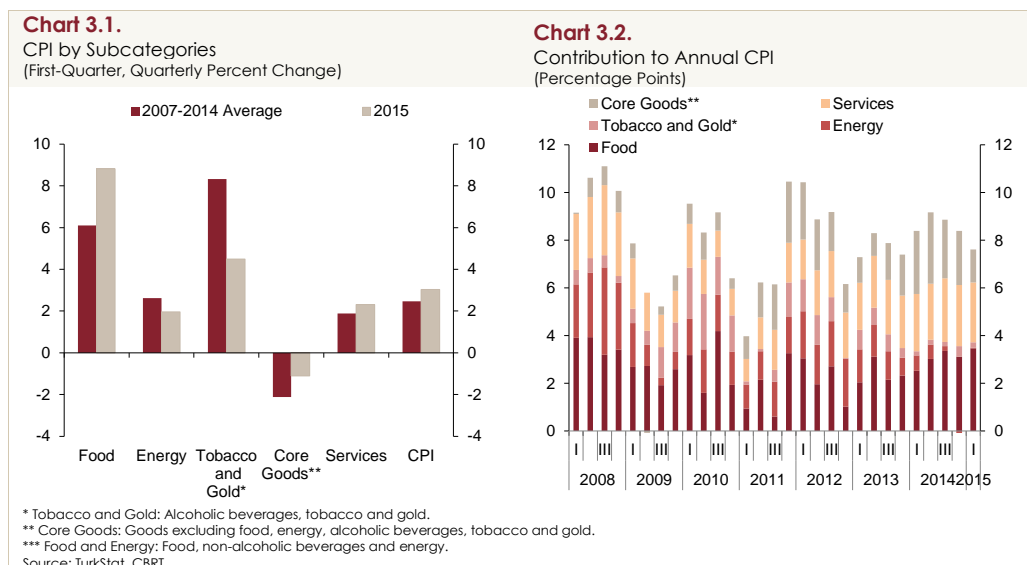


3. Inflation Developments

In the first quarter of 2015, consumer inflation decreased by about 0.6 points from end-2014 to 7.61 percent. This decline was mostly due to the base effect from prices of core goods. The most significant price developments for the first quarter were the ongoing implications of adverse supply conditions for food prices and their spillover into catering services prices. In fact, food prices added 3.47 points to annual inflation at the end of the first quarter, up 0.36 points from end-2014, accounting for a large part of consumer inflation. The downward pressure of oil prices on inflation has been restricted by the upsurge in international oil prices since February. In addition, the depreciation of the Turkish lira throughout this quarter was passed to inflation on a smaller scale compared to previous quarters. This was largely attributed to the lesser extent of the depreciation of the Turkish lira with respect to the currency basket than vis-à-vis the US dollar, the slowdown in USD-denominated import prices and the weak course of aggregate demand conditions. On the other hand, the absence of a solid improvement in inflation expectations and headline inflation postponed the slowdown in services inflation. Although the annual rates of increase in core inflation indicators posted a decline in this quarter, the underlying trend of these indicators remained unchanged quarter-on-quarter in seasonally adjusted terms.

In the first quarter of 2015, consumer prices increased by 3.03 percent, surpassing historical averages. The quarterly price change was higher than past averages across food, services and core goods but more moderate in energy (Chart 3.1). Yet, the most striking aspect about the quarterly outlook was food prices recording the highest first-quarter increase in the history of the index with 8.82 percent, which was driven by the course of unprocessed food prices. Core goods made less contribution to annual inflation quarter-on-quarter, largely due to base effects, whereas the contribution of services remained virtually unchanged. However, the contribution of food and energy prices to annual inflation increased (Chart 3.2).

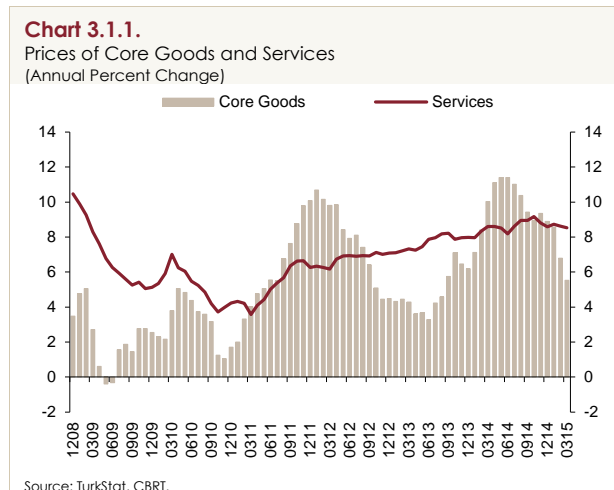


In sum, the first quarter was marked by an escalating trend in food inflation and relevant services items, a lessened effect of falling oil prices, and inflationary pressures generated by the Turkish lira

depreciation, which had a relatively smaller impact given current demand conditions and the external price outlook. The upcoming inflation outlook will depend on a likely correction in elevated food prices as well as on domestic demand conditions and the overall pricing behavior. Thus, the measures that the Food Committee (the Food and Agricultural Products Markets Monitoring and Evaluation Committee, founded in December 2014) might propose are expected to drive food inflation down. In addition to the correction in food prices, an ongoing cautious monetary policy stance coupled with the currently moderate levels of international commodity prices might help headline inflation slow further. Yet, amid uncertainty over global monetary policies, the heightened volatility of the Turkish lira continues to pose risks to this outlook.

3.1. Core Inflation Outlook

Having remained elevated throughout 2014 due to exchange rate effects, annual core goods inflation fell by 3.36 points to 5.54 percent in the first quarter (Table 3.1.1 and Chart 3.1.1). This drop was mostly attributed to the high base effect from the previous year and the weak domestic demand conditions. Moreover, the fall in non-energy commodity prices added to this outlook. In this period, annual inflation was down across all subcategories of core goods, with durable goods making the largest downward contribution. After rising sharply in January, prices of durable goods with a relatively higher exchange rate pass-through followed a modest path in February and March on the back of domestic demand. Accordingly, annual durable goods inflation dropped to 3.12 percent mostly due to base effects despite the recent exchange rate changes (Chart 3.1.2). A similar decline was evident in annual clothing inflation, with the seasonally adjusted underlying trend of clothing inflation slowing more notably. The fall in annual inflation was less marked in core goods excluding durables and clothing, which displayed a slightly higher quarterly increase in seasonally adjusted terms. Therefore, the contribution of core goods to consumer inflation decreased by 0.9 points in the first quarter to 1.38 points (Chart 3.2).



After halting in the fourth quarter, the improvement in the underlying trend of core goods inflation observed since the second quarter of 2014 continued into the first quarter of 2015 (Chart 3.1.3). The recent depreciation of the Turkish lira against the USD poses an upside risk to the

future core goods inflation outlook, which, however, is balanced by the moderate course of aggregate demand conditions as of the first quarter.

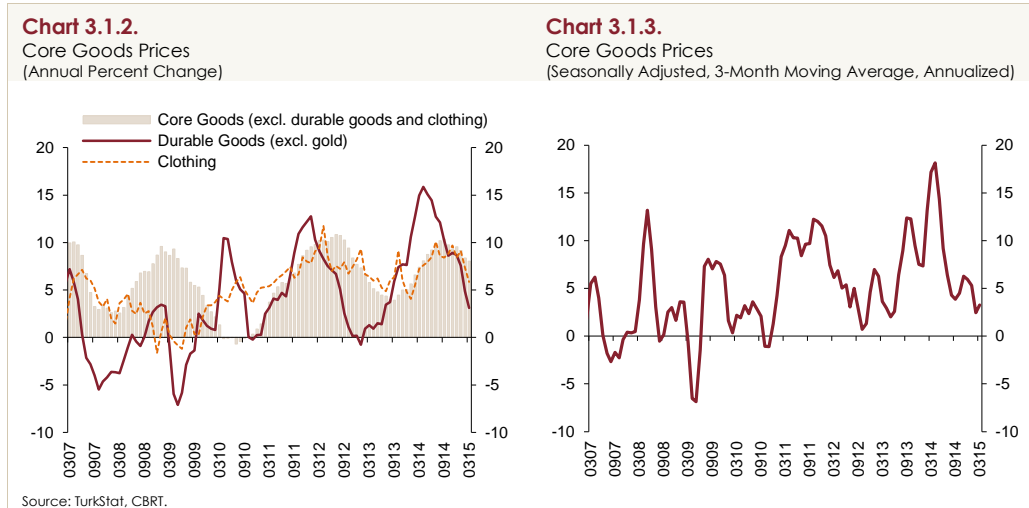


Table 3.1.1.

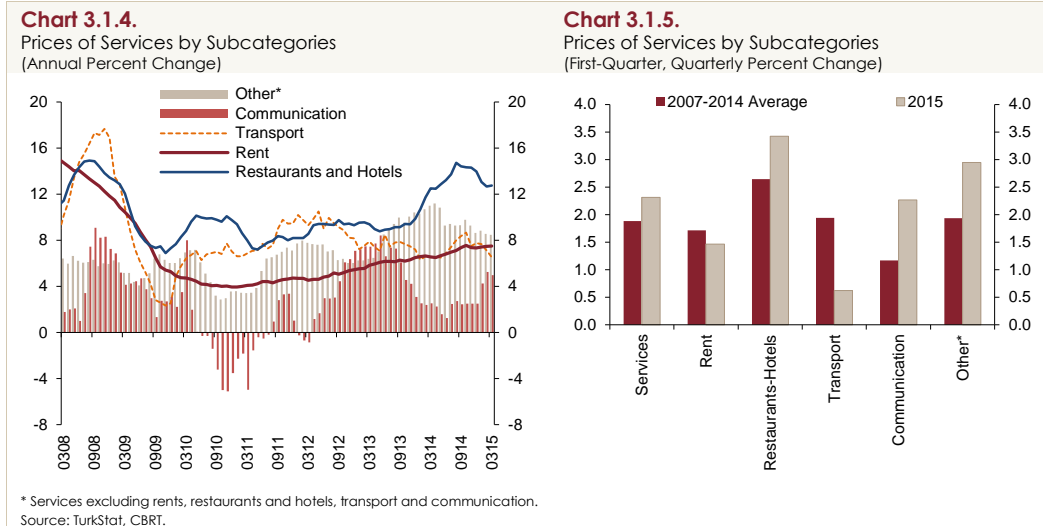
Prices of Goods and Services
(Quarterly and Annual Percent Change)

	2014					2015
	I	II	III	IV	Annual	I
CPI	3.57	2.06	0.69	1.63	8.17	3.03
1. Goods	4.08	2.05	-0.30	1.99	7.99	3.34
Energy	0.21	-1.12	0.11	-0.74	-1.54	1.96
Food and Non-Alcoholic Beverages	7.50	0.41	1.50	2.90	12.73	8.82
Unprocessed Food	10.79	-2.16	0.02	3.53	12.24	16.40
Processed Food	4.57	2.82	2.82	2.36	13.16	2.30
Core Goods	2.05	6.16	-2.39	2.98	8.89	-1.10
Clothing and Footwear	-10.32	22.36	-	10.38	8.40	-12.43
Durable Goods (excl. gold)	9.54	-0.39	-0.08	-0.29	8.70	3.91
Furniture	3.14	4.00	-1.11	1.56	7.73	3.55
Electrical and Non-Electrical Appliances	3.86	-2.51	0.69	-0.31	1.64	2.44
Automobile	16.65	-1.24	-0.10	-1.19	13.72	5.14
Other Durable Goods	2.78	2.75	0.26	1.07	7.02	1.38
Core Goods (excl. clothing and durable goods)	3.21	2.85	1.82	1.38	9.57	1.78
Alcoholic Beverages, Tobacco and Gold	8.24	-0.92	0.45	0.00	7.73	4.49
2. Services	2.37	2.10	3.05	0.81	8.59	2.32
Rent	1.30	1.82	2.25	1.78	7.34	1.47
Restaurants and Hotels	4.54	2.81	3.95	2.02	13.98	3.42
Transport	1.24	2.68	4.05	-0.38	7.76	0.10
Communication	-0.14	0.02	2.48	0.14	2.50	2.26
Other*	3.10	2.42	2.67	0.21	8.64	2.95

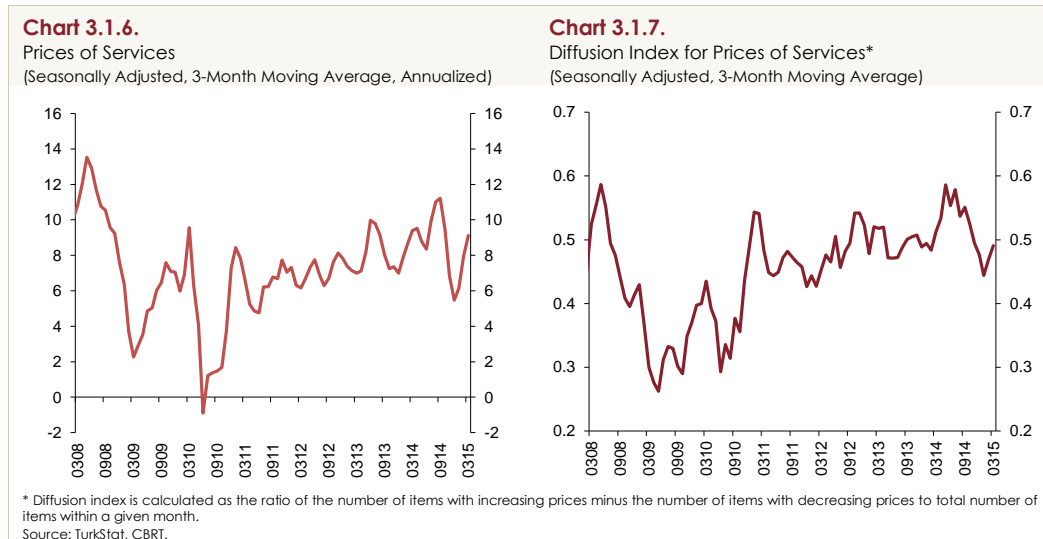
* Services excluding rents, restaurants and hotels, transport and communication.
Source: TurkStat, CBRT.

Annual services inflation barely changed in the first quarter and remained high at 8.53 percent (Chart 3.1.1). Restaurants and hotels continued to be the main driver of the high services inflation, while other services also played a major role. In this period, annual inflation increased in communication services, and with the steady prolonged uptrend in rents, it converged to overall consumer inflation. However, the lagged effects of falling oil prices continued to put a cap on transport services inflation (Chart 3.1.4). In fact, the first-quarter rate of increase in prices of transport services fell well below historical averages. Prices of restaurants and hotels as well as communication and other services, on

the other hand, increased at a higher rate than past averages (Chart 3.1.5). Hence, services made a relatively flat contribution by 2.51 points to consumer inflation compared to the previous quarter.

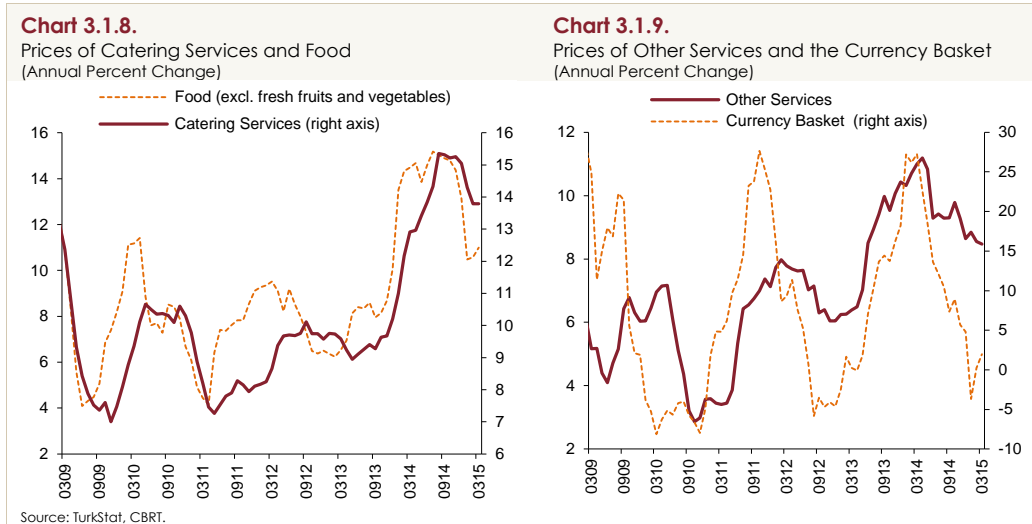


Seasonally adjusted data indicate that the underlying trend of services inflation was higher in the first quarter (Chart 3.1.6). After decreasing sharply during November-December 2014 when the effects of falling oil prices on services inflation were most prevalent, the underlying trend returned to the October 2014 level in March. According to quarterly averages, the underlying inflation trend and the diffusion index followed a similar pattern (Chart 3.1.7).



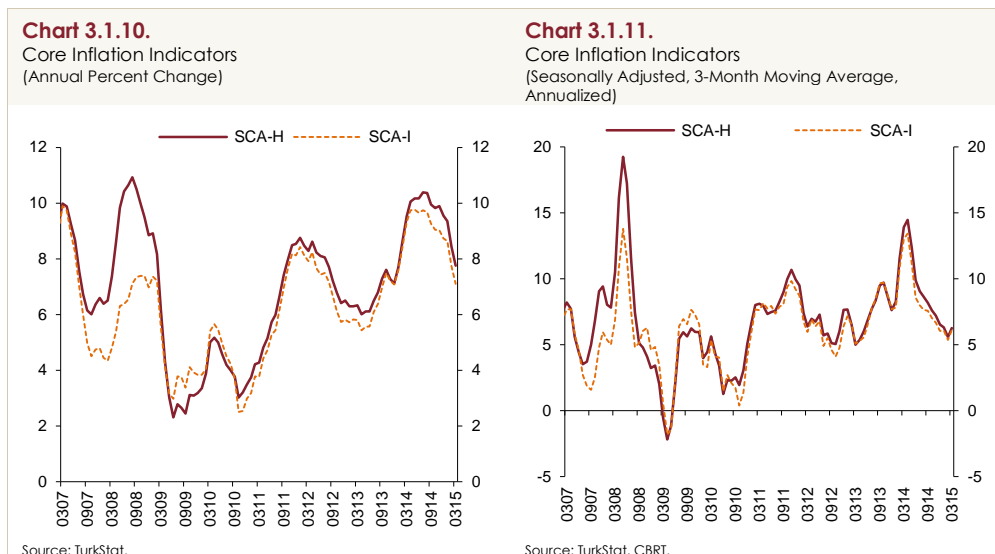
Compared with the previous reporting period, services inflation was subject to more cost pressures. Price increases in catering services, which are directly influenced by food prices, accelerated in the first quarter, causing annual catering services inflation to remain elevated at 13.79 percent (Chart 3.1.8). The post-January gains in oil prices, which were on the decline since July 2014, lessened the downward pressure on inflation caused largely by transport prices. Additionally, the Turkish lira depreciation during February-March restrained the improvement in the inflation of the highly exchange-rate sensitive "other services" (Chart 3.1.9). Another factor that restricted the slowdown in

services inflation was the fact that the net rate of increase in minimum wages, a key driver of services inflation, was set at 12.2 percent on average for 2015.

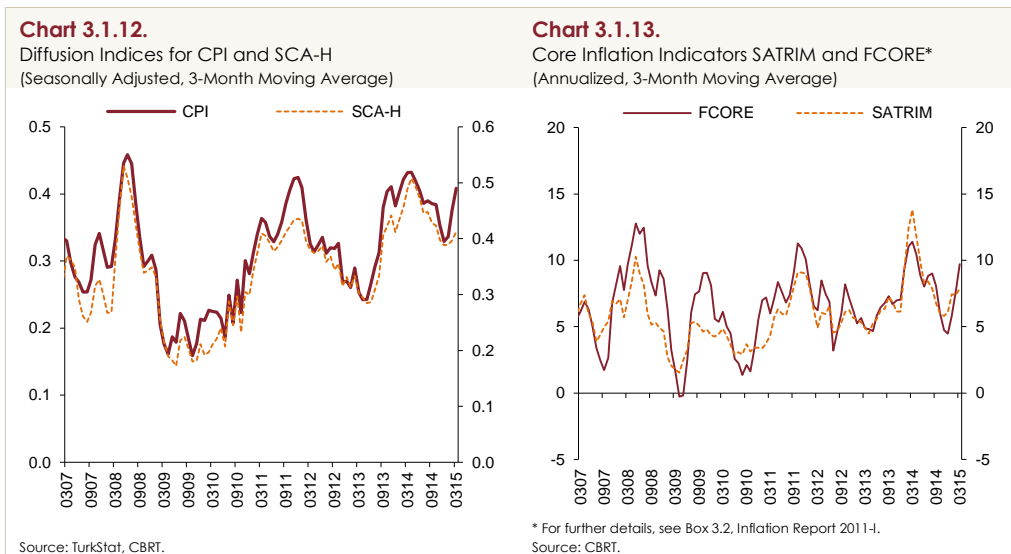


The cautious monetary policy stance and the slowing domestic demand support the expected gradual improvement in services inflation, yet the above cost effects appear to be the determining factors. Having long been recurring at short intervals, the adverse shocks on food prices and exchange rates delay a permanent fall in inflation expectations and consumer inflation and lead to inflation inertia in services where the indexing behavior is strong.

In line with the outlook for prices of core goods and services, annual inflation in SCA-H and SCA-I fell significantly in the first quarter to 7.75 and 7.10 percent, respectively (Chart 3.1.10). This decline in annual inflation was mostly due to the base effects from core goods, while the underlying trend remained almost unchanged from the end of the previous quarter (Chart 3.1.11). Despite the improved core goods outlook, the rising services inflation caused the underlying trend to remain horizontal.



On the other hand, according to the diffusion indices, the likelihood for prices to hike strengthened quarter-on-quarter, albeit slightly, in the first quarter, and especially in the CPI due to changes in food prices (Chart 3.1.12). The alternative core inflation indices monitored by the CBRT pointed to a relatively higher underlying inflation in this period, whereas the FCORE index recorded a comparatively more robust increase due to a more prevalent food price effect (Chart 3.1.13). In sum, the underlying inflation, which has assumed a downward course as of the second half of 2014, discontinued to decelerate further in the first quarter of 2015 amid exchange rate and oil price developments. The cautious monetary policy stance and the fluctuating financial markets caused domestic demand conditions to weaken, which, in turn, restrained cost pressures to some extent, and the non-food underlying trend indicators improved slightly from the previous quarter.



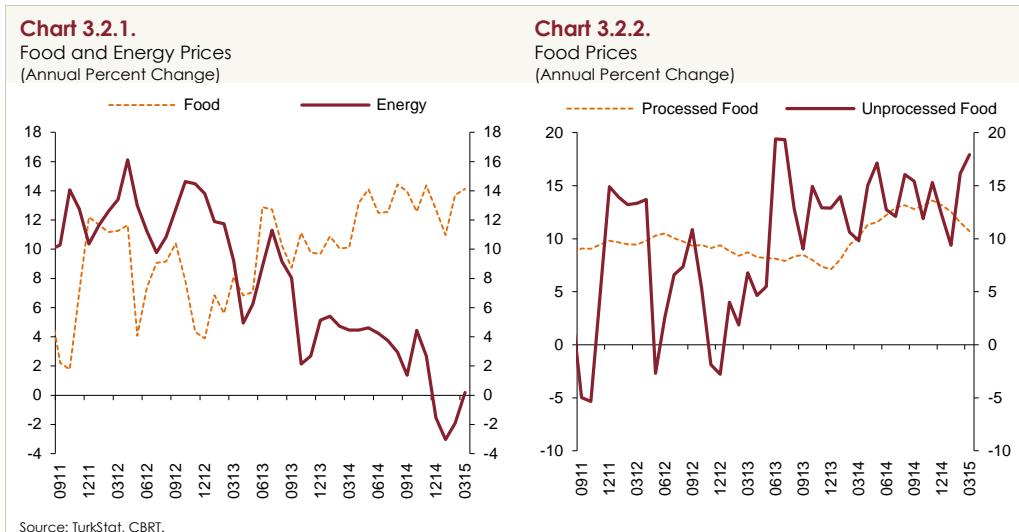
3.2. Food, Energy and Alcohol-Tobacco Prices

The agricultural value added contracted by 1.9 percent in 2014 on adverse weather conditions; thus having remained elevated throughout the year, food inflation ended 2014 at 12.73 percent. Annual food inflation rose to 14.12 percent in the first quarter of 2015, soaring significantly above the January Inflation Report assumptions (Chart 3.2.1). This upsurge in food inflation was driven by the negative outlook in unprocessed food prices (Chart 3.2.2).

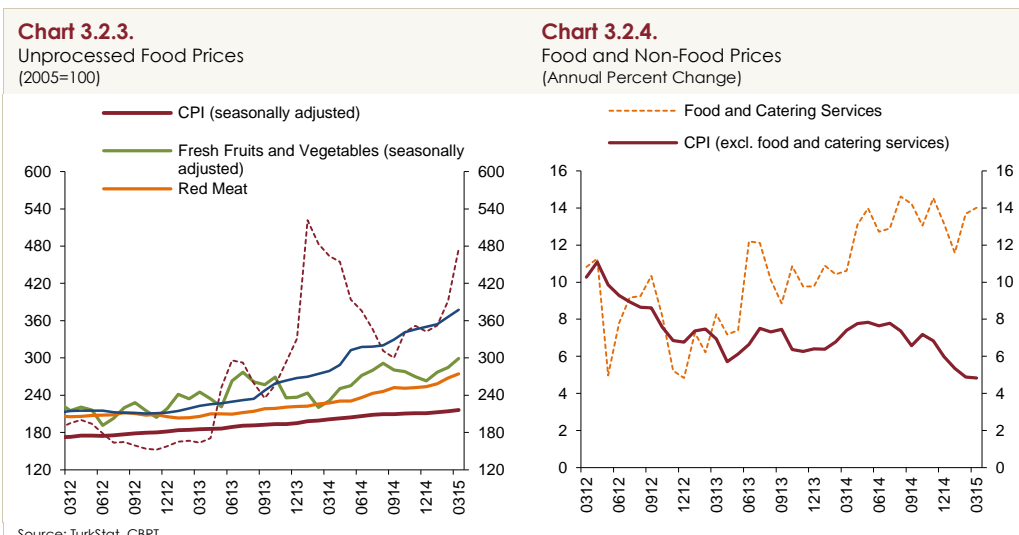
Annual unprocessed food inflation soared by 5.69 percent quarter-on-quarter to 17.93 percent (Chart 3.2.2). In seasonally adjusted terms, the sharp rise in unprocessed food prices during the first two months continued into March at a more rapid pace due to developments in prices of meat, fresh fruits, and especially fresh vegetables. Annual inflation in fresh fruits and vegetables skyrocketed to about 29 percent, while the annual rate of increase in meat prices escalated to about 20 percent on calf meat prices. Additionally, potato prices ascended by about 40 percent in the first quarter, while the rapid upsurge in prices of dry fruits continued into this quarter without wavering (Chart 3.2.3).

On the other hand, annual processed food inflation slowed in the first quarter (Chart 3.2.2), largely due to the slowing rate of increase in bread and cereals prices. Meanwhile, processed food excluding bread and cereals saw sharp month-on-month price hikes. In this period, prices of oils and

fats were up due to olive oil prices; processed meat prices increased on meat prices and prices of canned processed vegetable products were driven higher by vegetable prices. Thus, the contribution of food prices to annual inflation reached 3.47 points at the end of the first quarter.

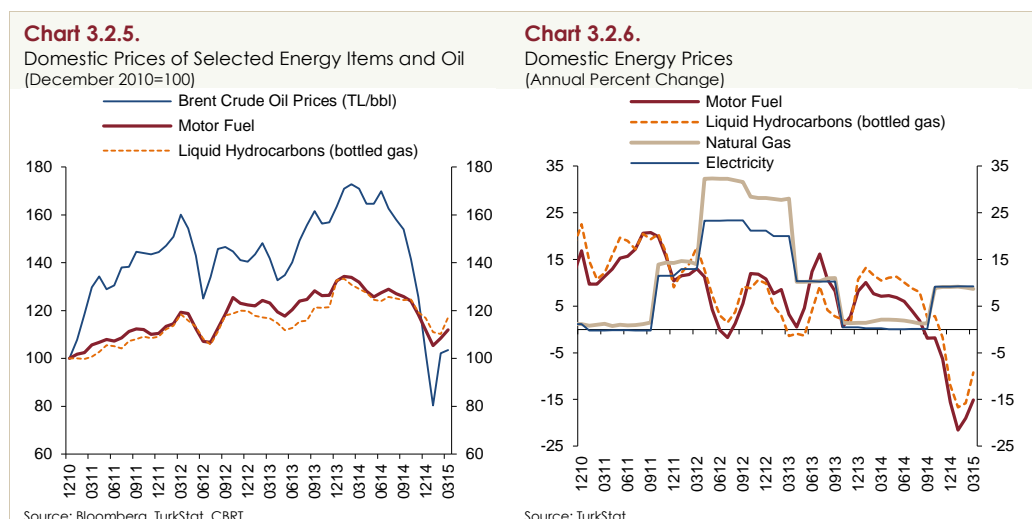


The jump in food prices continues to affect catering services prices. Accordingly, annual inflation in food and catering services, which make up about 30 percent of the consumption basket, reached around 14 percent, while consumer inflation excluding food and catering services dropped to 4.82 percent, causing both subcategories to diverge significantly (Chart 3.2.4). Measures that may be proposed by the Food Committee in this regard are estimated to contribute to the decline in food inflation in the upcoming period.



Energy prices rose by 1.96 percent in the first quarter. The downtrend in international oil prices came to halt in January and Brent crude oil prices ended the quarter at around 53 USD per barrel, slightly down from 56 USD at the end of the previous quarter. Thus, fuel and bottled gas prices rose merely by 0.18 and 0.29 percent, respectively, in the first quarter (Chart 3.2.5). Yet, amid fluctuating oil prices, fuel and bottled gas prices remained on a volatile track also due to the Turkish lira depreciation.

Among administered energy prices, electricity and natural gas tariffs were basically unchanged in the first quarter, whereas tap water tariffs continued to rise rapidly after soaring in 2014 (Chart 3.2.6). In sum, annual energy inflation increased during the first quarter but continued to make a positive contribution to consumer inflation by a record-low of 0.19 percent (Chart 3.2.1).



Prices of alcoholic beverages and tobacco products rose by 3.72 percent in the first quarter due to SCT adjustments. The contribution of this subcategory to annual consumer inflation declined by 0.20 points from December thanks to base effects.

3.3. Domestic Producer Prices

Domestic producer prices were up by 2.60 percent in the first quarter due to rising manufacturing prices, yet decreased year-on-year to 3.41 percent with base effects (Table 3.3.1 and Chart 3.3.1).

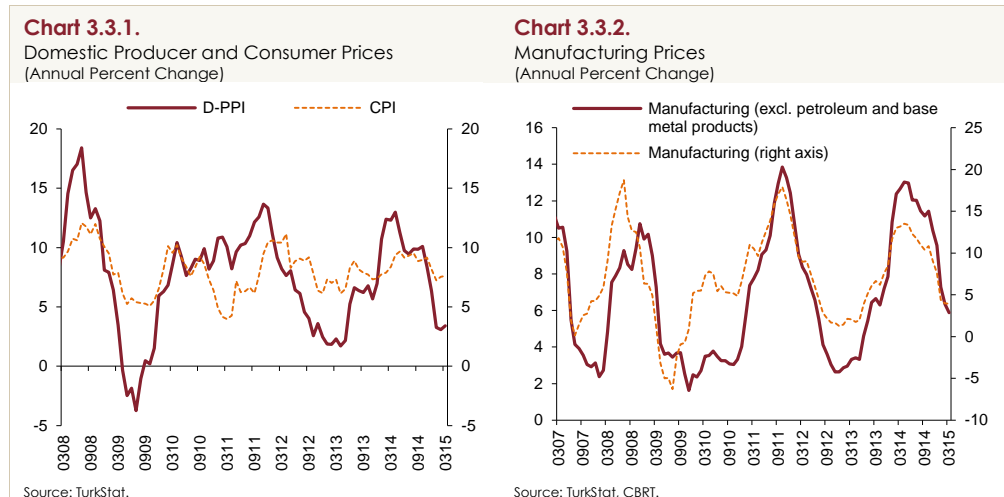
Table 3.3.1.
D-PPI and Subcategories
(Quarterly and Annual Percent Change)

	2014				2015	
	I	II	III	IV	Annual	I
D-PPI	5.52	-0.38	2.02	-0.82	6.36	2.60
Mining	4.91	-1.77	0.92	-2.86	1.02	0.33
Manufacturing	6.29	0.11	2.18	-1.01	7.63	2.64
Manufacturing (excl. petroleum products)	6.11	0.40	2.35	-0.06	8.98	2.65
Manufacturing (excl. petroleum and base metal products)	6.11	0.70	2.37	0.16	9.56	2.70
Electricity and Gas	-1.17	-4.85	1.01	1.53	-3.56	1.80
Water	3.66	2.29	0.95	4.54	11.90	13.75
D-PPI by Main Industry Groups						
Intermediate Goods	5.99	-0.57	1.45	-0.36	6.53	1.97
Durable Goods	8.47	-1.18	-0.50	0.84	7.55	5.15
Durable Goods (excl. gold)	4.91	1.44	-0.39	1.29	7.38	2.91
Non-Durable Goods	5.79	2.18	4.79	0.49	13.82	3.24
Capital Goods	1.66	-3.76	-0.07	-5.54	-7.64	2.29
Energy	6.78	-1.04	1.18	-0.88	5.97	2.23

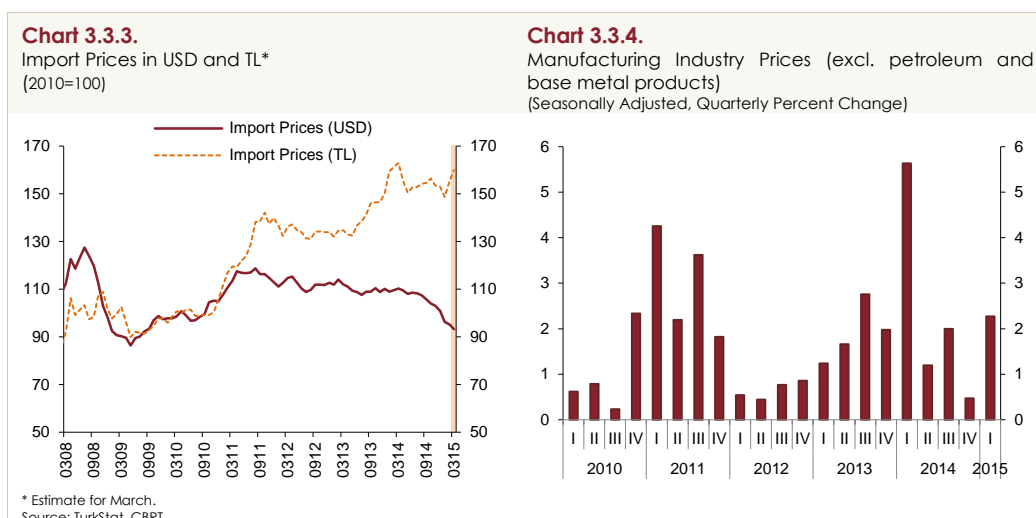
Source: TurkStat, CBRT.

In the first quarter, manufacturing prices rose by 2.64 percent, while annual manufacturing price inflation dropped to 3.93 percent thanks to the strong base effect from a year ago (Table 3.3.1 and

Chart 3.3.2). In this period, the hikes across all manufacturing prices were driven by the depreciating Turkish lira. In fact, import prices were down in USD terms but were notably higher in Turkish lira terms (Chart 3.3.3). However, plunging international commodity prices, especially oil prices, limited these exchange-rate driven pressures.

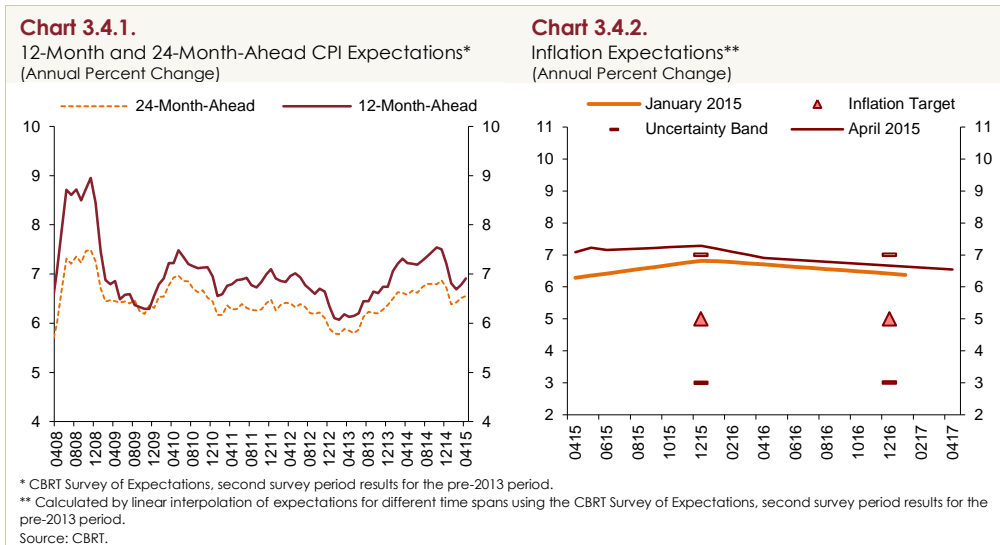


Price increases were evident across all manufacturing industry subcategories in this period, particularly in durable and non-durable goods (Table 3.3.1). Prices of durable goods soared remarkably by 5.15 percent mainly due to gold prices, while manufacturing prices of non-gold durable goods rose by 2.91 percent (Table 3.3.1). Prices of non-durable goods posted a quarterly increase of 3.24 percent on the back of the food manufacturing industry. Price hikes in food production, particularly in meat, fats and oils, and processed fruits and vegetables, also spilled over into consumer prices. Thus, despite slowing USD import prices, the Turkish lira depreciation and upward pressures related to food manufacturing prices caused consumer prices to face stronger cost pressures from producer prices compared to the previous quarter. In fact, the quarterly inflation in the manufacturing industry excluding petroleum and base metal products, which entail information on the underlying trend of producer prices, posted a quarter-on-quarter increase (Chart 3.3.4).

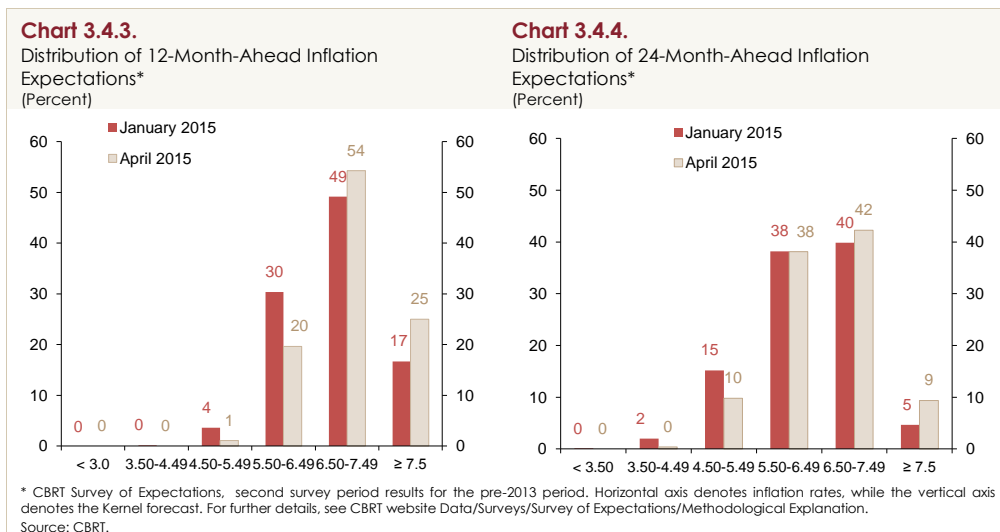


3.4. Expectations

After maintaining the fourth-quarter downtrend in the beginning of the year, inflation expectations increased in February and March on the back of rising food and energy prices. Medium-term expectations continued to deteriorate amid the depreciating Turkish lira in April (Chart 3.4.1). Across maturities, inflation expectations up to year-end were revised upward from the January Inflation Report, but longer-term expectations increased modestly (Chart 3.4.2). Inflation expectations currently hover above the 5-percent target set for end-2015 and end-2016.



The dispersion of both 12-month and 24-month-ahead inflation expectations indicates deterioration in inflation expectations compared to January (Charts 3.4.3 and 3.4.4). Specifically, the percentage of respondents expecting 12-month-ahead inflation to be between 5.5 and 6.49 percent decreased significantly in this period, while those expecting it to be 6.5 percent or above recorded an increase. The dispersion of 24-month-ahead expectations, however, deteriorated only slightly.



Box
3.1

The Impact of Reducing Supply Chain Barriers on the Prices of Fresh Fruits and Vegetables

The unprocessed food industry possesses a comprehensive supply chain including production, transportation, processing/classification, storage and the related commercial services. Therefore, the product travels through many intermediaries during its journey from the producer to the final consumer. Unregistered intermediaries, bureaucratic actions that hinder direct purchases between wholesalers and retailers and structural problems during storing and transportation stand out as the most important supply chain barriers in the unprocessed food market. Debates on removing such barriers lie at the center of food policies, which have become increasingly more important in recent years. Even though these policies mostly concern health, safety, quality and agricultural productivity, there is a common perception that removing these barriers might drive unprocessed food prices lower.

Law No. 5957 enacted on 1 January 2012 regulating the commerce of fruits and vegetables and other goods having enough supply and demand level aims to remove unregistered intermediaries, reduce the cost of accessing wholesales markets for producers and allow producers to sell their products directly to retailers. This box presents an analysis on whether Law No. 5957; i.e. the Wholesales Market Law, led to any decline in the prices of fresh fruits and vegetables by using the difference-in-differences and regression discontinuity methodologies from a semi-experimental perspective.

The empirical analysis relies on wholesale and retail prices. Wholesale prices are daily prices of fresh fruits and vegetables obtained from the website of the Municipal Wholesales Market in Antalya (ATH). More than half of the fresh fruits and vegetables are distributed from the ATH, the greatest wholesales market in Turkey. Moreover, in the winter, which is the season when the reform passed, seasonal products were traded via the ATH. Thanks to the presence of large greenhouses in the region, non-seasonal products are also traded through the ATH. Retail prices are represented by the monthly average consumer prices released by TurkStat. Even though the retail price dataset contains fewer product items compared to the wholesale price dataset, both datasets are similar to a great extent.¹

Difference-in-Differences Analysis (DID)

The DID analysis calculates the price changes in fresh fruits and vegetables for the pre-reform and post-reform periods. The baseline analysis uses a 2-month symmetrical analysis window from early December to late January around 1 January when the reform became effective. Thus, price changes before and after 1 January during 2010–2011 are compared to those before and after 1 January during 2011–2012. The dummy variables D and T were constructed, where the former takes the value 1 if the month of observation is January and 0 otherwise and the latter equals 1 if the year of observation is 2011–2012 and 0 otherwise. The interaction term ($D \cdot T$) captures the effect of the reform by comparing the intervention and control groups. The final equation to be estimated is as follows:

$$\ln p_{it} = \beta_0 + \beta_1 D_{it} + \beta_2 T_{it} + \delta(D_{it} \cdot T_{it}) + \mu_i + \epsilon_{it}$$

Here, i represents the product, t represents the observation period, $\ln p_{it}$ is the nominal price level for product i at period t , μ_i signifies the product-specific fixed effects and ϵ_{it} is the error term. The term δ , which is the main parameter of interest, measures the change in prices of fresh fruits and vegetables after the reform.

¹ For further details, see Aysoy et al. (2014).

Regression-Discontinuity Analysis (RDD)

The RDD method is used to test the validity of the DID estimation. The dummy variable R in the RDD analysis takes the value of 1 for post-reform and 0 for the pre-reform period. The assignment variable is time, which is “day” for wholesale prices and “month” for retail prices. The RDD equation can be written as follows:

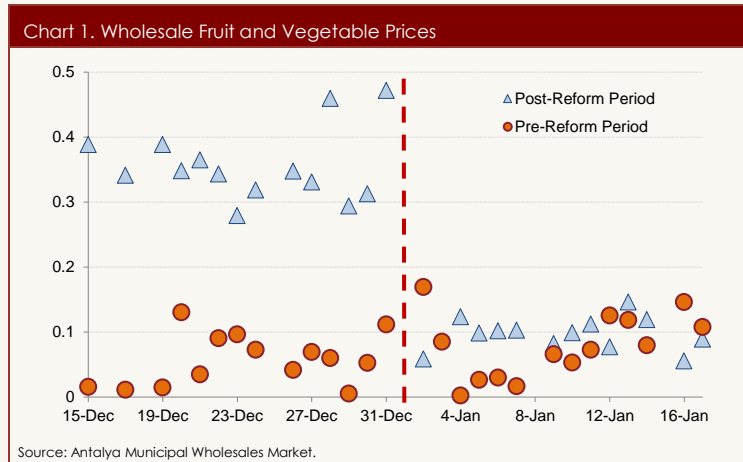
$$\ln p_{it} = \alpha + \gamma R_{it} + f_n(t) + \mu_i + \epsilon_{it}$$

Here, $f_n(t)$ is an n -degree polynomial showing the time trend. The γ parameter shows the change in fresh fruit and vegetable prices. A low degree polynomial is selected for $f_n(t)$ as suggested by Gelman and Imbens (2014). In fact, as prices are mostly scattered around a linear trend, they are assumed to be linear. Different window ranges are used for the DID and the RDD analyses.

The Impact of the Reform on Wholesale and Retail Prices

Table 1 shows DID estimations reflecting the impact of the reform on wholesale prices. Columns 1-3 represent the estimates for 2-month (1 December - 31 January), 1-month (15 December - 15 January) and 10-day (25 December - 5 January) windows, respectively. The DID estimation for the 2-month window shows that wholesale prices decreased by about 34 percent in the post-reform period. The decline in wholesale prices is around 23 percent in the 1-month window, while the estimate for price decline in the 10-day window is as low as 17 percent.²

Chart 1 visually confirms the validity of the RDD method. The vertical axis shows the average log prices of the products, while the prices in blue depict the observations for 2011–2012 when the reform was in effect and those in orange represent the observations for the pre-reform period of 2010–2011. The red vertical line is the date the reform was put into practice. As evident in Chart 1, wholesale prices saw a dramatic post-reform plunge, whereas there was no such price decrease in the same period of the previous year.



² Log-point estimates in Tables 1–4 are expressed in percentages using the $(e^x - 1) \times 100$ formula as suggested by Halvorsen and Palmquist (1980).

Similarly, Table 2 presents the RDD estimates for 2-month, 1-month and 10-day window ranges. The decline in prices estimated by the RDD analysis varies between 18 and 24 percent depending on the window range. Both DID and RDD estimates suggest that wholesale prices fell by around 20 percent in the post-reform period. In other words, the policy reform that aimed to reduce supply chain barriers in the fresh fruits and vegetables market brought the wholesale prices of selected items down by about 20 percent.

The DID estimates for retail prices are shown in Table 3 for different window ranges. In this Table, columns 1 and 2 display the results of 2-month and 4-month windows, respectively. Column 3 also shows the results of the 2-month window, but the intervention and control groups were extended to cover the 2012–2013 and 2009–2010 periods, respectively. This last exercise intends to justify that the results in Columns 1 and 2 are not determined by the pricing behavior in the periods of 2010–2011 and 2011–2012. All cases prove that the policy reform has no statistically significant effect on retail prices of fruits and vegetables. The RDD results in Columns 1-3 of Table 4 verify the DID results for 2-month (December - January), 4-month (November - February) and 6-month (October - March) windows, respectively. Contrary to wholesale prices, the policy reform is found to have no statistically significant impact on retail prices.

Overview

The estimates show that the reform pulled wholesale prices of fresh fruits and vegetables down by about 20 percent yet had no notable effect on retail prices. Wholesalers are small firms, which trade in markets mostly regulated by local authorities. Therefore the ability of wholesalers to set a price is limited. Retailers have greater pricing power than wholesalers and producers. Due to this difference in the pricing power, a fall in wholesale prices fails to be reflected on retail prices.

Table 1. Reform Effect (Wholesale Prices) – DID Analysis

Variable	2-Month		1-Month		10-Day	
Reform effect ($D \cdot T$)	-0.419***	(0.017)	-0.265***	(0.018)	-0.187***	(0.032)
D	0.176***	(0.011)	0.011	(0.011)	-0.048**	(0.019)
T	0.458***	(0.012)	0.301***	(0.013)	0.294***	(0.021)
Product-specific fixed effects	Yes		Yes		Yes	
R^2	0.813		0.858		0.854	
Number of observations	3848		2220		740	

***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. Standard errors in parentheses are aggregated by the period of observation.

Table 2. Reform Effect (Wholesale Prices) – RDD Analysis

Variable	2-Month		1-Month		10-Day	
Reform effect	-0.272***	(0.019)	-0.203***	(0.024)	-0.236***	(0.044)
Linear Trend	0.0011	(0.0007)	-0.0034**	(0.0015)	0.0003	(0.070)
Product-specific fixed effects	Yes		Yes		Yes	
R^2	0.869		0.908		0.910	
Number of observations	1924		1110		370	

***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. Standard errors in parentheses are aggregated by the period of observation.

Table 3. Reform Effect (Retail Prices) – DID Analysis

Variable	2-Month		4-Month		2-Month	
	2010-11/2011-12		2010-11/2011-12		2009-10/2012-13	
Reform effect ($D \cdot T$)	-0.036	(0.068)	0.022	(0.048)	-0.056	(0.060)
D	0.071	(0.048)	0.093***	(0.034)	0.091***	(0.024)
T	0.201***	(0.050)	0.128***	(0.032)	--	--
2009-2010	--	--	--	--	Subtracted category	
2010-2011	--	--	--	--	0.101***	(0.031)
2011-2012	--	--	--	--	0.312***	(0.045)
2012-2013	--	--	--	--	0.257***	(0.065)
Product-specific fixed effects	Yes	--	Yes	--	Yes	--
Month-specific fixed effects	No	--	Yes	--	Yes	--
R^2	0.930		0.918		0.927	
Number of observations	112		224		224	

***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. Standard errors in parentheses are aggregated by the period of observation.

Table 4. Reform Effect (Retail Prices) – RDD Analysis

Variable	2-Month		4-Month		6-Month	
Reform effect	0.035	(0.117)	-0.045	(0.043)	0.002	(0.047)
Linear Trend	--	--	0.080***	(0.023)	0.052***	(0.017)
Product-specific fixed effects	Yes	--	Yes	--	Yes	--
R^2	0.991		0.969		0.939	
Number of observations	56		112		168	

***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. Standard errors in parentheses are aggregated by the period of observation.

REFERENCES

- Aysoy, C., D.H. Kırılı and S. Tümen, 2014, Taze Meyve-Sebze Tedarik Zincirindeki Engelleri Azaltıcı Tedbirlerin Fiyatlar Üzerindeki Etkisi (in Turkish), CBT Research Notes in Economics No. 15/03.
- Gelman, A. and G.W. Imbens, 2014, Why High-Order Polynomials Should not be Used in Regression Discontinuity Designs?, NBER Working Paper No. 20405.
- Halvorsen, R. and R. Palmquist, 1980, The Interpretation of Dummy Variables in Semilogarithmic Equations, American Economic Review, 70(3): 474-475.

Box
3.2

Investigating the Effect of Fuel Prices on Fresh Fruit and Vegetable Prices through the Transportation Cost Channel

The recent sharp uptrend in fresh fruit and vegetable prices requires a better understanding of the pricing mechanism regarding these products. This study examines the impact of transport costs, which might constitute an important pillar of the costs associated with product and market structure, on fresh fruit and vegetable prices. The SCT Law that took effect on 22 September 2012 caused diesel prices to soar by 36 cents per liter (about 9 percent). As this law led to an unexpected, abrupt and exogenous increase in diesel prices, it acts as a natural experiment to investigate the effect of transportation costs on prices of fresh fruits and vegetables.

Wholesales markets for fresh fruits and vegetables are mostly constructed and operated by municipalities. Producers or intermediaries bring products to the wholesalers in these markets, which supply bulk products to wholesalers and retailers in other cities. The distance between the Municipal Wholesales Market in Antalya, the biggest wholesales market in Turkey which acts as the "seller", and the Municipal Wholesales Market in Istanbul, which acts as the "buyer", puts significant pressure on fresh fruit and vegetable prices in the Istanbul market due to transport costs. Diesel is a major cost item as fresh fruits and vegetables are mostly transported via trucks in Turkey. Accordingly, a sharp rise in diesel prices is likely to immediately pass through into wholesale prices in Istanbul, while prices at the Antalya market will remain intact in the short run.

In order to examine the effect of fuel price hikes on fresh fruits and vegetable prices through the transportation cost channel, 13-day windows were selected for the periods before and after 22 September 2012 when the SCT adjustment became effective. The daily Antalya and Istanbul wholesale prices of 17 fresh fruits and vegetables were monitored, 2/5th of the national production of which takes place in and around Antalya. The decision of the window range is based on selecting an interval short enough to be isolated from the effects of other factors, yet wide enough to observe the effect of SCT adjustment. It is expected that the fuel price change will have a limited impact on producer prices in the Antalya market in the short term, yet push prices of products higher in Istanbul that are delivered from distant cities such as Antalya. This asymmetrical effect also forms the basis of the difference-in-differences method utilized in this study.

The following equation estimates the causal effect of fuel prices on fresh fruits and vegetable prices by using a DID method. In this equation, the dependent variable is the natural logarithm of daily product prices obtained from Istanbul and Antalya wholesales markets. In addition, the f variable represents the product-specific fixed effects while the ϵ variable denotes the error term. The variable I , which is defined as the dummy variable, takes the value 1 for the presumably tax-affected Istanbul, and 0 for the unaffected Antalya. Similarly, the dummy variable T takes the values 0 and 1 for pre-reform and post-reform periods, respectively, and $I \times T$ measures the causal effect of the reform. The coefficient, which is the main parameter to be estimated, measures the divergence of price movements observed in Antalya and Istanbul following the SCT hike.

$$\ln p_{it} = \alpha_0 + \alpha_1 I_{it} + \alpha_2 T_{it} + \beta \cdot (I_{it} \times T_{it}) + f_i + \epsilon_{it}.$$

The findings are reported in Table 1. Rising by about 9 percent due to the SCT hike, fuel prices brought wholesale prices of fresh fruits and vegetables up between 7-11 percent in the short term. As this increase was observed rather immediately, the findings can be associated with the transportation costs channel. The hikes are almost one-to-one on a percentage level, but more than one-to-one on a nominal scale (i.e. in cent terms).

As shown in Table 1, shortening the data window led to no significant changes in the results. Moreover, as discussed in Balkan et al. (2015), similar results were obtained for Ankara, where fresh fruits and vegetables are truck-transported, as well as in estimations where 17 products were grouped at random.³

In conclusion, changes in fuel prices had more than a one-to-one effect on prices of fresh fruits and vegetables and transport-related costs played a major role in the wholesale prices of fresh fruits and vegetables. The observation of a more-than-proportionate

price hike can be attributed to the pass-through of delayed cumulative price rises coupled with price increases caused by fuel price hikes, the high pass-through of soaring costs due to the low price elasticity of the demand for fresh fruits and vegetables or the advance pass-through of expected price hikes due to rising cost margins.

REFERENCES

Balkan, B., S.H. Kal and S. Tümen, 2015, Do Fuel Prices Causally Affect Food Prices through the Transportation-Cost Channel? Evidence from a Tax Reform, unpublished manuscript.

Table 1. DID Regression Results

Variable	26-day window	16-day window	6-day window
$I \times T$	0.070*** (0.025)	0.111*** (0.023)	0.103* (0.055)
I	0.522*** (0.018)	0.476*** (0.007)	0.474*** (0.013)
T	-0.128*** (0.016)	-0.104*** (0.021)	-0.087 (0.053)
Product-specific fixed effects	Yes	Yes	Yes
Constant term	0.324*** (0.019)	0.330*** (0.028)	0.349*** (0.040)
R ²	0.898	0.900	0.903
Number of observations	884	544	204

***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. Standard errors in parentheses are aggregated on a daily basis. The window length represents the data interval of estimations.

³ For further details, see Balkan et al. (2015).

Box
3.3

Firm Cost Structure and Cost-Push Factors of Inflation

In emerging economies, cost factors are crucial in determining inflation besides demand factors. In fact, cost factors such as exchange rates, wages as well as food and energy prices have significant effects on short-term inflation dynamics. In this context, monitoring the cost-push pressures on consumer and services inflation is crucial.

However, as a pre-condition to monitoring the cost pressures, it is essential to know the firms' cost structure. This box estimates ratios and constructs quarterly cost indices from 2006 to 2014 period by sectors using a micro dataset for the period between 2006 and 2011 from TurkStat's Annual Industry and Service Statistics. The employed methodology enables to determine the degree of the cost-push pressure by its source (raw material, labor, financing, energy, etc.). It should be noted that this is not an impact analysis, but we solely attempt to examine the degree and the dynamics of the change in costs based on the firms' cost structure.^{4,5}

Table 1. Cost Distribution (2006-2011 Average Share, Percent, Firms with 20+ Employees)*

	Industrial Sector			Services Sector	Construction Sector	Non-Farm
	Manufacturing	Energy	Mining			
1.Total personnel expenses	16.0	24.7	21.7	33.3	14.8	23.6
2. Raw material expenses	58.9	39.2	32.6	20.2	60.0	41.5
3. Electricity expenses	2.3	5.7	4.6	1.9	0.4	2.0
4. Fuel and fuel oil expenses	2.6	4.2	15.5	4.2	3.8	3.6
5. Rent (building and machinery/equipment)	1.5	1.3	1.8	5.2	1.0	3.1
6. Financing expenses	2.5	4.5	2.5	5.1	1.7	3.6
7. Other operating expenses	9.6	10.7	14.5	22.2	9.1	15.2
8. Other	6.8	9.6	6.9	7.7	9.2	7.4
Total	100	100	100	100	100	100
Energy expenses (3+4)	4.9	10.0	20.1	6.1	4.2	5.6
Number of firms (2006-2011 average)	17002	284	579	17256	3877	38997
Distribution of firm shares (2006-2011 average)	43.6	0.7	1.5	44.2	9.9	100
Number of firms (2011)	20604	433	710	23854	6219	51820
Distribution of firm shares (2011)	39.8	0.8	1.4	46.0	12.0	100

* Other operating expenses include communication, travel, water, advertisement, marketing, stationery, small repairs, insurance, accounting, legal actions, and other expenses for producing services at enterprises of services. "Other" mostly reflects the effect of items "extraordinary expenses and losses" and "ordinary expenses and losses due to other activities (exchange rate losses, interest rate expenses, reserve expenses, commissions)". Calculations do not include the effect of depreciation.
Source: TurkStat Annual Industry and Service Statistics, Authors' calculations.

The cost decomposition of non-farm firms with 20+ employees during the 2006-2011 period shown in Table 1 reveals that:

(i) The highest share among costs belongs to raw materials with 41.5 percent (Table 1). Personnel expenses come next with 23.6 percent. These are followed by the other operating expenses, which reflect general operating costs, with 15.2 percent. Energy (electricity, fuel and fuel oil) expenses account for an average of 5.6 percent, while rent (paid for building and machinery-equipment) and financing expenses make up 3.1 and 3.6 percent, respectively.

⁴ For further details, see Gürçihan-Yüncüler and Ögünç (2015).

⁵ The cost shares in Table 1 are estimated on an accounting basis using the expense items of firms. These cost factors are not completely independent from each other. For example, some of the raw material costs of a firm may also contain the personnel costs of another firm that supplies the raw material. Therefore, shares estimated on an accounting basis will vary from expense shares calculated on a production function basis. If the effect of each production factor could be truly separated, the share of raw materials would decrease while the share of personnel and other factors would increase.

(ii) In non-services sectors, raw material expenses account for the largest share in total expenses. This item is the smallest in the services sector with 20.2 percent and the highest in manufacturing and construction sectors with 60 percent. The relatively large share of raw material expenses in manufacturing is consistent with the strong correlation between manufacturing prices (D-PPI) and commodity prices and exchange rate developments.

(iii) In the labor-intensive services sector, employment has a share of about 33 percent. By the size of the share of personnel expenses (including personnel payments, social security payments and severance payments), services is followed by energy (24.7 percent) and mining (21.7 percent) sectors, respectively. The share of personnel expenses in manufacturing and construction sectors is nearly 15 percent.

(iv) The mining sector stands out among other sectors with the relatively larger share of the fuel and fuel oil item. Thus, mining is the sector in which the share of total energy costs is the highest.

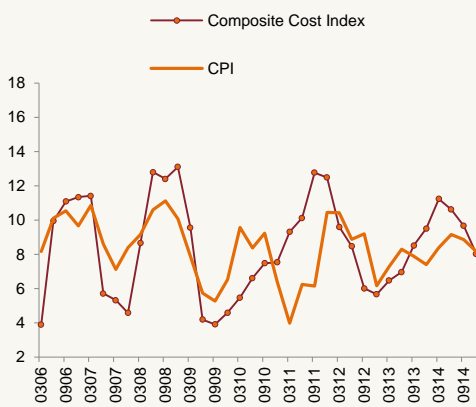
(v) Rents make up about 5 percent of the services sector. The share of rent expenses in other sectors is below 2 percent. Rents are relatively less important among other expense items. This is due to the fact that these ratios reflect the cost structure of firms with more than 20 employees, thus this rate might be higher in smaller enterprises.

(vi) The share of other operating expenses that reflect general operating expenses is 22.2 percent in services. This rate is about 10 percent in other sectors.

(vii) The share of financing expenses is relatively low with 3.6 percent across non-farm sectors. The largest share of financing expenses is seen in services with 5.1 percent.

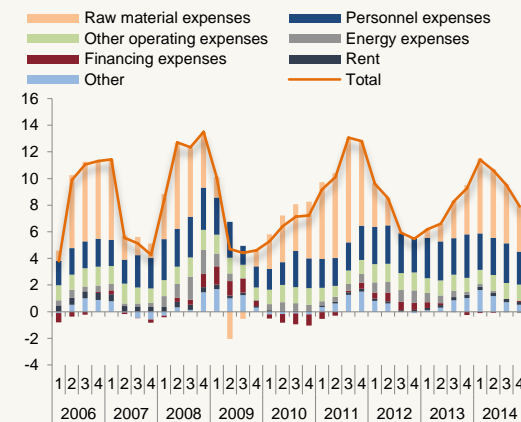
The composite cost index is estimated using the above mentioned cost distribution and some selected series that would serve as an indicator for each of the cost items. These indicators are aggregated into an index by using the average cost shares estimated for the non-farm sector in Table 1. The cost index and the annual CPI changes are drawn in Chart 1. Cost changes and consumer inflation mostly have a similar pattern. Looking from 2006 on, the correlation between both series deteriorated somewhat in late 2010 and early 2011.

Chart 1. Composite Cost Index and CPI (Annual Percent Change)



Source: TurkStat, Authors' calculations.

Chart 2. Contributions to the Annual Percent Changes in the Composite Cost Index



The average annual rate of increase in the cost index is 8.5 percent for 2006-2014. For the same period, average annual consumer inflation is 8.3 percent.⁶ The highest average contribution to this change in costs comes from raw material costs (3.3 points) and personnel expenses (2.5 points) (Chart 2). The contribution of financing expenses increased in mid-2008, 2009, mid-2011 and 2012. Energy and rent items contributed by an average 0.6 and 0.3 points, respectively (Chart 2).

Analyzing both the notable contribution of changes in raw material prices and the large share of imported inputs in raw material use, it is evident how the stability of exchange rates and import prices is necessary for restraining cost pressures on consumer inflation. Yüncüler (2011) and Öğünç and Kara (2012) reveal how exchange rates and FX-denominated import prices are important for prices.

The services sector is distinguished from other sectors by being relatively less open to external trade and hence by being domestic market-oriented and having a labor-intensive structure. Hence, an additional cost index is constructed for services due to its distinctive structure. The cost index estimated for this sector captures the main trends in the services inflation. Given the cost structure of the firms operating in services, the increases in labor costs are more significant for this sector. Labor costs were up by a nominal average of 10 percent year-on-year for the analyzed period, which is greater than the overall consumer inflation. Considering the share of personnel expenses in total costs, wage increases above the targeted inflation would restrain the fall in inflation given that profit margins remain unchanged. On the other hand, wage growth that is aligned with productivity gains would limit the inflationary pressures from this channel. Smaller gains in partial labor productivity since 2011 indicate that wage increases have become more binding for the dynamics of services inflation in this period. Moreover, other operational expenses have a large share in the services sector. The fact that the changes in this expenditure item are generally affected by increases in the overall price level implies that services inflation is highly sensitive to changes in overall consumer inflation.

In sum, the major drivers of the increase in costs, which feed into consumer inflation, are raw material prices and labor expenses. Meanwhile, labor costs become increasingly crucial for the services sector and overall operating costs stand out as another important factor besides labor and raw material expenses. The cost indices estimated for consumer and services inflation are informative indicators for policymakers as they are useful in monitoring the course of cost-push factors and provide information on the source and the degree of the pressures.

REFERENCES

- Gürçihan-Yüncüler, B. and F. Öğünç, 2015, *Firma Maliyet Yapısı ve Maliyet Kaynaklı Enflasyon Baskıları* (in Turkish), CBRT Working Paper No. 15/3.
- Kara, H. and F. Öğünç, 2012, *Döviz kuru ve ithalat fiyatlarının yurt içi fiyatlara etkisi* (in Turkish), *İktisat İşletme ve Finans*, 27(317): 09-28.
- Yüncüler, Ç., 2011, *Pass-through of External Factors into Price Indicators in Turkey*, *Central Bank Review*, 11(2): 71-84.

⁶ The average change in the estimated cost index and of the consumer price index took similar values. Yet, due to gains in total factor productivity and changes in profit margins, changes in costs and prices need not necessarily coincide at all times.

