by the sharp decline in unprocessed food prices, causing the annual rate of increase in food prices to end 2010 at 7.02 percent, well below the October forecast of 10.5 percent.

Energy prices rose by 3.98 percent in the last quarter due to higher international prices, bringing annual energy inflation up to 9.96 percent in

December following the downtrend since mid-2010 (Graph 3.1.7 and Table 3.1.1). After rising substantially in January 2010 due to administered price and tax adjustments, energy prices remained relatively constant until the last quarter of the year (Graph 3.1.8). Fuel and bottled gas prices rose significantly as international Brent oil prices increased about 13.6 percent in USD terms during the fourth quarter. Moreover, water tariffs went up in a number of cities. The annual rate of increase in energy prices is likely to slow down significantly given the base effects from January 2010 tax adjustments.

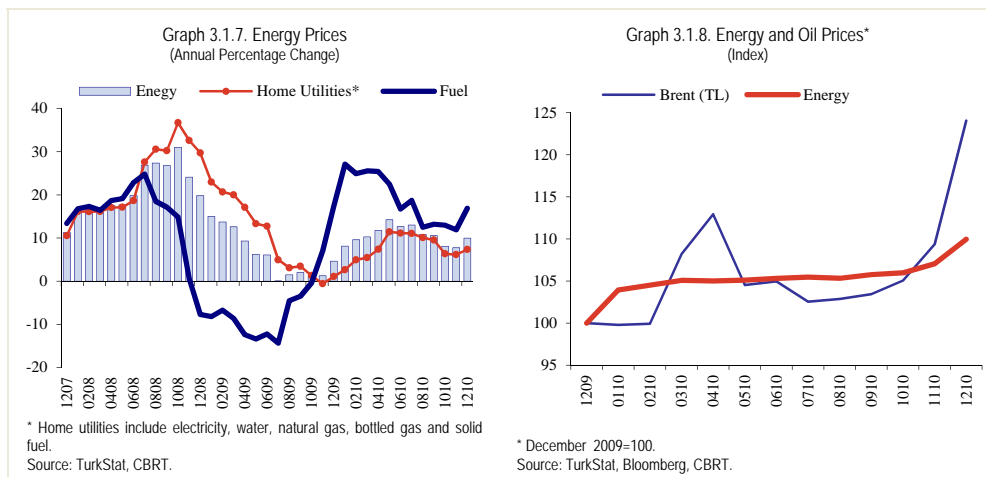


Table 3.1.1. Prices of Goods and Services
(Quarterly and Annual Percentage Change)

	2009		2010				
	IV	Annual	I	II	III	IV	Annual
CPI	4.26	6.53	3.93	-0.32	1.15	1.55	6.53
1. Goods	5.32	7.01	4.50	-0.38	1.29	1.64	7.18
Energy	4.54	4.64	5.08	0.21	0.43	3.98	9.96
Food and Non-Alcoholic Beverages	7.57	9.26	7.33	-6.66	7.02	-0.18	7.02
Unprocessed Food	15.00	19.35	13.40	-12.76	13.16	-3.05	8.52
Processed Food	1.27	1.04	1.93	-0.62	1.69	2.59	5.68
Goods excl. Energy and Food	3.65	6.15	1.81	5.07	-2.96	2.21	6.09
Core Goods	4.08	2.56	-3.27	6.16	-3.45	2.59	1.70
Durable Goods excl. Gold	3.25	1.22	1.32	0.36	-0.34	-1.06	0.26
Alcoholic Beverages, Tobacco and Gold	2.03	22.89	23.22	1.48	-1.27	0.93	24.61
2. Services	1.28	5.13	2.32	-0.17	0.73	1.31	4.24
Rent	1.10	5.28	0.96	0.65	1.30	0.98	3.96
Restaurants and Hotels	2.32	7.31	3.30	2.28	1.56	2.30	9.76
Transportation	1.25	2.53	2.44	1.32	1.83	1.28	7.04
Communication	2.55	3.08	3.53	-6.11	-2.90	2.23	-3.51
Other*	-0.05	6.03	1.76	0.27	1.19	0.30	3.57

* Services excluding rent, restaurants and hotels, transportation and communication.
Source: TurkStat, CBRT.

The annual rate of increase in core goods decreased by 1.5 percentage points quarter-on-quarter to 1.70 percent (Table 3.1.2), largely due to the expired base effects from the 2009 tax incentives. In fact, seasonally adjusted prices of core goods remained broadly unchanged during the last quarter (Graph 3.1.9). Prices of durable goods declined while prices of other core

goods remained moderate, keeping core inflation at all-time lows (Graph 3.1.10).

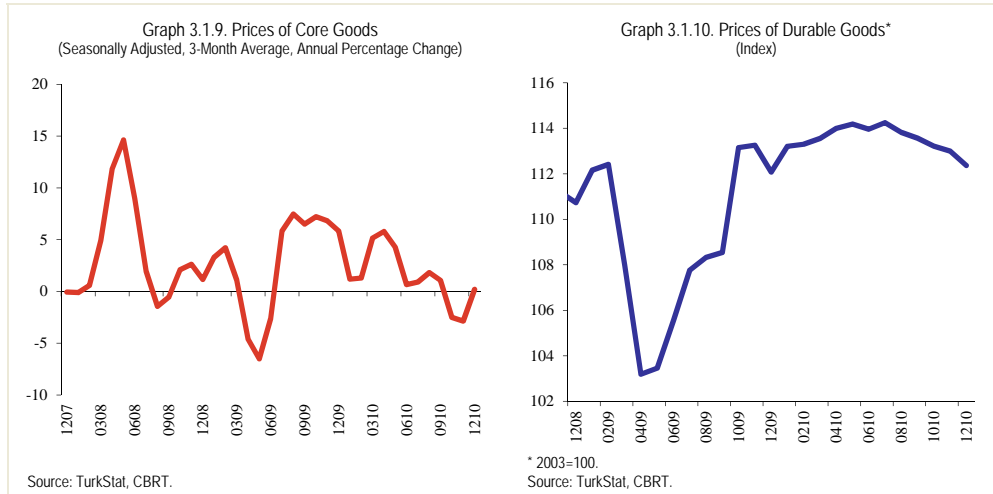
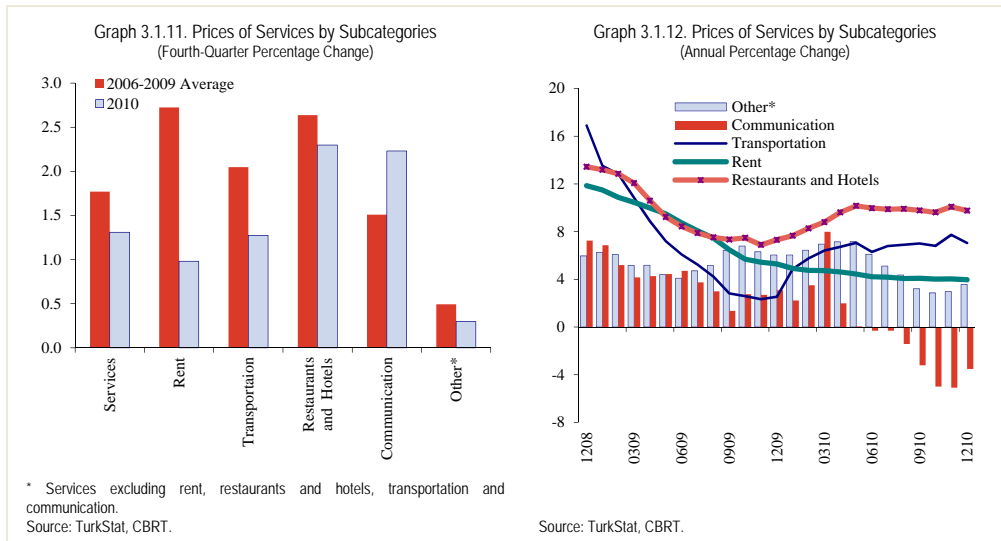


Table 3.1.2. Prices of Core Goods
(Quarterly and Annual Percentage Change)

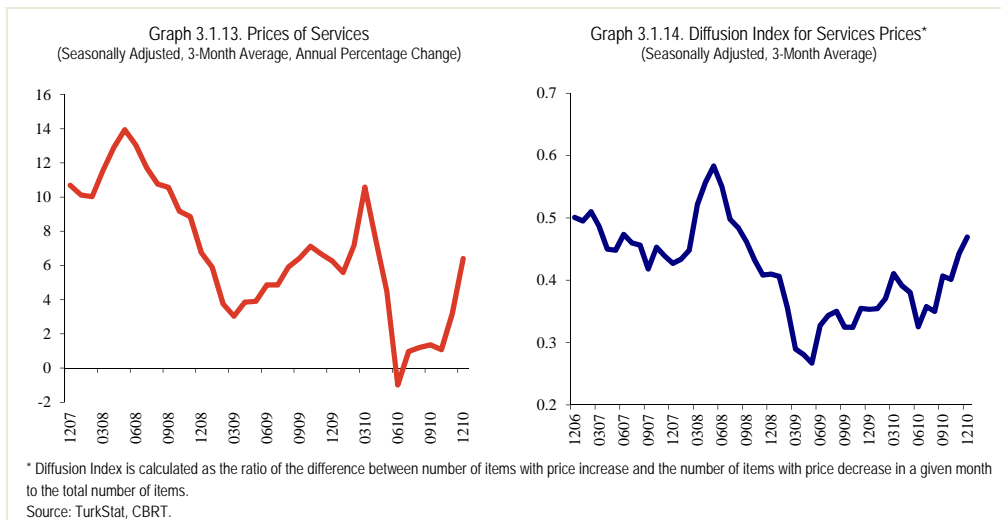
	2009		2010				
	IV	Annual	I	II	III	IV	Annual
Core Goods	4.08	2.56	-3.27	6.16	-3.45	2.59	1.70
Clothing and Footwear	10.27	3.39	-12.62	23.73	-11.90	9.94	4.72
Durable Goods excl. Gold	3.25	1.22	1.32	0.36	-0.34	-1.06	0.26
Furniture	7.86	-2.51	1.41	3.76	1.77	-1.06	5.94
Electrical and and Non-Electrical Appliances	-1.11	-4.47	-0.16	-1.01	-0.85	-0.23	-2.23
Automobile	4.72	6.49	2.17	-0.11	-0.61	-1.67	-0.26
Other Durable Goods	0.41	2.79	0.56	2.17	-1.81	0.90	1.79
Other	0.17	3.40	-0.95	0.11	0.58	1.18	0.91

Source: TurkStat, CBRT.

Prices of services increased by 1.31 percent in the final quarter, whereas the annual services inflation remained unchanged from the third quarter at 4.24 percent (Table 3.1.1). Thus, services inflation continued to hover around all-time lows. Price hikes were below the historical averages across all services except for communication, in which, prices increased due to rising mobile call rates (Graph 3.1.11). The annual inflation in rent continued to fall, albeit more slowly, to an all-time low of 3.96 percent.

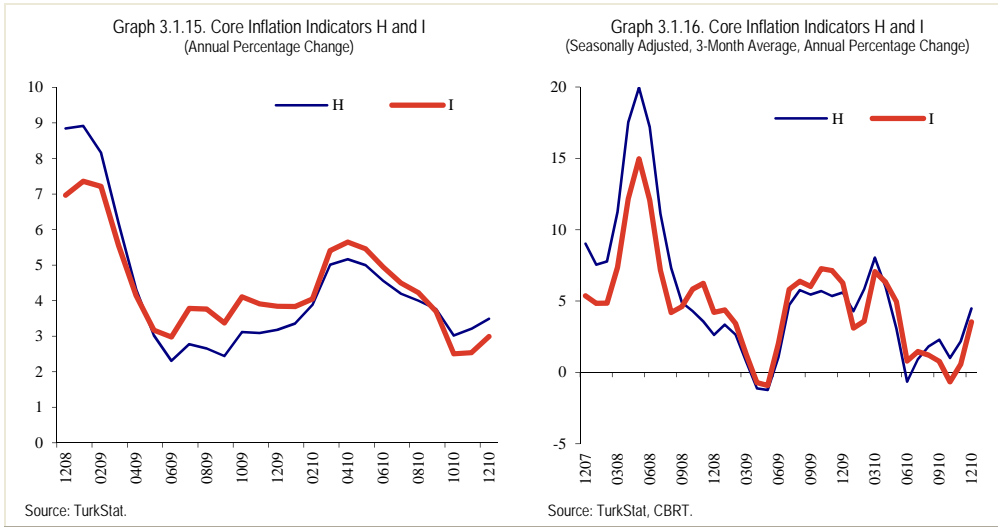


Although annual inflation rates remained constant across all subcategories of services in the fourth quarter, seasonally adjusted data point to an upward movement in prices of services (Graph 3.1.13). This finding is also supported by the diffusion index calculated as a ratio of the number of items indicating a price increase to number of items indicating a price decrease (Graph 3.1.14). Annual services inflation is also expected to move upward, albeit slightly, in coming months.

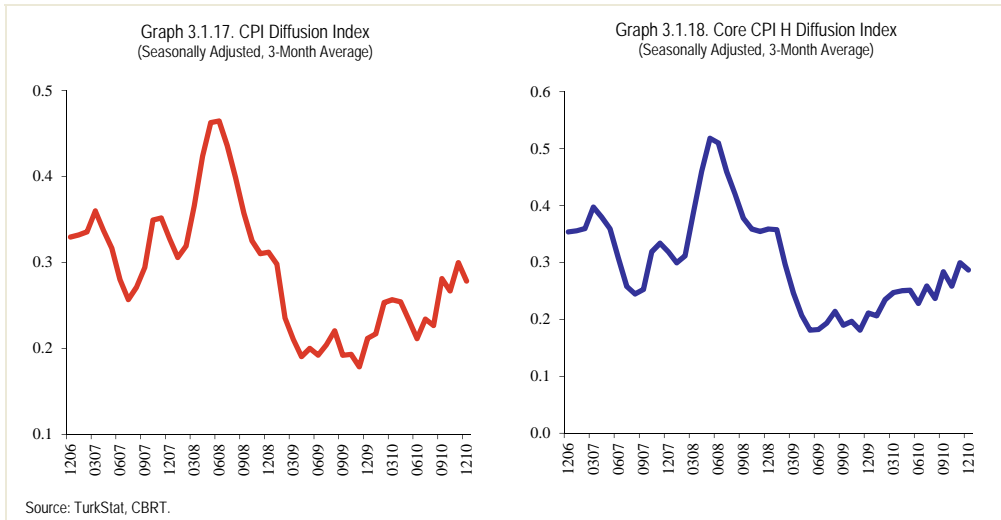


The annual rate of increase in core inflation indicators slowed quarter-on-quarter (Graph 3.1.15). The base effects from the 2009 tax incentives on durable goods brought the annual rate of increase in these indicators down in October. However, the indicators edged up in November and in December. The 3-month moving averages of the seasonally adjusted monthly changes in core

inflation indicators have recently been on the rise, yet remained consistent with medium-term targets (Graph 3.1.16). The CBRT's other core inflation indicators developed by alternative methods also indicate a similar underlying trend (Box 3.2).

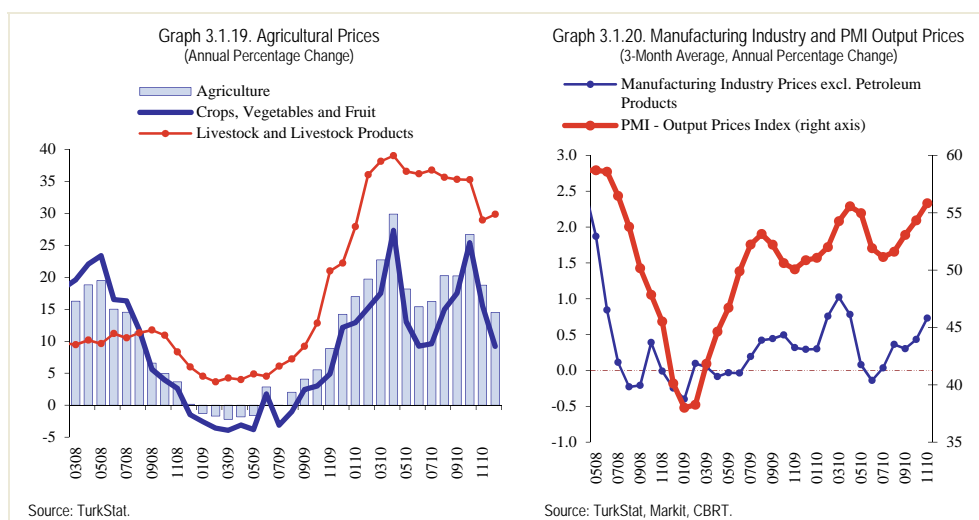


The seasonally adjusted data obtained from diffusion indices have generally been on the rise over the fourth quarter, converging to historical averages at the end of the year (Graphs 3.1.17 and 3.1.18).



Producer prices rose at a faster pace compared to the last two quarters amid higher manufacturing industry prices (Table 3.1.3). Agricultural prices have been relatively favorable due to falling producer prices for fruits and vegetables. Yet, prices for manufacturing inputs such as wheat, barley,

sunflower and cotton continued to increase on higher agricultural commodity prices.



Manufacturing industry prices increased by 2.86 percent due to rising import prices (Graph 3.1.20). Moreover, the recent depreciation of the Turkish lira also adversely affected the manufacturing industry prices. Rising commodity prices had a particular impact on producer prices for petroleum products and base metals. Surging international prices for cotton placed additional upward pressure on producer prices for textile and apparel. In sum, due to rising manufacturing industry prices, cost pressures on inflation have been mounting during the final quarter.

Table 3.1.3. PPI and Subcategories
(Quarterly and Annual Percentage Change)

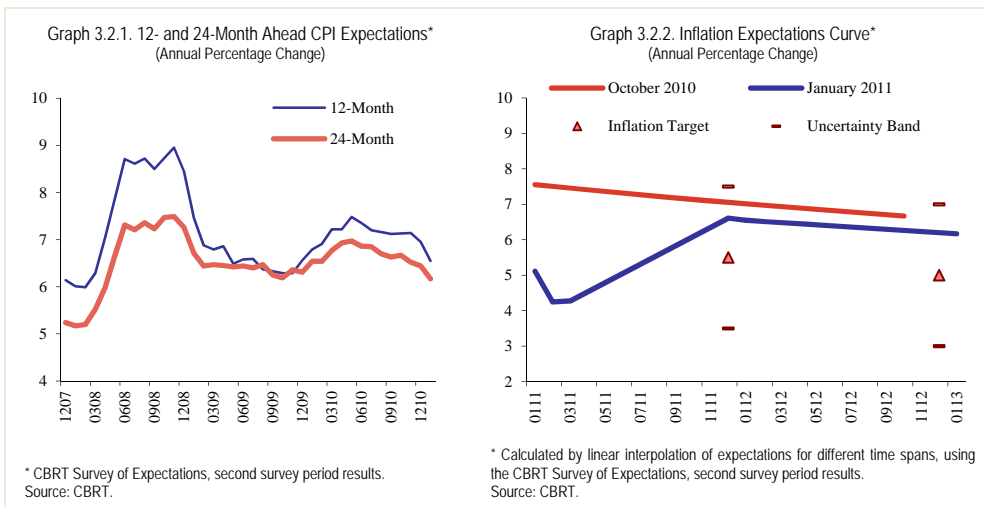
	2009		2010				
	IV	Annual	I	II	III	IV	Annual
PPI	2.25	5.93	4.24	0.67	1.51	2.21	8.87
Agriculture	5.25	14.22	9.66	2.41	1.71	0.26	14.52
Crops, Veteables and Fruit	4.20	12.17	7.55	2.03	2.78	-3.17	9.20
Livestock and Livestock Products	12.77	22.22	12.63	0.29	6.23	8.21	29.85
Industry	1.56	4.14	3.12	0.29	1.46	2.64	7.70
Mining	2.08	10.58	0.99	1.27	3.75	0.95	7.11
Manufacturing Industry	1.52	5.20	2.54	0.10	0.99	2.86	6.62
Manufacturing Industry excl. Petroleum Products	0.96	2.45	2.28	0.24	1.09	2.20	5.92
Manufacturing Industry excl. Petroleum and Basic Metal Products	0.95	2.28	1.16	0.14	0.72	1.90	3.98
Electricity, Gas and Water	1.80	-10.50	9.67	1.66	5.07	1.32	18.68

Source: TurkStat, CBRT.

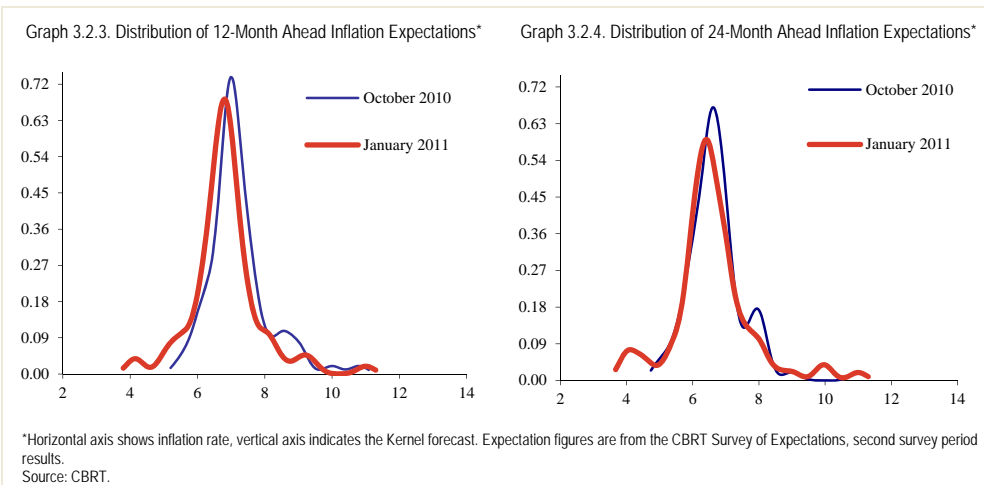
On balance, inflation is expected to fall further in the first quarter, while core inflation indicators will increase modestly, but remain in line with medium-term targets.

3.2. Expectations

After remaining stable during the third quarter of 2010, medium-term inflation expectations fell in the fourth quarter amid faster-than-expected decline in inflation (Graph 3.2.1). Near-term inflation expectations went sharply down quarter-on-quarter, while longer-term expectations fell slightly quarter-on-quarter (Graph 3.2.2). Currently, inflation expectations hover about 1 percentage point above the year-end targets of 5.5 and 5 percent for 2011 and 2012, respectively.



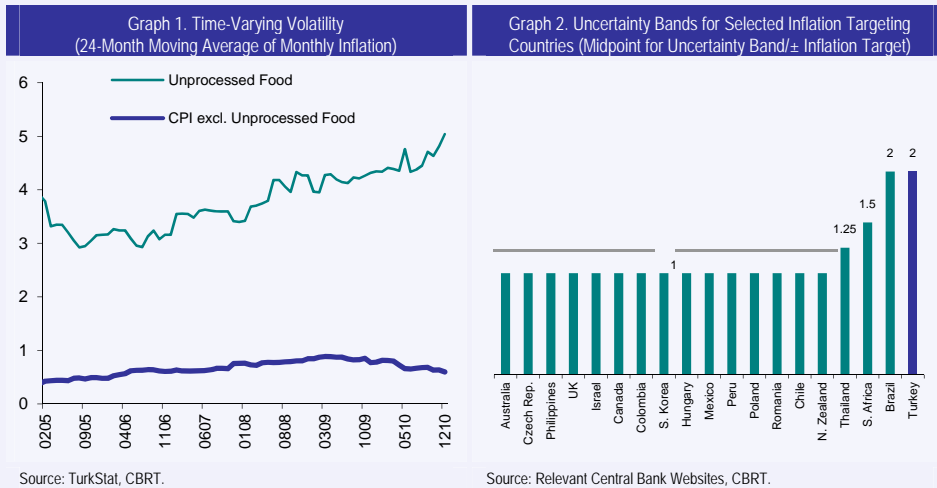
The dispersion of survey respondents' 12-month ahead inflation expectations is lower compared to October; whereas, the dispersion for 24-month ahead inflation expectations remains largely unchanged (Graphs 3.2.3 and 3.2.4).



Box
3.1

Sources of Volatility in Unprocessed Food Prices

The volatility of unprocessed food prices in Turkey have been increasingly higher in recent years (Graph 1). Moreover, findings indicate that this volatility is significantly higher compared to other economies (Öğünç, 2010). Given its high share in consumer price index, unprocessed food prices create a major source of uncertainty for the analysis and estimation of consumer inflation, and also impedes expectation management. This high volatility also results in a wider uncertainty band around the inflation target when compared to other inflation-targeting economies (Graph 2). It is essential to identify the sources of volatility in unprocessed food prices in order to achieve price stability in the medium term, and hence, this Box focuses on these sources.



The reasons of the relatively high volatility in unprocessed food prices can be classified in two categories. The first category includes factors regarding the measurement methods for price indices, while the second consists of structural reasons affecting price formation. Our analysis mainly focuses on the volatility in fresh fruit and vegetable prices, since fresh fruits and vegetables display the highest volatility among the unprocessed food items and account for a substantial share of the consumption basket.

Measurement Methods

In a study on the first category, Atuk and Sevinç (2010) have found out that differences exist between Turkey and other countries, in terms of the methodology (i.e. the treatment of seasonal products in a price index) for including fresh fruit and vegetable prices into the consumer price index, and this may affect price volatility.

Fresh fruit and vegetable prices are the main drivers of volatility in unprocessed food prices in Turkey. In the literature, products, including fresh fruit and vegetables, that are only available during certain seasons of the year are referred to as “products exhibiting strong seasonality”. This strong seasonality requires use of different price indexation and weighting methods for including these products into monthly CPI. Price indexation methods are generally based on exclusion of extreme prices from the index or use of moving averages of prices, while weighting methods employ two main approaches: variable weight and fixed weight. Various approaches exist for handling products in CPI calculations with strong seasonality, yet, none of these approaches are ideal for any time or for any country. The correct approach may vary depending on the behavioral characteristics of prices, and hence on the data structure. This Box focuses on the weighting method and presents a comparative analysis on the widely cited variable weight and fixed weight approach.

The current CPI calculations in Turkey are based on the variable weight approach. In other words, according to the data provided by the Household Budget Survey of TurkStat, weights of fresh fruit and vegetable products in the CPI differ each month, depending on the changes in the consumption patterns. For example, the weight of apricot, a summer fruit, in the consumer basket is higher between June and July, but zero in the remaining ten months, and therefore apricot is not included in the CPI calculation except June and July.

In the fixed weight approach, all products are assigned an average fixed weight. Hence, using the above example and the fixed weight approach, apricot is added to the CPI calculation with a fixed weight each month. Accordingly, when prices are unavailable for some months (in the case of apricot, the months excluding June and July), prices are imputed to fill in the missing data.

Price indices for fresh fruits and vegetables calculated by both approaches are presented in Graphs 3 and 4, and as can be seen, the two approaches are quite different, especially for fruit prices index.

The two approaches differ in terms of volatility in monthly fruit price inflation in the analyzed period between 2008 and 2010. While fresh vegetables remain broadly unchanged year-on-year over the period, the volatility in fruits is significantly lower using the fixed weight approach (Table 1).

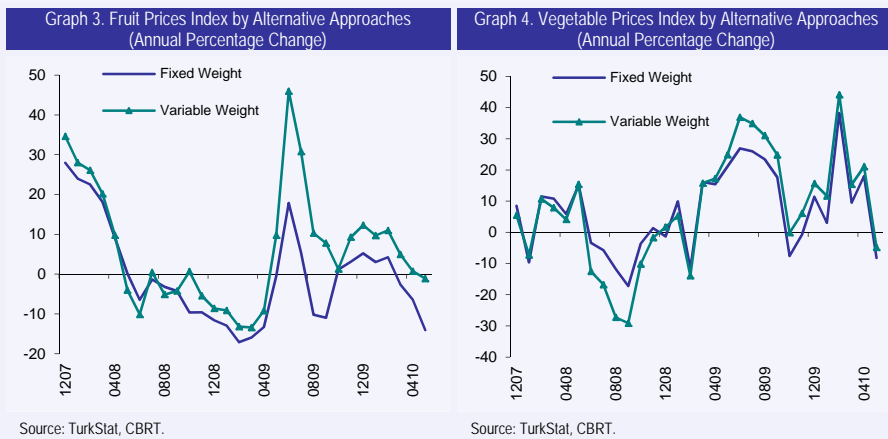


Table 1. Average Monthly Inflation Volatility (Standart Deviation)				
	Fresh Fruit		Fresh Vegetables	
	Fixed Weight	Variable Weight	Fixed Weight	Variable Weight
2008	6.21	8.79	16.22	18.39
2009	10.94	13.08	13.57	13.57
2010*	3.55	9.59	24.30	22.36
Whole Sample	8.14	10.70	16.14	16.67

* Calculations for 2010 covers the first 5 months.

The findings suggest that, using fixed weight approach, the weight-related proportion of the volatility in unprocessed food inflation can be controlled, and thus, the volatility declines. Given the differences in terms of volatility between the above-mentioned weighting methods as well as the differences among countries using different price indexation methods, it is useful to conduct a more detailed analysis of the alternative methods for measuring unprocessed food prices in the CPI.

Structural Reasons

Orman *et al* (2010) conducted a study on the structural factors affecting volatility in unprocessed food prices by interviewing experts of various industries. The findings of the study can be outlined as follows:

The Extreme Climate Sensitivity of Production: The interviews revealed that a change in unprocessed food prices is largely driven by supply conditions due to low price and income elasticities for these products. According to experts, producers are unable to control for the impact of weather conditions on the production quantity and quality due to the relatively low average income and educational level of farmers as well as the small production scale, lack of infrastructure for production and irrigation, and also lack of modern production technologies, all leading to major fluctuations in food supply.

Lack of Know-How: Agricultural production is dominated by traditional family businesses, and crop decisions are usually taken on current year prices. Such production decisions may lead to significant decline in the crop's price in the following year or result in sharp increases on the price of the abandoned crop. Moreover, the large extent of unregistered production and the lack of institutionalization limit the development of organized crop markets and production planning. In addition, the poor quality of the production data impedes the price predictability.

Market Structure: Unlike advanced economies, the organization of producers is particularly weak in Turkey. However, the final sellers and middlemen have a stronger position. Since farmers are unorganized, they cannot stabilize prices, whereas, middlemen or buying firms can manipulate prices by speculation. While there are only 1 or 2 middlemen in advanced economies, the number rises up to 5-6 for some goods in Turkey, causing each middleman to aggravate price volatility by manipulative actions.

Instability in Government Support/Subsidies: Although the government's production support/subsidy program covers a 5 to 7 year period in most countries, these financial assistance programs not only change frequently in Turkey, but also are announced after or shortly before producers' crop decisions, thereby distorting market expectations about future prices.

Concentration of Crop Production in Certain Regions: Agricultural production is heavily concentrated in a number of centers/regions. This shortens the production season for certain products, leading to abrupt price movements.

Fluctuations in External Demand: The increased integration of the agricultural sector to external markets through exports exposes agricultural prices to volatility in external demand. External demand volatility affects prices of some fruits and vegetables in retail chains. Lack of quality and standards (pesticide residues etc.) appears to be the main reason for the volatility in external demand.

Price Structure of Exported Goods: Unprocessed food are exported at prices quoted by importing countries (especially the EU countries). The price lists are changed on a monthly basis under various constraints. Both exchange rate developments and changes in price lists cause volatility in export prices, also affecting the domestic prices which are mainly determined by export prices.

Consumption Pattern: Individuals consume a significant amount of fresh fruit and vegetables in Turkey. Due to the limited demand for canned, dried or frozen fruit and vegetables, supply developments may lead to severe price movements.

To sum up, detailed analyses by both public and private sector institutions on measurement methods and structural problems, and producing policy in light of these analyses are critical for unprocessed food prices to gain stability over the medium to long term.

References

Atuk, O. and O. Sevinç (2010), "Fixed and Variable Weight Approach for the Treatment of Seasonal Products in the Consumer Price Index: A Study on Turkey's Fresh Fruit and Vegetable Prices", CBRT Economic Notes No. 10/15.

Orman, C., Öğünç, F., Saygılı, Ş. and G. Yılmaz (2010), "Structural Factors Causing Volatility in Unprocessed Food Prices", CBRT Economic Notes No. 10/16.

Öğünç, F. (2010), "Volatility of Unprocessed Food Inflation in Turkey: A Review of the Current Situation", CBRT Economic Notes No. 10/05.

Box
3.2

An Evaluation of Core Inflation Indicators

The CPI inflation measures the changes in prices of all products within the household's consumption basket. The consumption basket consists of items of goods and services with different pricing behaviors. These pricing behaviors lead to heterogeneity across goods and services in terms of frequency, timing and the size of price changes. Therefore, prices of some goods and services can be extremely volatile or be subject to temporary shocks. Although such a price change can be substantial and significant by itself, and moreover, can affect the CPI, it provides little insight into the overall trend of consumer prices.

Monetary policy is based on a medium-term perspective, and therefore it is crucial to monitor the underlying trend of inflation that is shielded from temporary shocks and fluctuations. In this context, in order to better understand and assess the dynamics of inflation, in addition to overall consumer inflation, core inflation indicators should also be closely monitored for the information they contain about the underlying inflation.

The derived core inflation indicators should satisfy certain properties. For empirical purposes, core inflation indicators are expected to be less volatile than the overall consumer inflation and to better estimate the underlying trend of inflation. For practical purposes, core inflation indicators should be simultaneously derived with overall inflation, easily estimated and well understood by the public.

Core inflation indicators can be calculated by different methods. These methods are classified as exclusion-based methods, statistical methods based on the distribution of price changes and model-based methods. The first category includes permanent exclusion methods that constantly leaves specific goods and services out of the price index. This method excludes products that are exposed to certain shocks, or products whose price changes are significantly exogenous to the monetary policy. The key advantage of the permanent exclusion method is that the excluded items are pre-determined and do not change over time and the indicator can be easily communicated with the public. The disadvantage of this method is that it excludes only certain shocks and volatility factors, but, in the meantime, it may also exclude some important signals for the inflation trend due to its static nature.

The second category includes statistical methods based on the distribution of price changes in the CPI basket. These methods, in general, are based on removing an item when its average price change fails to lie within a certain standard deviation range, or trimming the distribution of abnormal periodic price changes towards normal distribution. The most important advantages of the methods that depend on the distribution of periodic price changes is their dynamic nature and the exclusion of goods and services only if necessary. The disadvantage of these measures is that they are unable to yield comparable results as the contents can change each period, and may also exclude stickiness which are significant for policy making.

The third category for measuring core inflation consists of model-based methods. By following theoretical and empirical core inflation approaches such as structural vector autoregression models and dynamic factor models, these models are designed to filter out permanent and transitory movements in inflation, and are able to measure underlying inflation and capture the overall trend by decomposing the noise and unusual shocks from the data by using a structural approach. The disadvantages of these methods are that model-based core inflation indicators are subject to retrospective revision whenever new data are available, and produce unobservable results which cannot be easily communicated.

There are specific criteria that need to be satisfied by the various core inflation indicators. These criteria are generally as follows: core inflation should not deviate from consumer inflation in the long run, it should have less volatility than consumer inflation and be able to track the underlying inflation trend as well as be able to predict consumer inflation.

Core inflation indicators for Turkey are estimated using permanent exclusion method and are published by TurkStat as Special CPI Aggregates. In addition, the CBRT has developed other measures to track core inflation by using the above-mentioned methods.¹

¹ The alternative core inflation indicators cited in this study can be found in Tekatlı (2010), Atuk and Özmen (2009a, 2009b).

Atuk and Özmen (2009a) have developed different core inflation measures by using statistical methods. These measures are estimated by excluding volatile items² (V_1, V_1, 5, V_2, V_2, 5), by optimal trimmed mean³ (TRIM) and by weighted median⁴ (WM). This study analyzes in detail the comparative performances of these measures and the SCA series. With regard to the evaluation criteria, V_1, V_2, TRIM and WM perform better compared to other measures. In addition, Atuk and Özmen (2009b) concluded that trimmed measures would provide relatively less information in highly seasonal series, and developed a new trimmed mean inflation measure (SATRIM) by using seasonally adjusted data. SATRIM's performance in capturing the volatility and the underlying trend has been more satisfactory than the TRIM.

In another study, Tekatlı (2010) developed another model-based method to measure core inflation by the dynamic factor model (Fcore). This measure uses 12 main expenditure categories in the CPI basket, and decomposes monthly price changes as core inflation and relative price changes. In the study, the Fcore measure performed better than H and I by many criteria.

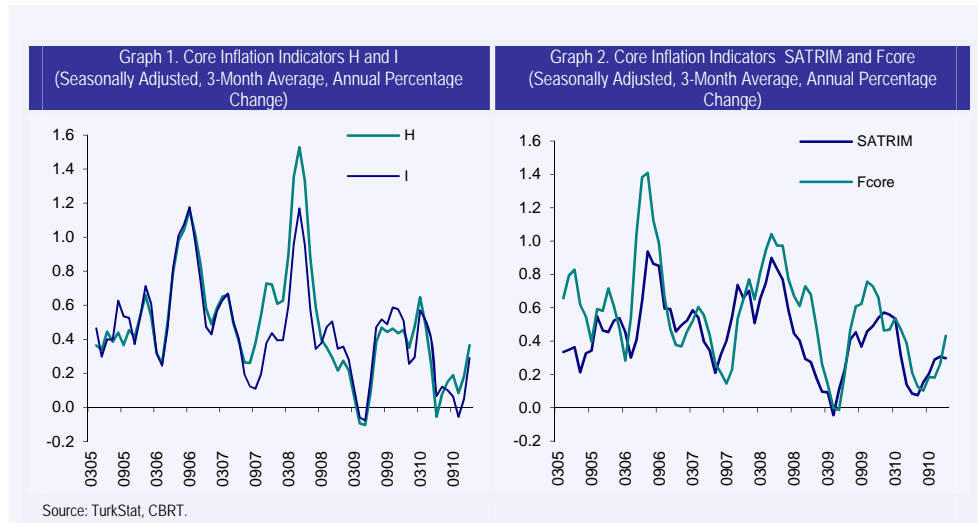
Atuk, Özmen and Tekatlı (2011) show that the exclusion-based measures of H and I, which are available to the public and often cited in CBRT's publications, satisfy the basic criteria for evaluating core inflation indicators. However, in satisfying the technical criteria, SATRIM and Fcore are relatively more superior. According to the study, the SATRIM performs particularly better than other measures in predicting future inflation.

Against this background, the trend of H, I, SATRIM and Fcore measures would provide useful information about the underlying inflation trend. These measures recently point to an uptrend in inflation, but suggest that underlying inflation remains on track with medium-term targets.

² The goods and services that fall outside of 1, 1.5, 2 and 2.5 standard deviations of each month's mean of the monthly price changes in all items are excluded from the calculation.

³ 18 percent is trimmed from the upper and lower end of each month's distribution of price changes.

⁴ The weighted median of each month's distribution of price changes.



It should be emphasized again that the different measures of core inflation not only enrich the analysis but also help accurately track the underlying inflation trend since each measure, by nature, responds to different types of shocks. Hence, the CBRT does not refer to a single measure as the “sole core inflation indicator”, but instead, simultaneously monitors several core inflation indicators to get a better understanding of the underlying inflation trend, and makes a joint assessment of the information collected from these various measures.

References

- Atuk, O. and M. U. Özmen (2009a), "Design and Evaluation of Core Inflation Measures for Turkey", BIS IFC Working Papers, No. 3.
- Atuk, O. and M. U. Ozmen (2009b), "A New Approach to Measuring Core Inflation for Turkey: SATRIM", Economics, Business and Finance, Volume 24, No. 285, 73-88.
- Atuk, O. and M. U. Özmen, and N. Tekatlı (2011), "An Evaluation of the Use of Core Inflation Indicators", CBRT Economic Notes No. 11/01.
- Tekatlı, N. (2010), "A New Core Inflation Indicator for Turkey", Central Bank Review, Volume 10, No. 2, 9-22.