

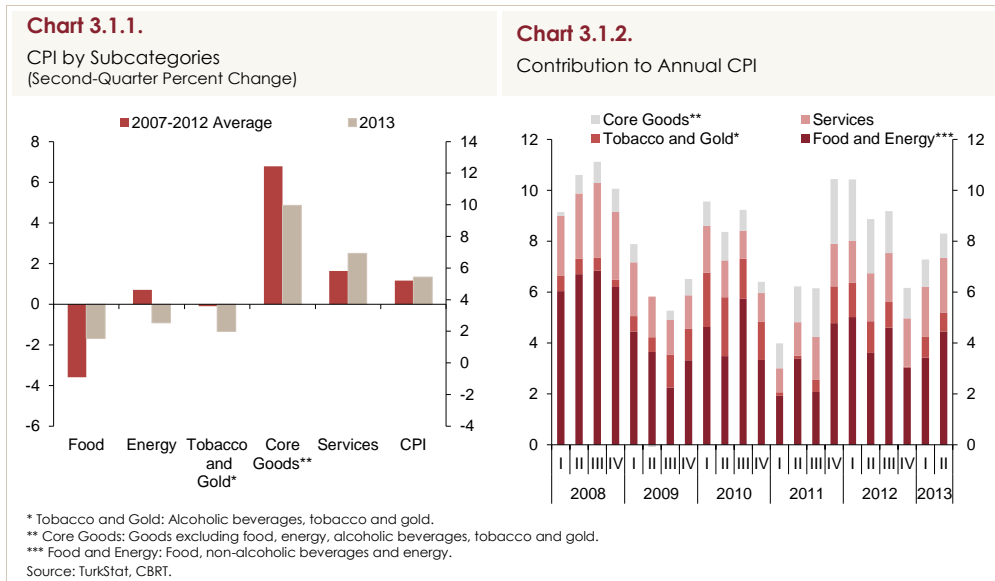
## 3. Inflation Developments

### 3.1. Inflation

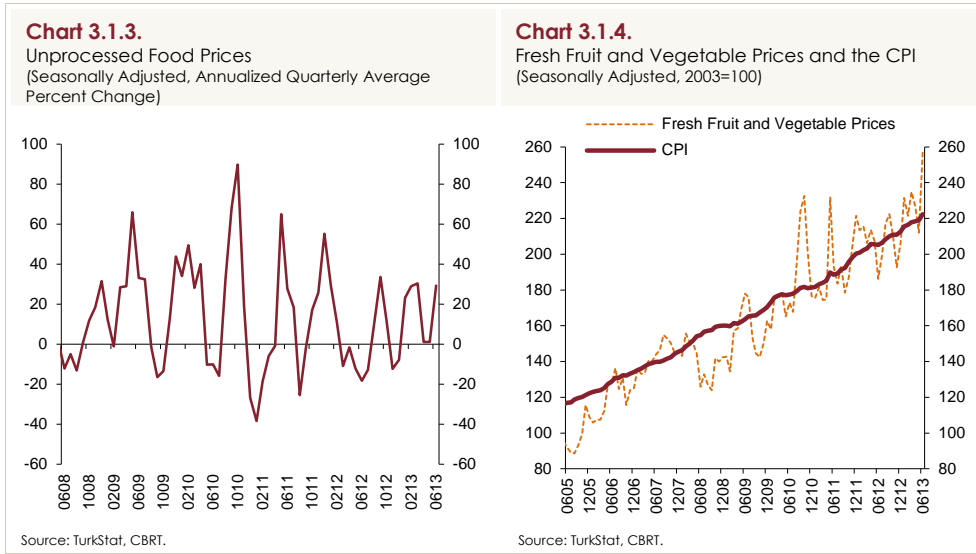
In the second quarter of 2013, annual consumer inflation went up by 1 percentage point quarter-on-quarter to 8.30 percent. This was mainly driven by the course of unprocessed food prices in June. In this period, the annual core inflation remained on a downward course, while services inflation registered an increase. The limited recovery in economic activity continued to support the inflation outlook and core inflation indicators also presented a mild outlook in the same period given the weak course of cost-side pressures. Having recorded a higher-than-expected rise in the first quarter, the increase in unprocessed food prices overshoot expectations in the second quarter as well. As a result, inflation stood above the path projected in the April Inflation Report in the second quarter.

Across subcategories, prices of food and services registered a higher-than-average quarterly increase compared to past years, while inflation in other subcategories, particularly the energy group, proved more favorable in the second quarter (Chart 3.1.1). The course of consumer inflation in this period was determined by unprocessed food prices, the annual inflation of which surged by 12.6 percentage points. The contribution of unprocessed food prices to inflation increased by 2.3 percentage points compared to the end of 2012 (Chart 3.1.2). In this period, services inflation increased slightly, and its contribution to consumer inflation went up by around 0.2 percentage points. Meanwhile, the prices of energy and core goods continued with a favorable course in this quarter.

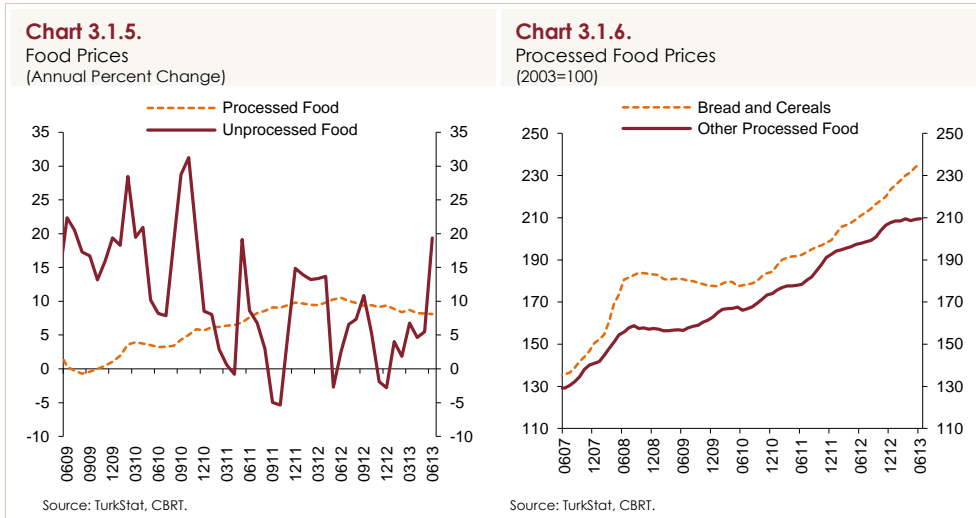
In sum, the mild course of international commodity prices in the second quarter and the limited recovery in economic activity contributed positively to the inflation outlook and annual inflation went up mainly due to the unprocessed food prices. The expected correction in annual unprocessed food inflation, which currently hovers around 20 percent, will determine the year-end consumer inflation. On the other hand, adverse effects of the current depreciation in the Turkish lira on inflation are estimated to emerge as of the third quarter, particularly on energy and durable consumption goods. Accordingly, the moderate course of core goods and core inflation indicators may slightly deteriorate.



Following the first quarter, seasonally adjusted unprocessed food prices registered an increase in the second quarter as well (Chart 3.1.3). Having been led mainly by the annual inflation in fresh fruits and vegetables that reached 37.91 percent in June, unprocessed food prices have continued on an upward track since the end of 2012. In fact, relative prices of fresh fruits and vegetables soared in this period as well (Chart 3.1.4). Seasonally adjusted agricultural prices, which have been receding since the last quarter of 2012, soared in the second quarter, indicating that the course of unprocessed food prices is parallel to the producer prices. However, the base effect emanating from the same period of 2012 coupled with the price dynamics of some products, which are included in the index in this period, increase the volatility of the annual unprocessed food inflation considerably. This volatility, in turn creates an important source of uncertainty on the course of consumer inflation. In the unprocessed food group, excluding fresh fruits and vegetables, annual inflation recorded a quarter-on-quarter increase, while annual unprocessed food inflation reached 19.39 percent in the second quarter. Taking the base effects stemming from the previous year into account, unprocessed food inflation is expected to fall in the third quarter, and increase in the last quarter.



In the second quarter of 2013, processed food prices recorded the lowest quarterly increase by 0.99 percent in the last two years. In this respect, annual processed food inflation continued with a downtrend in line with the expectations and stood at 8.11 percent in June (Chart 3.1.5). Developments in the first half of 2013 exhibited a noticeable divergence among processed food products. Parallel to the course of domestic wheat prices seen as of the second half of the year, the uptrend in the bread and cereals group was preserved in the first half of the year, and annual inflation in this group climbed to 11.75 percent. On the other hand, prices in processed food excluding bread and cereals saw a flat course in the first half, and recorded a cumulative price increase by 0.90 percent (Chart 3.1.6). Accordingly, annual inflation in this subcategory saw a steady downtrend in the second quarter as well. Thus, in the second quarter of the year, annual processed food inflation remained consistent with projections. As for the upcoming period, annual inflation in the bread and cereals is expected to trend downwards upon the end of the increase in domestic wheat prices. However, annual inflation in other unprocessed food products is projected to creep up due to depreciation of the Turkish lira.



In sum, annual food inflation, which stood at 3.90 percent in 2012, increased in line with the course of unprocessed food prices in the first half of 2013. Having climbed to 12.88 percent in June, annual food inflation went above the projections of the April Inflation Report.

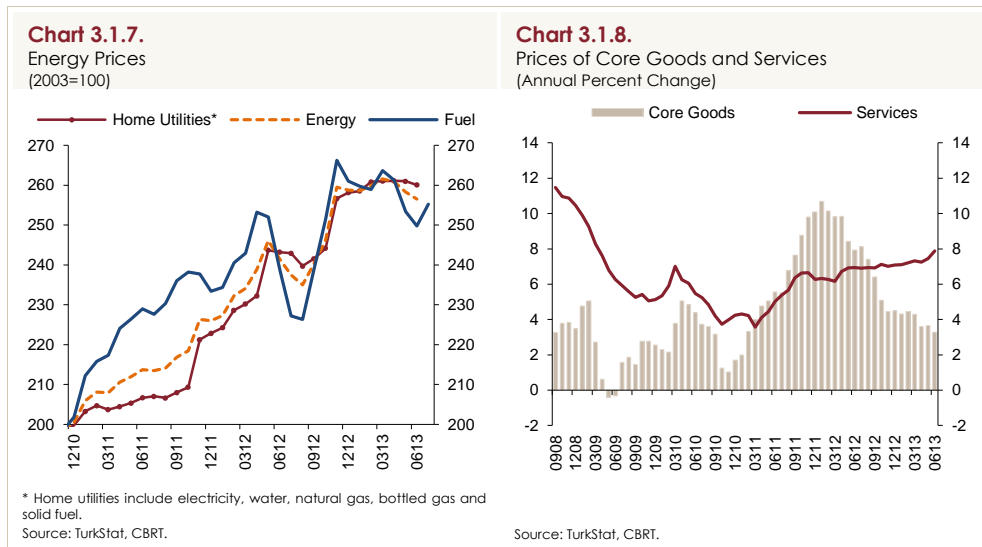
**Table 3.1.1.**  
Prices of Goods and Services  
(Quarterly and Annual Percent Change)

	2012				2013	
	II	III	IV	Annual	I	II
<b>CPI</b>	<b>0.39</b>	<b>1.36</b>	<b>2.74</b>	<b>6.16</b>	<b>2.63</b>	<b>1.33</b>
<b>1. Goods</b>	<b>-0.19</b>	<b>1.12</b>	<b>3.25</b>	<b>5.82</b>	<b>2.95</b>	<b>0.90</b>
Energy	-0.57	3.70	5.02	13.79	0.86	-0.92
Food and Non-Alcoholic Beverages	-5.85	4.01	3.12	3.90	7.06	-1.69
Unprocessed Food	-14.76	7.01	2.82	-2.78	13.87	-4.70
Processed Food	1.55	1.92	3.35	9.37	1.63	0.99
Goods (excl. energy and food)	4.78	-2.24	2.50	3.78	0.92	3.65
Core goods	5.88	-2.93	3.03	4.49	-1.52	4.86
Durable Goods (excl. gold)	-0.05	-0.69	-0.48	0.17	2.54	0.05
Alcoholic Beverages, Tobacco and Gold	-0.17	1.03	0.04	0.57	12.41	-1.35
<b>2. Services</b>	<b>1.96</b>	<b>2.00</b>	<b>1.38</b>	<b>7.09</b>	<b>1.78</b>	<b>2.50</b>
Rent	1.27	1.59	1.61	5.46	1.25	1.59
Restaurants and Hotels	2.62	2.66	1.74	9.31	2.07	2.18
Transport	1.79	3.21	0.81	8.16	1.88	2.34
Communication	2.07	1.79	3.00	7.08	0.40	1.28
Other Services*	2.00	1.27	0.41	6.04	2.58	4.02

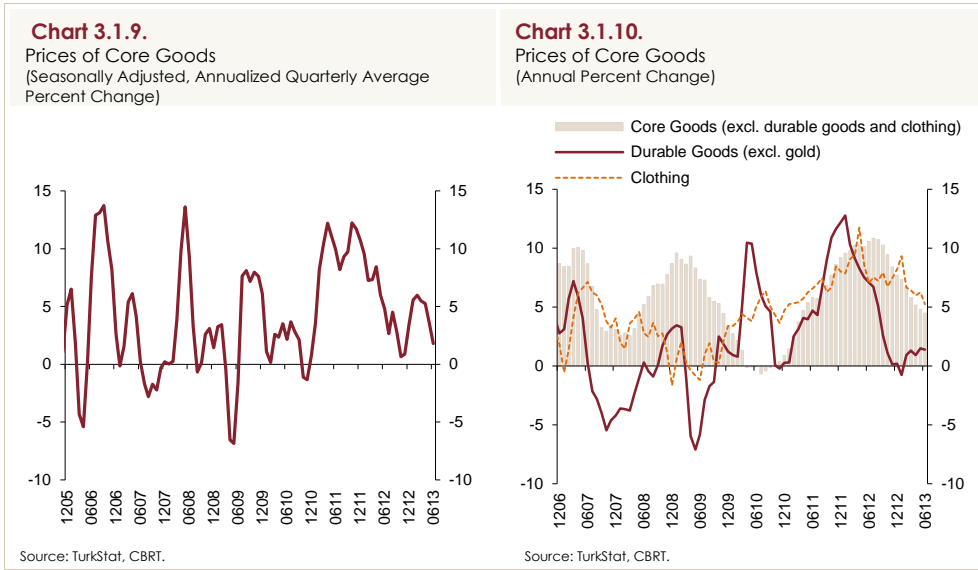
\* Services excluding rents, restaurants, hotels, transport and communication.  
Source: TurkStat, CBRT.

Energy prices went down by 0.92 percent in the second quarter (Table 3.1.1). This decline was driven by domestic fuel prices that receded by 2.30 percent in this quarter amid plummeting international oil prices in April. Meanwhile, prices of home utilities registered a decline upon tumbling solid fuel and bottled gas prices in this period (Chart 3.1.7). As a result, annual energy

inflation edged down by 0.39 percentage points to 8.83 percent in the second quarter. Assuming that no additional tax and public price adjustments will be implemented the rest of the year, and taking into account the base effect in the second half of 2012, annual energy inflation is projected to hit historic lows at the year-end. However, the recent depreciation of the Turkish lira and the increase in international oil prices may restrict this favorable course.



The downtrend in annual core goods inflation continued in the second quarter dropping inflation to 3.28 percent (Chart 3.1.8). In this period, the increase in seasonally adjusted annual core goods inflation displayed a quarter-on-quarter decline (Chart 3.1.9). Durable goods prices followed a flat course, and the annual inflation in durable goods crept up to 1.39 percent in the second quarter (Chart 3.1.10). Across subcategories, this rise is attributed to automobile prices (Table 3.1.2). Annual inflation in core goods excluding durable goods is on a downward track. In the second quarter of the year, seasonally adjusted annual inflation in clothing slowed down to 5.24 percent. The customs duty hikes, which were put into effect in 2011 under the protection measures on imports of textiles and retail clothing, are weighing less heavily on inflation. Annual inflation in core goods excluding clothing and durables, which started to slow down in the second half of 2012, declined further in the second quarter of the year (Chart 3.1.10). The recent depreciation of the Turkish lira has not yet affected core goods prices as of the end of the second quarter. Nevertheless, due to the relatively high exchange rate pass-through, annual inflation in core goods excluding clothing is expected to record a slight increase in the upcoming period.

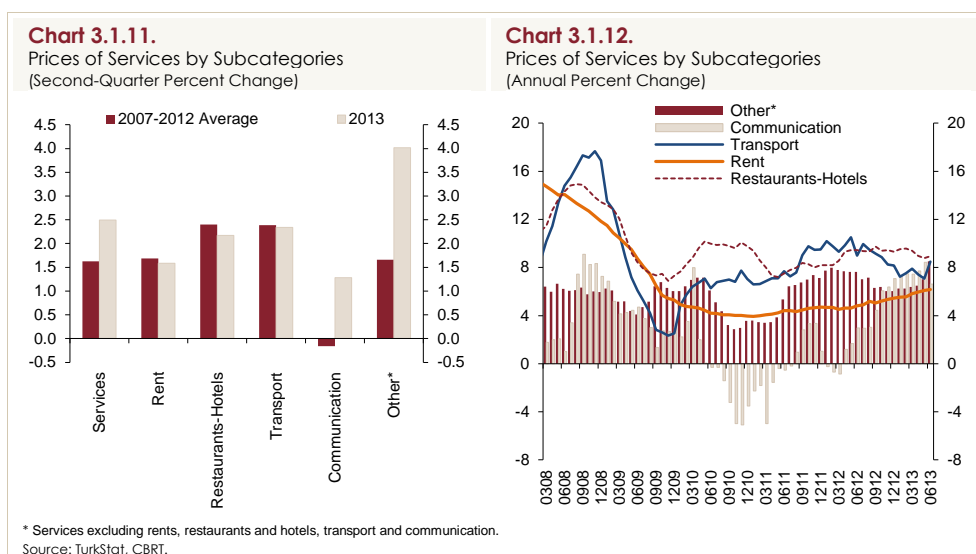


**Table 3.1.2.**  
Prices of Core Goods  
(Quarterly and Annual Percent Change)

	2012				2013	
	II	III	IV	Annual	I	II
<b>Core Goods</b>	<b>5.88</b>	<b>-2.93</b>	<b>3.03</b>	<b>4.49</b>	<b>-1.32</b>	<b>4.86</b>
<b>Clothing and Footwear</b>	<b>22.34</b>	<b>-11.37</b>	<b>12.00</b>	<b>8.20</b>	<b>-10.90</b>	<b>20.95</b>
<b>Durable Goods (excl. gold)</b>	<b>-0.05</b>	<b>-0.69</b>	<b>-0.48</b>	<b>0.17</b>	<b>1.41</b>	<b>0.05</b>
Furniture	1.76	-0.58	1.84	6.33	3.19	0.65
Electrical and Non-Electrical Appliances	-2.75	-0.65	-0.96	-3.41	0.94	-2.66
Automobile	0.42	-0.82	-1.07	-0.40	1.09	0.72
Other Durable Goods	3.13	0.69	0.54	5.68	1.22	1.53
<b>Other</b>	<b>2.42</b>	<b>1.28</b>	<b>1.05</b>	<b>7.71</b>	<b>2.76</b>	<b>1.15</b>

Source: TurkStat, CBRT.

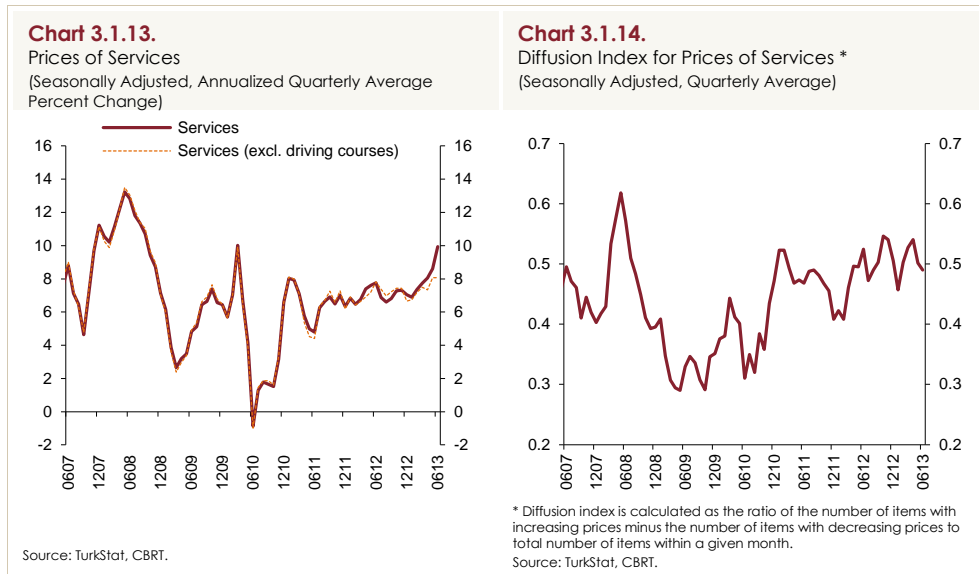
Annual services inflation posted a quarter-on-quarter increase by 0.56 percentage points to 7.88 percent (Chart 3.1.8). Thus, price increases in the second quarter went remarkably above the past years' averages. This increase was driven by communication and other services prices while rents, restaurants-hotels and transport services also recorded hikes close to historically high averages (Chart 3.1.11). As of June, annual inflation in restaurants-hotels remained flat above the overall services, while that of rents continued with a steady uptrend, and inflation in transport and other services increased notably (Chart 3.1.12).



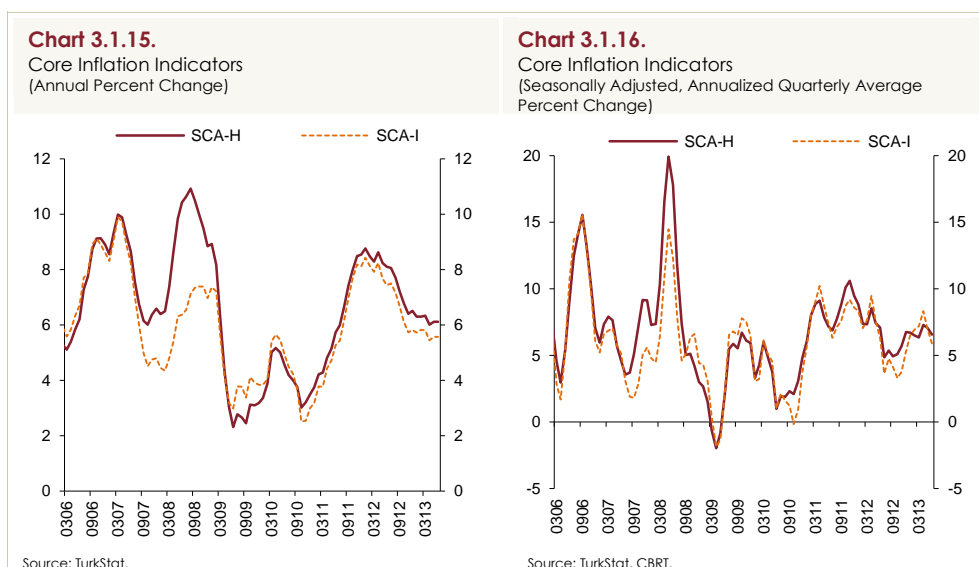
The surge in the driving course fees in June added around 0.5 percentage points to the annual services inflation. The effect of the surge on annual inflation will continue for a year and the underlying trend of services inflation will display a one-time temporary leap. Therefore, seasonally adjusted trends excluding driving course fees entail more reliable information. Accordingly, the underlying trend of services inflation did not display a month-on-month change in June, but remained on an upward track on a quarterly basis (Chart 3.1.13).

The rise in the underlying trend of services inflation was attributed to wages, a significant cost factor, along with economic activity. In the second quarter of 2012, parallel to the notable deceleration in economic activity, the stable course of exchange rates and the mild level of real unit wages, the underlying trend of services inflation remained relatively moderate, standing at 7 percent at the year-end. However, upon the recovery in economic activity as well as the acceleration in real unit wages in the first half of 2013, the underlying trend went up to 8 percent in June (Chart 3.1.13).<sup>1</sup> The diffusion index slowed down on a quarterly basis in this period; yet, it hovered above the levels recorded during times of a weak underlying trend in inflation.

<sup>1</sup> Current studies at the CBRT, which analyze wage-inflation relation, find statistically and economically significant pass-through from wages to prices, especially at labor-intensive sectors. For these studies, see Box 3.1 and Inflation Report 2013-II, Box 3.2.

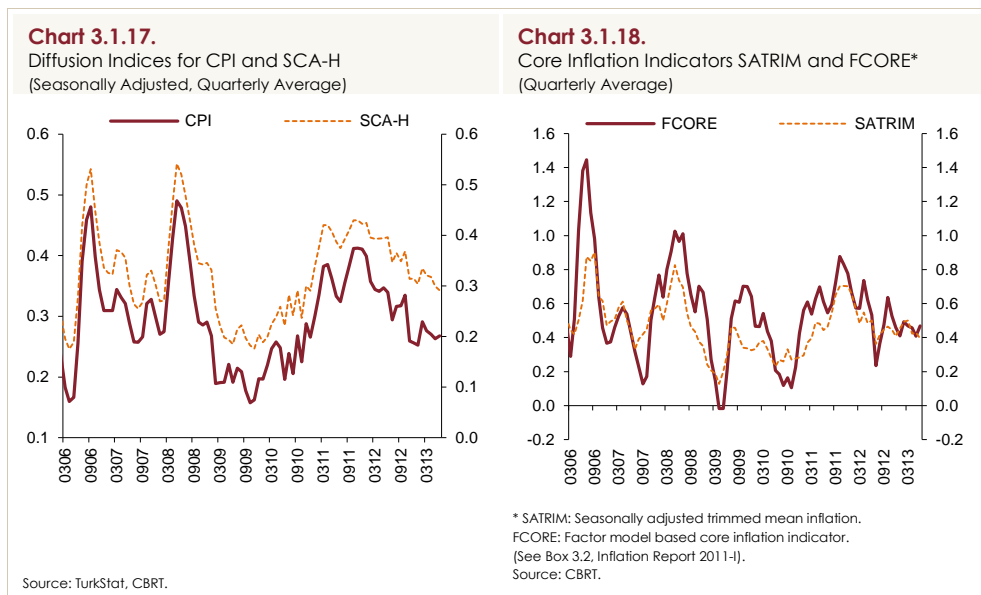


In the second quarter of the year, annual inflation in core inflation indicators SCA-H and SCA-I went down to 6.11 and 5.57 percent, respectively (Chart 3.1.15). This fall was led by the deceleration in the core goods inflation notwithstanding the acceleration in services inflation. Seasonally adjusted data indicate that the underlying trend in the SCA-H index remained unchanged, while the SCA-I index posted a slight decline on a quarterly basis (Chart 3.1.16). It should be noted that when the one-time increase in the driving course fees in June is excluded, the underlying trend of core inflation indicators point to lower levels.





Diffusion indices of the CPI followed a flat course, while the SCA-H recorded a decline in the second quarter (Chart 3.1.17). Out of the alternative core inflation indicators monitored by the CBRT, FSCORE remained flat while SATRIM trended downwards compared to the first quarter (Chart 3.1.18). In sum, the analysis of core inflation indicators alongside diffusion indices and alternative core indicators suggests that the underlying trend of inflation posted a relative decline on a quarterly basis. However, it should be noted that the depreciation of the Turkish lira in the second quarter poses an upside risk to the underlying trend of inflation in the upcoming period.

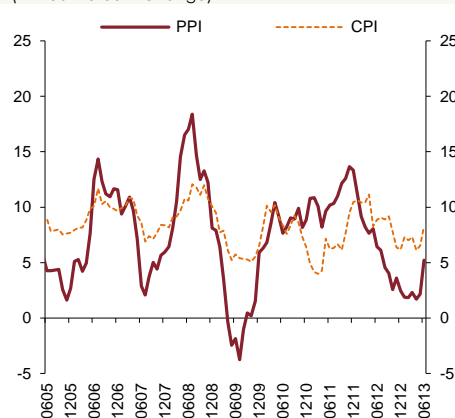


Upon the surge in agricultural prices, producer prices went up by 1.95 percent in the second quarter of 2013 (Table 3.1.3). The annual rate of increase in producer prices posted a quarter-on-quarter surge by 2.93 percentage points to 5.23 percent. Soaring agricultural prices were caused by the increase in the prices of fresh fruits and vegetables, which was higher than historical averages (Chart 3.1.20). On the other hand, domestic wheat prices, which have been increasing since last year, went down by 1.24 percent in this period. Additionally, in the second quarter, cotton and milk prices fell by 2.51 and 2.21 percent, respectively.

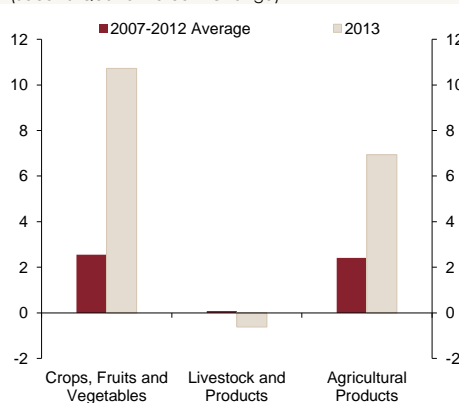
**Table 3.1.3.**PPI and Subcategories  
(Quarterly and Annual Percent Change)

	2012				2013	
	II	III	IV	Annual	I	II
<b>PPI</b>	<b>-0.89</b>	<b>0.97</b>	<b>1.72</b>	<b>2.45</b>	<b>0.50</b>	<b>1.95</b>
<b>Agriculture</b>	<b>-3.36</b>	<b>0.91</b>	<b>-3.31</b>	<b>-4.17</b>	<b>-0.06</b>	<b>6.94</b>
Crops, Fruit and Vegetable Products	-3.75	2.82	-4.78	-5.05	2.32	10.72
Livestock and Animal Products	-2.44	-0.16	-0.29	-3.15	-8.47	-0.62
<b>Industry</b>	<b>-0.37</b>	<b>0.98</b>	<b>2.74</b>	<b>3.83</b>	<b>0.61</b>	<b>0.98</b>
Mining	2.24	2.13	0.13	5.49	3.90	2.11
<b>Manufacturing</b>	<b>-0.83</b>	<b>1.22</b>	<b>-0.17</b>	<b>1.27</b>	<b>1.87</b>	<b>0.88</b>
Manufacturing (exc. petroleum products)	-0.36	0.87	0.18	1.48	1.75	1.04
Manufacturing (excl. petroleum and base metal products)	-0.09	1.15	0.48	2.50	1.76	1.11
Electricity, Gas and Water	2.57	-1.41	28.21	23.64	-11.28	1.45

Source: TurkStat, CBRT.

**Chart 3.1.19.**PPI and CPI  
(Annual Percent Change)

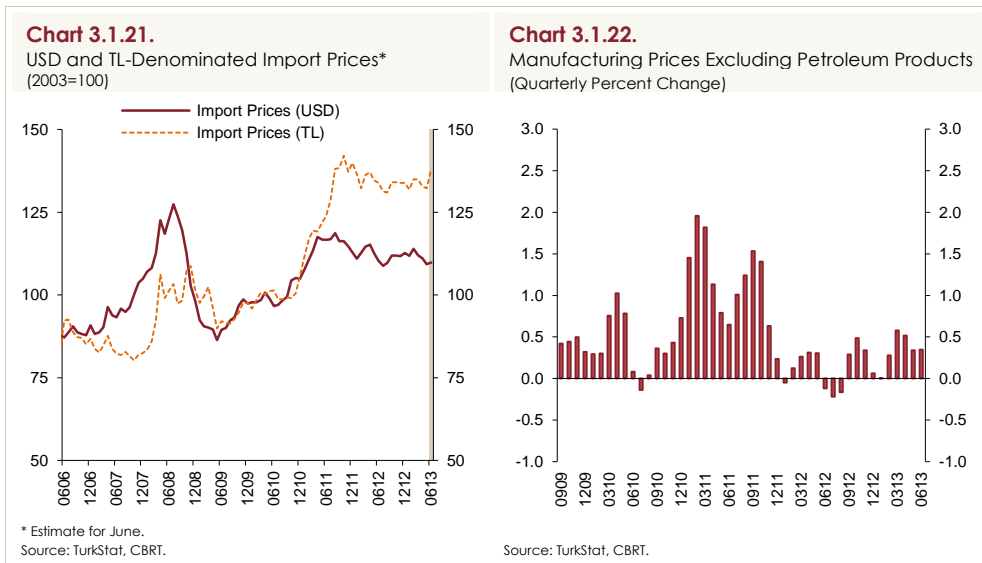
Source: TurkStat.

**Chart 3.1.20.**Agricultural Prices  
(Second Quarter Percent Change)

Source: TurkStat.

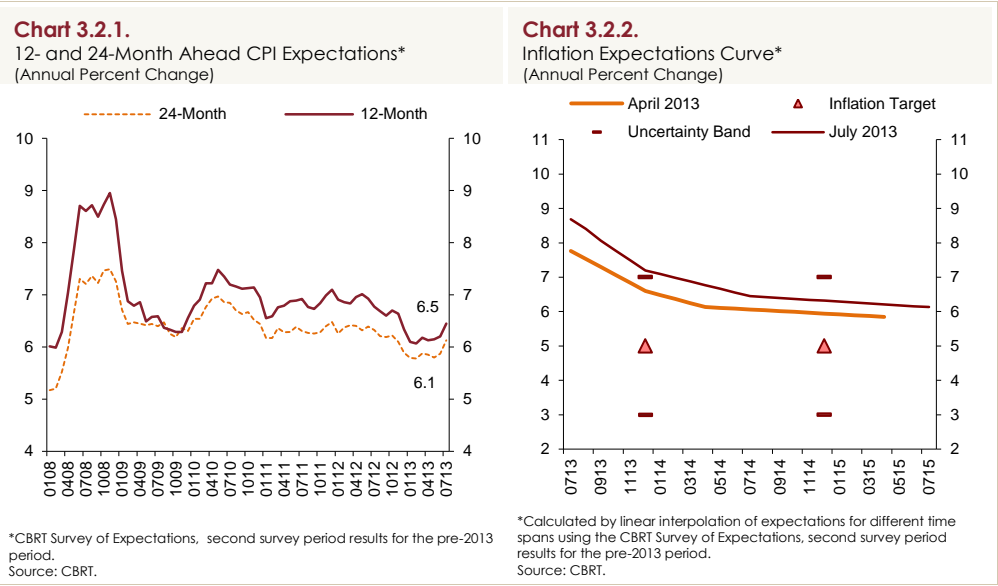
Despite the mild course of commodity prices, manufacturing prices increased by 0.88 percent in the second quarter of 2013 due to the partial effects of the depreciation in the Turkish lira (Table 3.1.3). USD-denominated import prices posted a decline upon the fall in commodity prices in this period, while TL-denominated import prices increased due to the depreciation in the Turkish lira at the end of the second quarter (Chart 3.1.21). Manufacturing industry prices excluding petroleum products rose by 1.04 percent in this quarter, and annual inflation rose by 1.44 percentage points to 3.88 percent quarter-on-quarter. Intermediate goods, capital goods and non-durable goods saw rising prices in this quarter, whereas prices of durable goods posted a decline. The fall in jewelry manufacturing prices influenced durable goods prices, while prices of non-durable goods rose prompted by the manufacturing

prices of fruits and vegetables. Overall, in the second quarter of 2013, manufacturing industry prices excluding petroleum products remained on a mild track, and producer prices do not currently exert an apparent cost pressure on consumer prices (Chart 3.1.22). However, the pass-through from the depreciation of the Turkish lira to the manufacturing industry prices is expected to pose a cost-side pressure on consumer prices, mainly on the prices of durable goods, in the upcoming period.

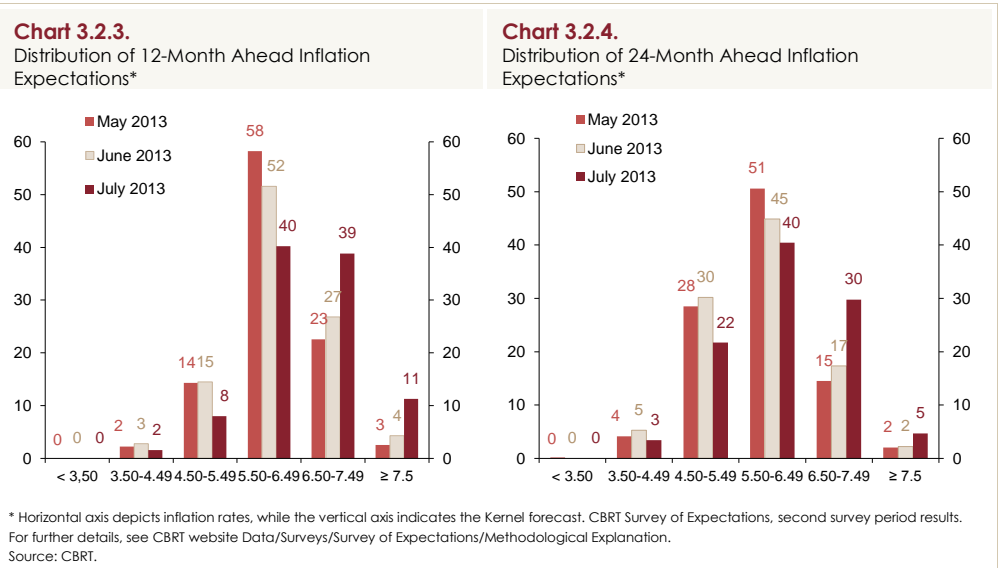


## 3.2. Expectations

In line with the mild outlook in core inflation indicators, medium-term inflation expectations displayed a flat course in the first half of 2013. However, due to the depreciation of the Turkish lira and the higher-than-expected inflation in June, medium-term inflation expectations posted a surge in July (Chart 3.2.1). An analysis of maturities shows that 12-month ahead inflation expectations were revised upwards on a quarterly basis, whereas 24-month ahead expectations exhibited a more limited rise (Chart 3.2.2). Currently, inflation expectations still hover above the inflation target of 5 percent set for the end-2013 and 2014.



The dispersion of respondents' 12-month and 24-month-ahead inflation expectations deteriorated in July (Charts 3.2.3 and 3.2.4).



Box  
3.1

## The Effect of Domestic Cost Measures on Inflation

Cost factors are the major determinants of inflation dynamics. In small open economies like Turkey, foreign cost measures like import prices and the exchange rate can be more important than domestic cost measures due to intensive use of imports in domestic production. In fact, while pass-through from foreign cost measures to Turkish inflation is well studied, little work has been done on the appropriate measures of domestic costs and their impact on inflation. So, as a contribution to this realm, this box estimates the New Keynesian Phillips Curve (NKPC) for Turkey by Bayesian methods, and focuses on the impact of domestic cost pressures on inflation.<sup>2</sup>

The output gap is commonly used as the real marginal cost measure in the literature on NKPC estimations. However, failure of the output gap to directly reflect the productivity improvement as well as wage rigidities cause the two series to diverge, thus signifying the need to employ alternative measures to the output gap to represent the real marginal cost. Hence, in addition to the output gap, this study uses real unit labor costs to capture domestic costs.

**Model and the Estimation**

The New Keynesian Phillips Curve used in the analysis is in equation (1):

$$\pi_t = \gamma_b \pi_{t-1} + (1 - \gamma_b) E_t \pi_{t+1} + \lambda rmc_t + \varepsilon_t^\pi \quad (1)$$

Accordingly, the current inflation,  $(\pi_t)$ , depends on past inflation  $(\pi_{t-1})$ , the expected inflation  $(E_t \pi_{t+1})$ , and the real marginal cost  $(rmc_t)$ . The effect of backward and forward-looking pricing behavior on inflation is measured by coefficients,  $\gamma_b$  and  $1 - \gamma_b$ , respectively.  $\lambda$  denotes the total effect of the real marginal cost on inflation, while,  $\varepsilon_t^\pi$  represents inflation shocks. The real marginal cost is composed of domestic and foreign components,  $(rmc_t^d)$  and  $(rmc_t^f)$ , respectively:

$$rmc_t \equiv \zeta rmc_t^d + (1 - \zeta) rmc_t^f \quad (2)$$

Coefficient  $\zeta$  in equation (2) denotes the share of domestic costs in the overall real marginal cost. Foreign costs in the study reflect costs regarding imported input prices and the exchange rate.

<sup>2</sup>The analysis presented in this box is based on Başer, KÜÇÜK and ÖĞÜNÇ (2013).

$$rmc_t^f = \mu_1 \pi_t^{M,d} + \mu_2 \pi_{t-1}^{M,d} + (1 - \mu_1 - \mu_2) \pi_{t-2}^{M,d} \quad (3)$$

Quarterly changes in TL-denominated import prices are expressed by  $\pi_t^{M,d}$  in equation (3). Domestic component of the real marginal cost is estimated via alternative equations. While the base model solely uses the output gap, ( $\tilde{y}_t$ ) alternative estimations employ real unit labor cost, ( $ulc_t$ ), by itself or in addition to the output gap. Equations (4), (4') and (4'') display alternative estimations.

$$rmc_t^d = \omega_1 \tilde{y}_t + \omega_2 \tilde{y}_{t-1} + (1 - \omega_1 - \omega_2) \tilde{y}_{t-2} \quad (4)$$

$$rmc_t^d = \tau_1 ulc_{t-1} + \tau_2 ulc_{t-2} + \tau_3 ulc_{t-3} + \tau_4 ulc_{t-4} + \varepsilon_t^{cd} \quad (4')$$

$$rmc_t^d = \Omega_1 \tilde{y}_t + \Omega_2 ulc_{t-1} + \Omega_3 ulc_{t-2} + \Omega_4 ulc_{t-3} + \Omega_5 ulc_{t-4} + \varepsilon_t^{cdu} \quad (4'')$$

Model parameters are estimated by Bayesian methods for 2005Q2-2012Q3.<sup>3</sup> The consumer inflation series in estimations are the annualized quarterly averages of the seasonally adjusted CPI excluding unprocessed food, alcohol and tobacco. The real unit labor cost is denoted by non-farm total wages, and alternatively, by the minimum wage series. The output gap series is based on the updated estimations by Alp, Öğünç and Sarıkaya (2012).<sup>4</sup>

## Results

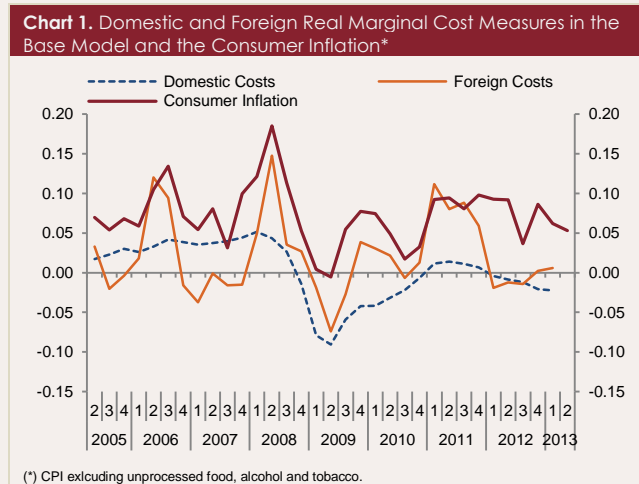
Results show that the base model employing the output gap as the domestic real marginal cost measure performs better than alternative models that include real unit labor costs. The first major result to be underlined regarding base model estimations is that forward-looking pricing behavior is at least as important as the backward-looking pricing behavior. Coefficients  $\gamma_b$  and  $1 - \gamma_b$  in equation 1 are estimated to be 0.56 and 0.44, respectively for the 2003Q2-2012Q3 period and 0.49 and 0.51, respectively for the 2005Q2-2012Q3 period. This indicates that the forward-looking pricing behavior has become more important with the adoption of the explicit inflation targeting regime.

<sup>3</sup> The analysis starts from 2003Q1 in order to exclude the effect of the 2001 crisis as well as to use price index with the base year 2003. However, as real unit labor cost series starts from 2005Q2, the model comparison also starts from 2005Q2.

<sup>4</sup> Model equations, parameter priors and estimation results are discussed extensively in Başer, Küçük and Öğünç (2013). The preceding section charts display the updated estimations of the study discussed above.

Secondly, the share of the foreign cost component is higher in total real marginal cost. The coefficient  $\zeta$  of the domestic real marginal cost in equation 2 is estimated to be 0.36. In other words, about 0.64 percent of the costs effective on consumer inflation is due to changes in TL-denominated import prices.

Chart 1 presents consumer inflation as well as the domestic and foreign real marginal cost series. It follows that the turning points in inflation are mostly determined by foreign cost measures, though domestic cost measures are also effective on inflation. In the last period extending to 2013Q1, the effect of domestic cost measures on inflation was weak due to the output gap, while foreign cost measures started to exert upside pressure on inflation.<sup>5</sup>



The inclusion of real unit labor costs in the model does not provide additional contribution to better understand the consumer inflation dynamics, whereas the labor-intensive services sector has quite a major role on inflation dynamics. The equation (4''), which jointly uses the output gap and the services sector real unit labor cost (real minimum wage/services sector productivity) has the highest explanatory power for estimating the services sector inflation among alternative models.

<sup>5</sup> The 2012Q4 hike is attributed to adjustments to taxes and public prices in the energy sector.

