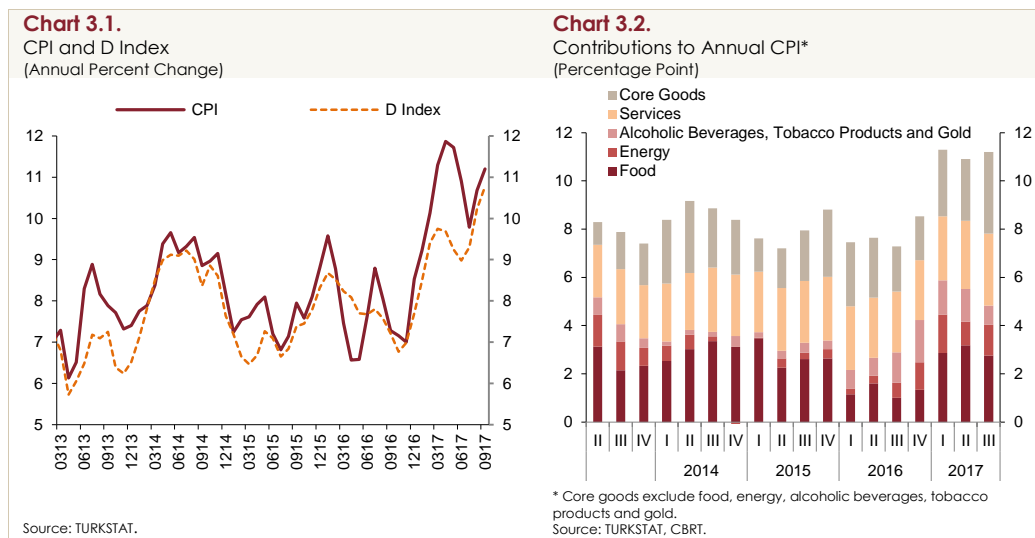


3. Inflation Developments

In the third quarter of the year, consumer inflation inched up by 0.32 points quarter-on-quarter to 11.20 percent (Chart 3.1). After falling to 9.79 percent in July, inflation picked up amid the depreciation of the Turkish lira against the exchange rate basket and increased import prices, particularly oil and base metals. Moreover, the methodological change in the measurement of clothing prices also caused a rise in inflation. TL-denominated import prices displayed a slight pickup, while the producer prices accelerated slightly compared to the second quarter. Thus, producer prices continued to pose upward pressure on consumer prices. Moreover, aggregate demand conditions provided no disinflationary support amid the robust course of economic activity. Medium-term inflation expectations followed a relatively flat course and remained elevated.

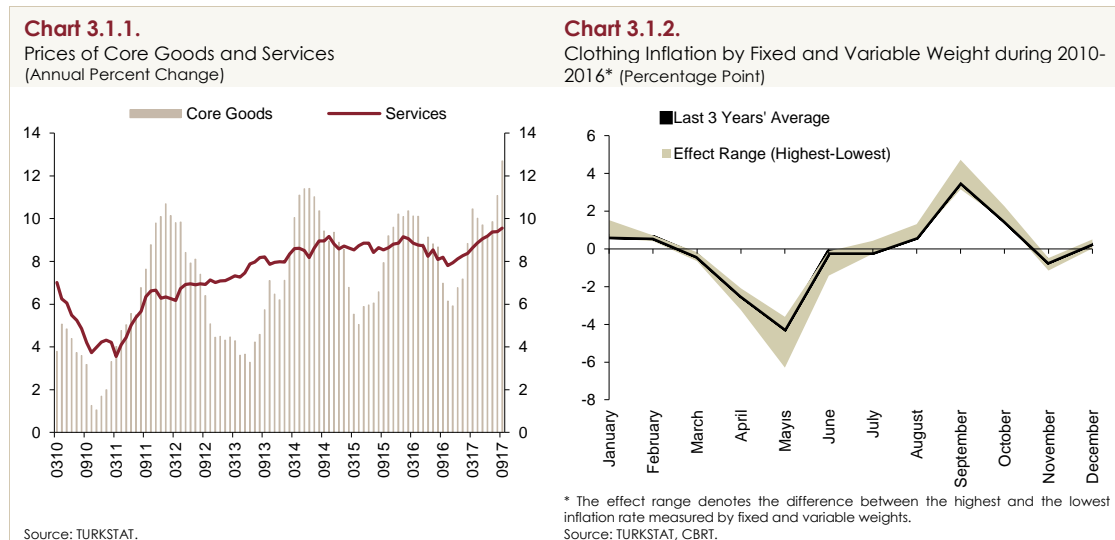


Across subcategories, annual unprocessed food inflation receded due to the base effect from fresh fruits and vegetables, but processed food inflation went up with widespread price hikes across sub-items. After recording a decline in the second quarter, energy prices displayed an increase in this quarter amid the price hikes in oil and other inputs. Particularly, the depreciation of the Turkish lira against the euro, the brisk pace of domestic demand and the methodological change in the weighting system of clothing prices pushed core goods inflation considerably upwards in this quarter. Meanwhile, services inflation displayed an upward trend, which spread across the sub-items. Against this background, annual inflation in core indicators escalated. Compared to the previous quarter, the contribution of core goods, services and energy to annual consumer inflation increased by 0.8, 0.2 and 0.3 points, respectively, while the contribution of food, alcoholic beverages and tobacco products decreased by 0.4 points, and that of gold was down by 0.6 points in the third quarter (Chart 3.2).

In sum, after a limited decline in the second quarter, consumer inflation displayed an increase in the third quarter. Inflation is expected to be elevated also in October and November and remain high in December despite some decline due to base effects. The upward trend in services inflation since the start of the year is mainly caused by high costs, demand pressure and indexing behavior. Also, the depreciation of the Turkish lira and the withdrawal of temporary tax reductions put upward pressure on core inflation in October. Moreover, the high level of inflation and the developments in core inflation indicators pose risks to pricing behavior. Inflation is expected to display an improvement starting from December, which is likely to be stronger in early 2018. Yet, this may be interrupted given that inflation expectations are still deteriorated.

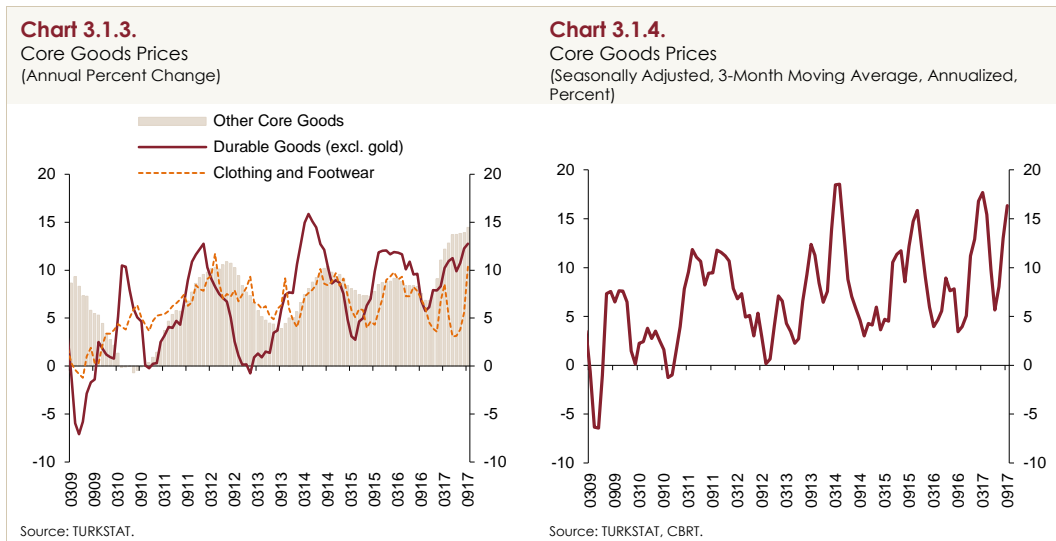
3.1. Core Inflation Outlook

Annual inflation in core goods in the third quarter increased by 3.49 points to 12.70 percent (Table 3.1.1, Chart 3.1.1). This was driven by price developments in clothing and durable consumption goods. The rise in clothing prices was attributed to the temporary effects due to the methodological changes in the weighting system of clothing prices besides the depreciation of the Turkish lira against the euro and the pass-through of cumulative costs to prices amid improved demand conditions. Price increases in other core goods (core goods excluding clothing and durable goods), which accommodate slower pass-through from exchange rate changes, lost pace on a quarterly basis, yet remained brisk and recorded a higher annual inflation rate.



Annual clothing inflation registered a sharp increase of 7.22 points to 10.38 percent in the third quarter. This was largely driven by the transition from the variable-weight to the fixed-weight method in clothing prices. Measurements suggest that the monthly clothing inflation calculated by fixed-weight method are overestimated in September and October (Chart 3.1.2). Taking into account the average differences in the last three years, the methodological change is estimated to add around 4 points to the third-quarter clothing inflation. Apart from these temporary effects due to the change in weighting system, developments in production in the clothing sector and the depreciation of the Turkish lira against the euro also posed an upward pressure on prices in this period.

Durable consumption goods saw a price hike of 3.37 percent, and annual inflation in this category hit 12.76 percent in the third quarter (Chart 3.1.3). This was driven by surging prices of automobile, furniture and white goods. The Turkish lira depreciated by around 5 percent against the euro in this period. This led to a quarterly surge by 4.32 percent in automobile prices, which have high sensitivity to changes in TL/EUR rate (Table 3.1.1). Another important factor driving costs in the third quarter was the acceleration of industrial metal prices. In addition, prices of furniture and white goods also increased amid the brisk demand induced by incentives. The expiration of the tax reduction as of October will have an additional adverse impact on prices of durable goods in the last quarter.



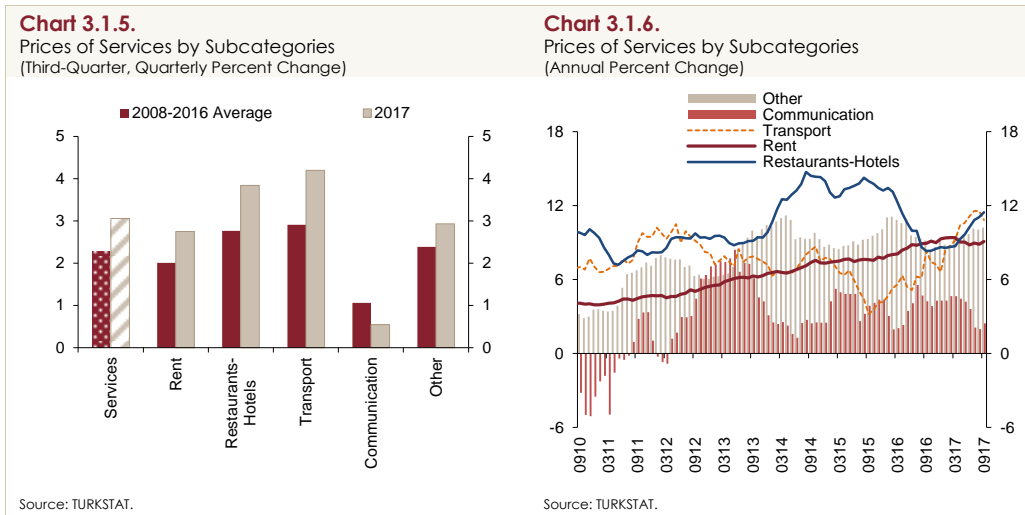
The seasonally adjusted underlying trend of core goods prices reveals an upsurge in the third quarter of the year due to the upward pressure stemming from the methodological change in the weight structure of the clothing prices (Chart 3.1.4).

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

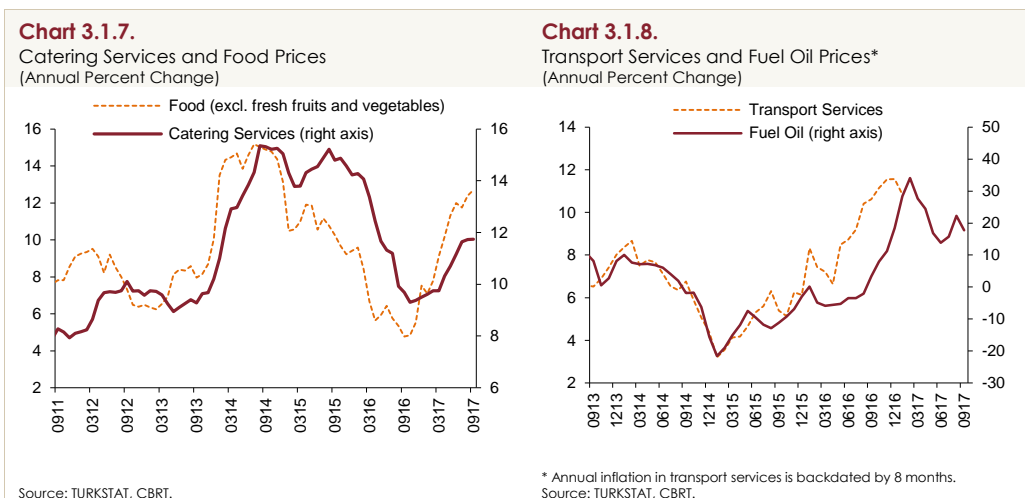
	2016			2017			
	III	IV	Annual	I	II	III	Annual
CPI	1.05	3.64	8.53	4.34	1.49	1.32	11.20
1. Goods	0.32	4.83	8.72	5.01	1.12	0.58	11.95
Energy	1.46	4.18	8.67	4.11	-2.26	3.46	9.68
Food and Non-Alcoholic Beverages	0.46	4.51	5.65	9.34	-0.39	-1.16	12.50
Unprocessed Food	-0.48	8.19	4.52	15.98	-2.95	-5.60	14.97
Processed Food	1.25	1.46	6.67	3.39	2.17	3.08	10.49
Core Goods	-2.54	4.95	6.77	2.23	4.44	0.58	12.70
Clothing and Footwear	-12.06	12.02	3.92	-8.52	14.46	-5.90	10.38
Durable Goods (excl. gold)	0.74	2.73	7.93	5.89	0.27	3.37	12.76
Furniture	0.98	0.38	8.27	-2.54	1.71	3.88	3.36
Electrical and Non-Electrical Appliances	-0.46	1.87	1.73	3.88	-0.31	1.65	7.23
Automobile	1.45	4.71	12.91	10.99	-0.29	4.32	20.87
Other Durable Goods	1.11	2.02	6.55	5.78	2.99	2.58	14.02
Core Goods (excl. clothing and durable goods)	1.44	2.49	7.68	6.34	2.86	2.09	14.45
Alcoholic Beverages, Tobacco Products and Gold	10.20	6.80	31.25	4.05	-0.18	0.82	11.84
2. Services	2.71	1.03	8.11	2.83	2.33	3.06	9.55
Rent	2.49	2.23	9.30	1.89	1.93	2.75	9.09
Restaurants-Hotels	2.73	1.64	8.62	2.62	2.90	3.84	11.45
Transport	4.48	-1.01	6.63	3.91	3.41	4.20	10.84
Communication	1.69	0.67	4.29	0.35	0.85	0.54	2.43
Other Services	2.47	0.91	9.15	3.87	2.14	2.93	10.20

Source: TURKSTAT, CBRT.

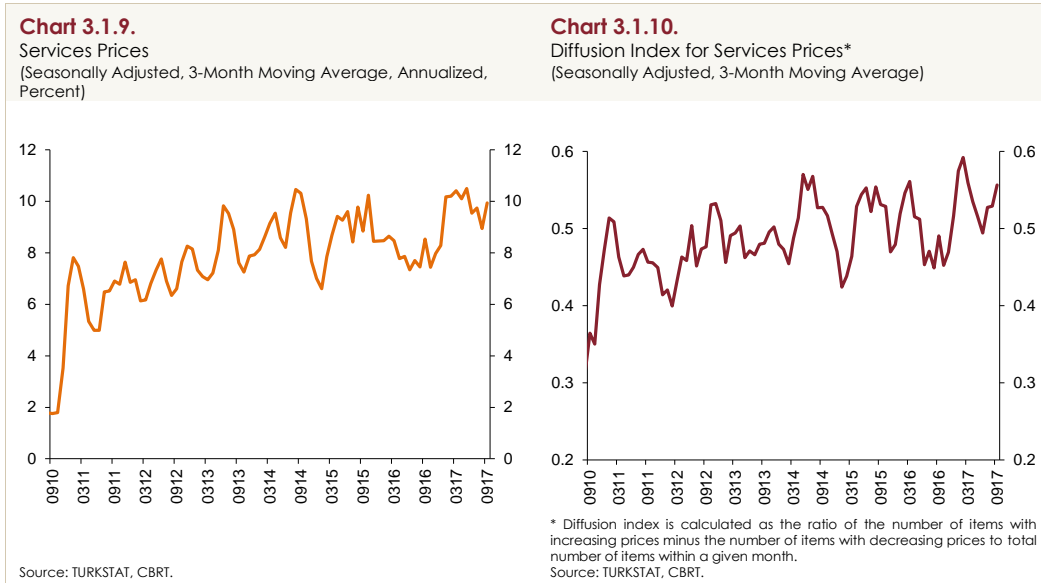
In the third quarter of the year, prices of services increased at a pace higher than historical averages by 3.06 percent, and annual services inflation reached 9.55 percent (Charts 3.1.1 and 3.1.5). All subcategories excluding communication saw remarkable price hikes above past averages. In this quarter, annual inflation receded in transport and communication but increased in other subcategories (Chart 3.1.6).



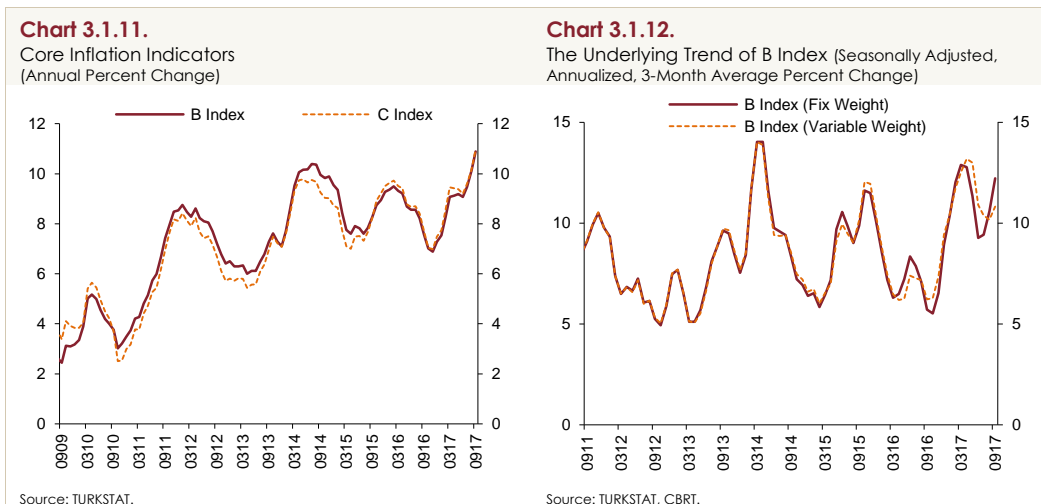
Services inflation was driven by robust domestic demand and cost-side factors in the third quarter. Restaurants-hotels and other services registered the highest annual inflation across services (Chart 3.1.6). In the restaurants-hotels subcategory, annual inflation in catering services hit 11.74 percent amid rising prices of food excluding fresh fruits and vegetables (Chart 3.1.7). As for accommodation services, the depreciation of the Turkish lira against the euro, the recovery in the tourism sector and the low base effect from 2016 caused a notable rise in annual inflation. In the other services category, cost-side factors like rising exchange rate and elevated headline inflation were transmitted as higher prices in education and health, driving the annual inflation in this subcategory to 10.20 percent. Rent inflation exhibited a quarterly increase and hit 9.09 percent (Chart 3.1.6). Despite recording a slight decline parallel to the waning lagged effects of fuel price hikes, annual inflation in transport services remained high in this period (Chart 3.1.8).



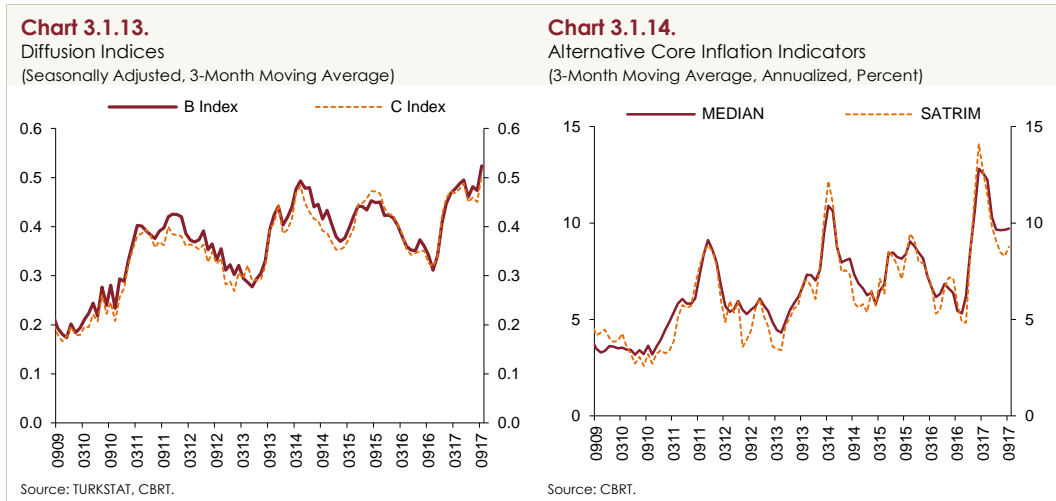
Across services, both the annual inflation and the underlying trend displayed an uptick in this quarter. In particular, the underlying trend of inflation, which is captured by seasonally adjusted 3-month averages, and the diffusion index, which signifies price increasing tendency, have increased in this period (Charts 3.1.9 and 3.1.10).



In line with the developments in core goods and services in the third quarter, annual inflation in B and C indices posted a quarterly jump of 10.89 and 10.98 percent, respectively (Chart 3.1.11). Following the improvement in the second quarter, the underlying trend of core inflation indicators increased again in the third quarter. Estimations indicate that when adjusted for the methodological change in clothing, core inflation re-settled on an uptrend in September after the slowdown in July and August (Chart 3.1.12).

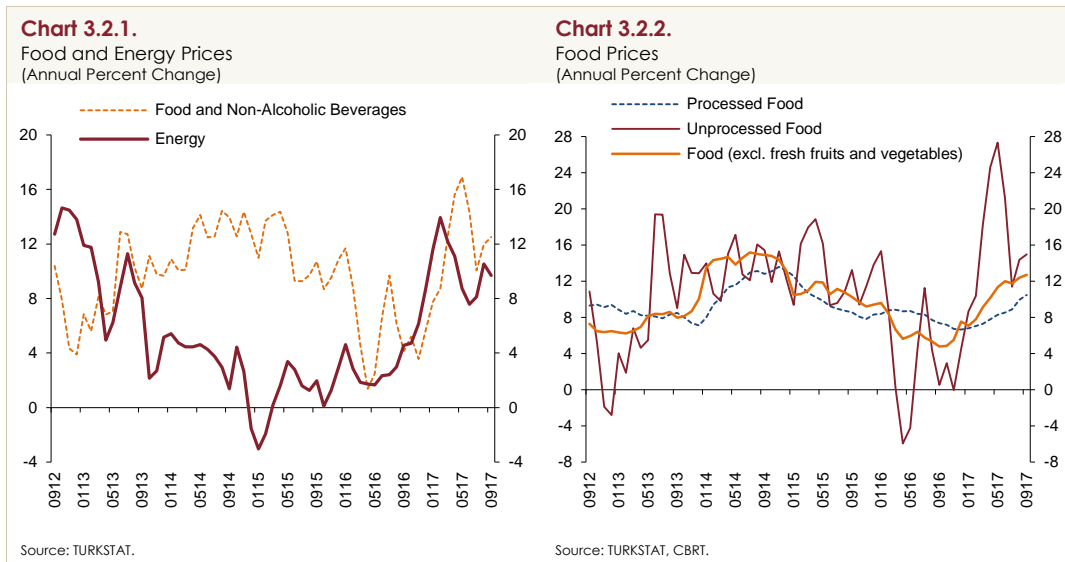


In this period, the tendency for price hikes proved stronger than the previous quarter as captured by the diffusion indices for core indicators (Chart 3.1.13). In SATRIM and MEDIAN, the alternative core inflation indicators monitored by the CBRT, the downtrend of the second quarter came to a halt, and both indicators hovered above historical averages (Chart 3.1.14). In sum, given indicators for tendency and pricing behavior, it can be concluded that the underlying trend of inflation registered some deterioration on a quarterly basis.

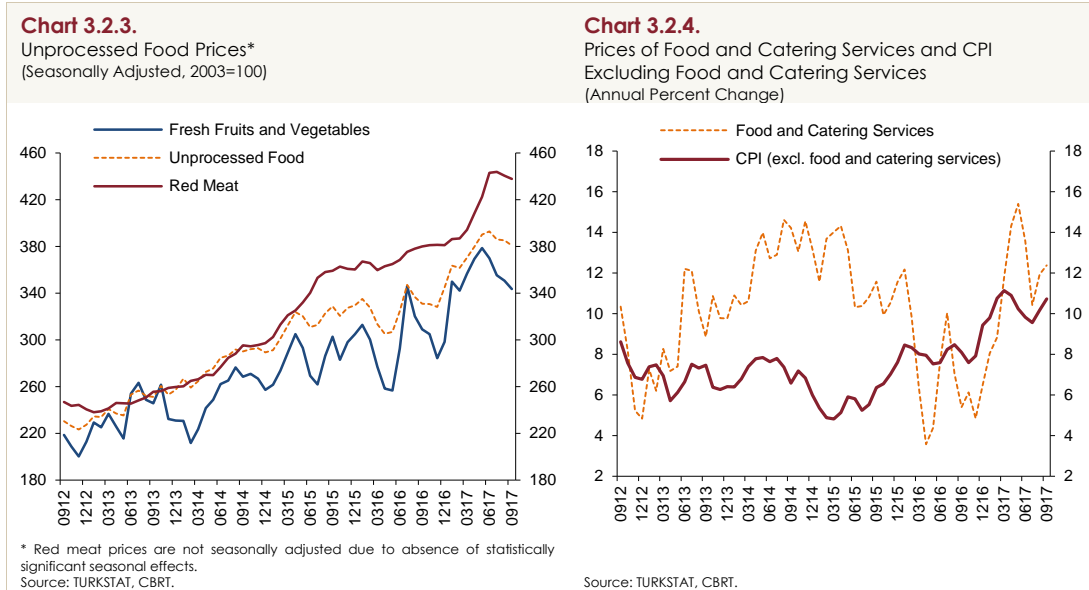


3.2. Prices of Food, Energy, Alcoholic Beverages and Tobacco Products

Having soared in the first quarter, annual food inflation dropped by 1.84 points to 12.50 in the third quarter (Chart 3.2.1). Thus, food inflation stood slightly below the level projected in the July Inflation Report.



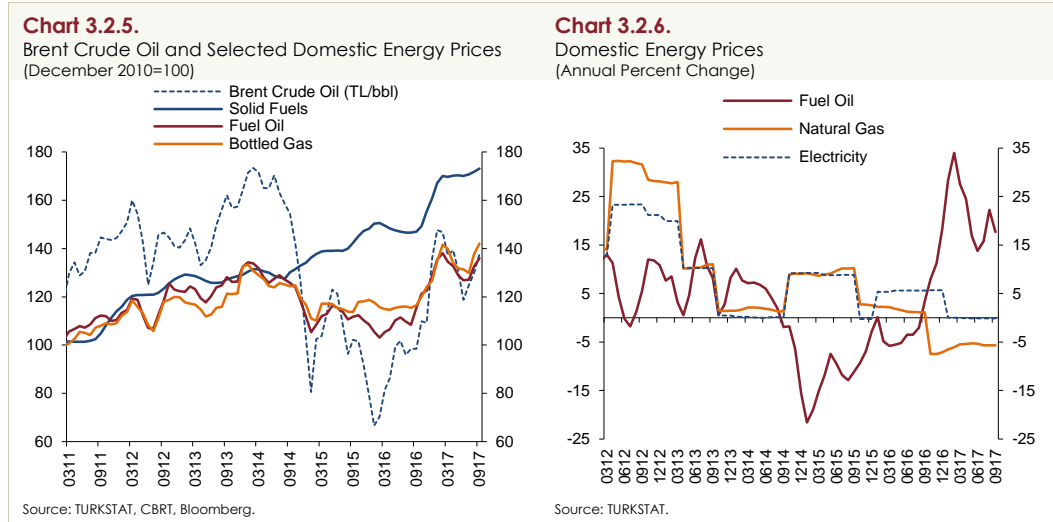
Annual inflation in unprocessed food receded by 6.24 points to 14.97 percent in the third quarter, providing a major contribution to the decline in food inflation (Chart 3.2.2). In seasonally adjusted terms, unprocessed food prices dropped over the third quarter owing to fresh fruits and vegetables (Chart 3.2.3). Prices of other unprocessed food items also went down, and prices of meat and legumes, particularly that of red meat, decreased on the back of the adopted measures. On the other hand, prices of fresh milk recorded a striking increase of 7.26 percent due to the price hike in raw milk purchases in this quarter.



On the processed food front, inflation remained on an upward trend as in the second quarter (Chart 3.2.2). Price increases proved solid over the quarter, particularly those in dairy products such as yoghurt, cheese and butter as well as tea and deli products. This is attributable to the cumulative increases in producer prices of products of inputs such as tea, milk and meat. In addition to adverse supply shocks over the year and the brisk course of domestic demand, the uptick in food inflation excluding fresh fruits and vegetables continued in the third quarter of the year amid the rebound in tourism, and the annual inflation in processed food climbed to 12.71.

In this quarter, annual inflation in food and catering services fell by 1.19 points to 12.37 percent, whereas annual consumer inflation excluding food and catering services rose by 0.91 points to 10.73 percent (Chart 3.2.4).

Energy prices soared by 3.46 percent in the third quarter (Table 3.1.1). Brent crude oil prices posted a notable increase by 18 percent in this period (Chart 3.2.5). Despite the appreciation of the Turkish lira against the US dollar in this period, rising prices of oil and other inputs pushed bottled gas and fuel prices up by 8.19 and 7.17 percent, respectively. As for administered prices, with electricity and natural gas prices remaining virtually unchanged, annual inflation in these categories displayed a flat course (Chart 3.2.6). Overall, annual energy inflation rose by 2.12 points to 9.68 percent in this period (Chart 3.2.1).



3.3. Domestic Producer Prices

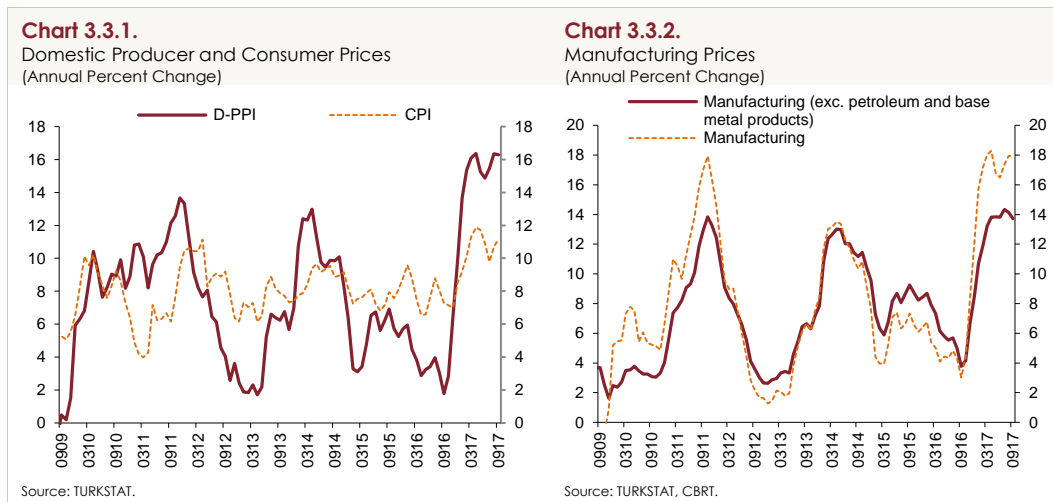
Domestic producer prices increased by 1.82 percent in the third quarter amid increases in manufacturing prices. Having lost considerable pace in the second quarter, quarterly inflation in D-PPI accelerated slightly in the third quarter. Meanwhile, annual D-PPI inflation recorded a quarterly uptick by 1.41 points to 16.28 percent (Table 3.3.1, Chart 3.3.1). Despite standing relatively strong against the US dollar, the Turkish lira depreciated against the euro in this quarter. Together with price hikes in international commodity prices, especially oil and base metals, this had an adverse effect on producer prices during this period.

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

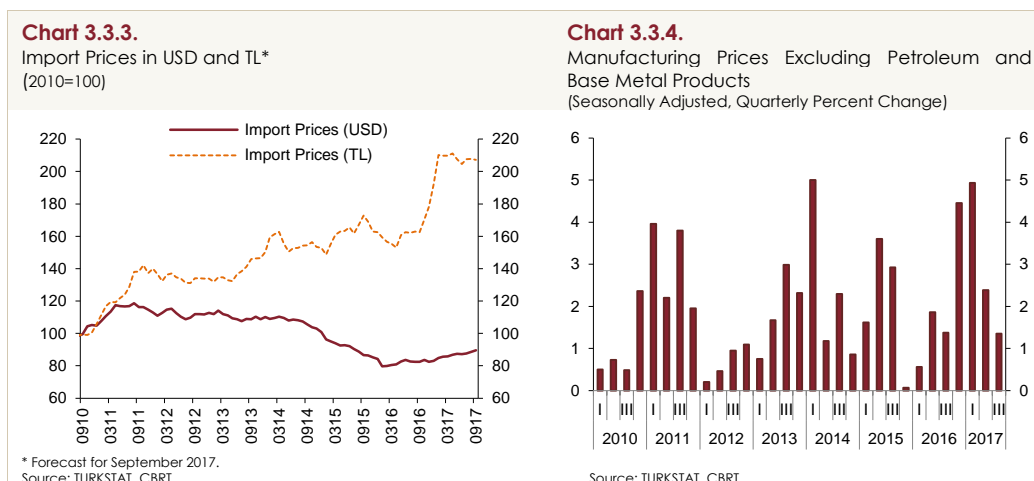
	2016			2017			
	III	IV	Annual	I	II	III	Annual
D-PPI	0.58	5.92	9.94	6.38	1.35	1.82	16.28
Mining	-0.17	3.01	8.01	9.53	-2.60	1.85	11.93
Manufacturing	0.84	6.73	12.07	6.70	1.43	2.13	17.98
Manufacturing (excl. petroleum products)	0.87	5.92	10.83	6.68	1.76	1.86	17.14
Manufacturing (excl. petroleum and base metal products)	1.16	3.92	8.46	6.10	2.03	1.08	13.72
Electricity and Gas	-2.20	-2.17	-11.79	0.64	2.27	-2.37	-1.70
Water	0.27	1.98	7.21	6.40	1.71	1.26	11.75
D-PPI by Main Industrial Categories							
Intermediate Goods	0.43	9.17	13.83	8.21	0.90	3.15	22.96
Durable Goods	2.15	1.82	11.75	6.49	3.47	2.02	14.46
Durable Goods (excl. jewelry)	0.59	2.14	7.17	6.17	3.91	2.07	15.02
Non-Durable Goods	0.88	2.04	6.41	4.58	2.86	-0.88	8.79
Capital Goods	1.61	4.82	9.32	5.96	1.27	3.07	15.92
Energy	-1.31	6.57	4.53	4.00	-1.36	1.73	11.20

Source: TURKSTAT, CBRT.

In this quarter, manufacturing prices registered an increase by 2.13 and 17.98 percent in quarter-on-quarter and year-on-year terms, respectively (Table 3.3.1, Chart 3.3.2). The rise in the manufacturing industry prices is mainly attributed to the prices of iron-steel and refined petroleum products owing to soaring international commodity prices. On the other hand, TL-denominated import prices posted a limited rise in this period (Chart 3.3.3).

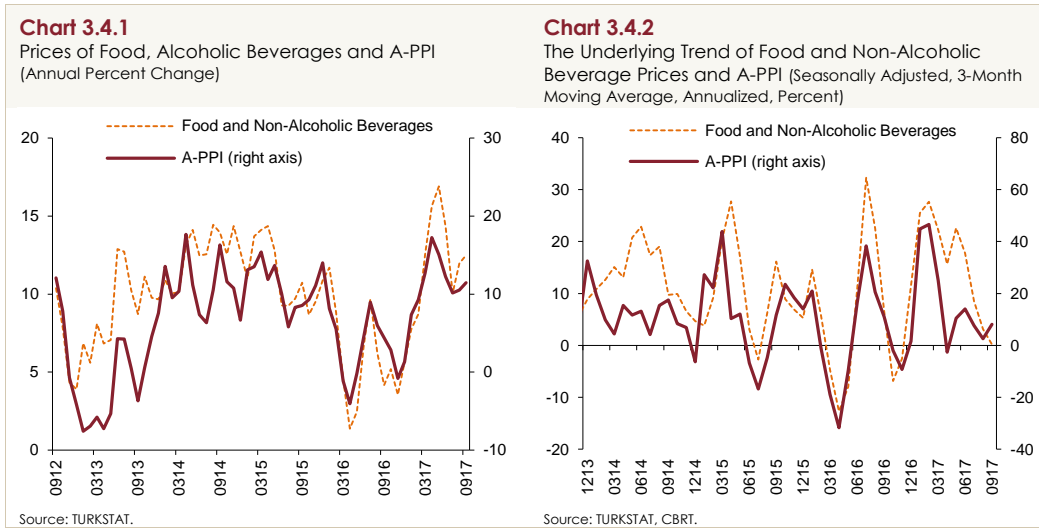


Main industrial categories increased in general except for non-durable goods (Table 3.3.1). Prices of intermediate goods were mostly driven by rising prices of base metals, particularly iron-steel and ferro alloys, while price hikes in capital goods were driven mainly by increasing prices of motor vehicles, agricultural and forestry machinery as well as metal construction products. Energy prices increased owing to refined petroleum products. Thus, after the significant fall in the previous quarter, the annual energy inflation increased by 3.31 points to 11.20 percent in the third quarter. Prices of durable goods were pushed up by prices of furniture and home appliances, whereas the prices of non-durable goods fell due to food products, mainly fruits and vegetables as well as processed meat amid the adopted measures for red meat. All in all, manufacturing prices excluding petroleum and base metal products, which entail information on the underlying trend of producer prices, posted a quarter-on-quarter decline, yet cost pressures on consumer prices driven by producer prices remained strong due to the prices of oil and base metal products (Chart 3.3.4, Box 3.1).



3.4. Agricultural Producer Prices

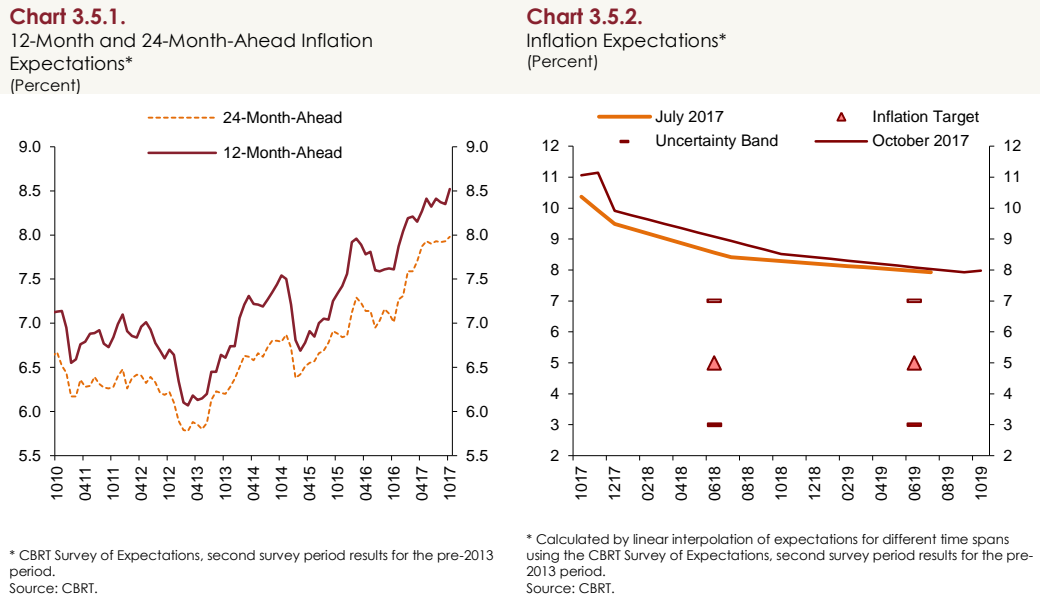
Agricultural producer prices fell by 1.08 percent in the third quarter, pulling the annual A-PPI inflation down by 0.75 points to 11.48 percent (Chart 3.4.1). In this period, annual inflation in crops and legumes posted a decline due also to the measures taken by the Food Committee, yet remained high. Moreover, annual inflation in fruits and vegetables also fell in this quarter. On the other hand, livestock prices continued with an upward trend. Cow milk prices registered an increase by 4.8 percent in this quarter, which were also reflected on consumer prices of processed dairy products such as butter and cheese.



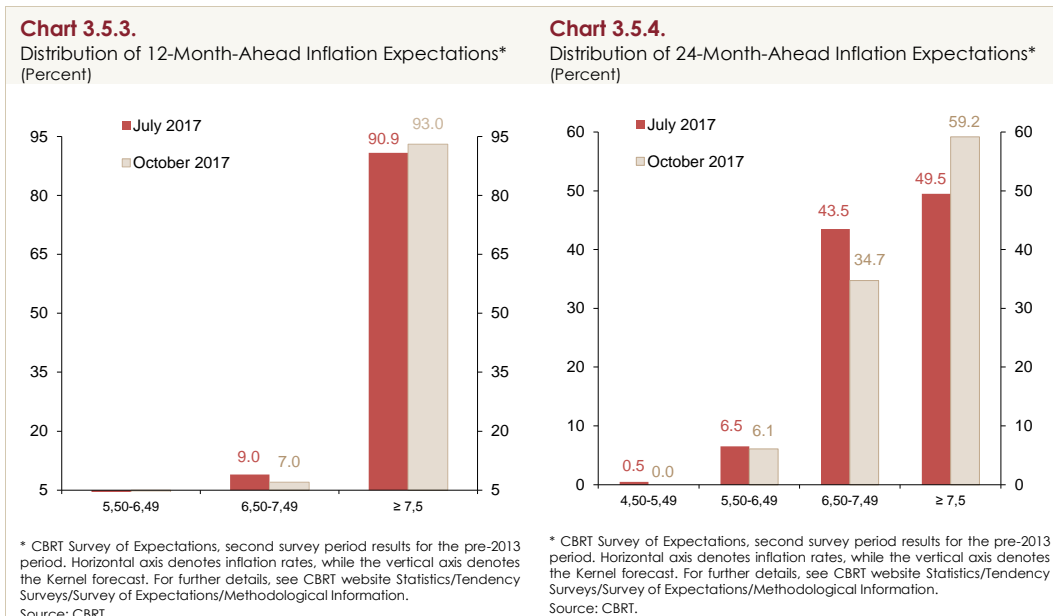
The underlying trend of A-PPI based on seasonally adjusted data in 3-month averages reveals some quarter-on-quarter decline (Chart 3.4.2). As a consequence of this relatively mild trend in prices of agricultural products, the underlying trend of food inflation also decelerated in this period.

3.5. Expectations

Cost shocks and the general inflation outlook have caused a notable deterioration in expectations since the last quarter of 2016. Yet, medium-term inflation expectations in the third quarter remained almost unchanged from the previous quarter (Chart 3.5.1). On the other hand, inflation expectations increased again in October, and 12-month and 24-month-ahead expectations remained substantially above the inflation target at 8.52 and 7.98 percent, respectively (Chart 3.5.1).



Across maturities, inflation expectations were revised upwards on a quarterly basis, especially in the short term (Chart 3.5.2). In addition, distribution of inflation expectations also deteriorated compared to previous reporting period (Charts 3.5.3 and 3.5.4). Medium-term inflation expectations have not displayed any improvement yet, pointing out that upside risks posed both by wage adjustments and the pricing behavior to the inflation outlook persist.

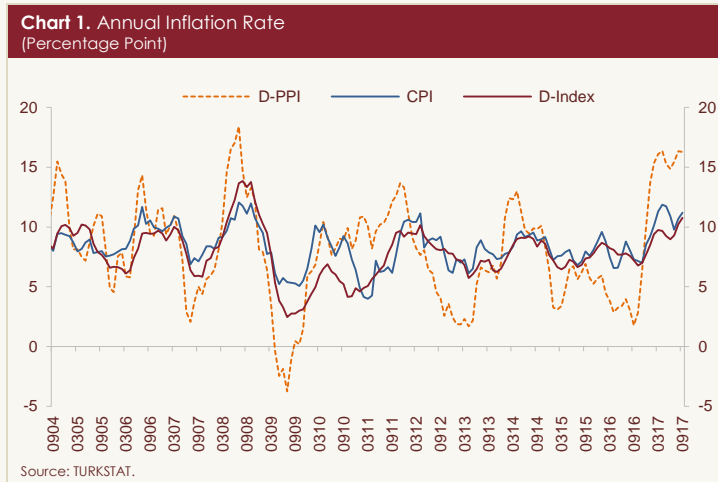


Box
3.1

Pass-Through from Producer Prices to Consumer Prices

Consumer and producer price indices are two major indicators for an economy. Yet, these prices may occasionally diverge from each other, which provokes a great deal of discussion. Even though producer prices are an indicator for capturing cost-side pressures on consumer prices, the two indices may not necessarily display a full pass-through for most of the time.

Annual inflation rates for CPI and D-PPI announced by TURKSTAT show that producer prices are much more volatile than consumer prices, and these two prices may considerably differ in certain times (Chart 1).¹ However, it can be observed that the divergence between producer and consumer inflation is short-lived and these two inflation rates converge to each other in the long term. In fact, during January 2004 and September 2017 period, the average annual change in D-PPI is 8.1 percent, while that of CPI and D-index is 8.4 and 7.8 percent, respectively. As producer prices have higher sensitivity to exchange rate and import prices, the annual D-PPI inflation has a wider range. Owing particularly to the recent depreciation of the Turkish lira and the increase in commodity prices such as oil and industrial metal, annual D-PPI inflation in September, which was 16.3 percent, hovered far above the consumer inflation at 11.2 percent. The question to what extent the recent surge in producer prices will be reflected on consumer prices has brought renewed attention to pass-through from producer prices to consumer prices.



There are various factors that prevent a complete and immediate pass-through from D-PPI to CPI. The first factor is taxes, which are included in CPI but excluded from D-PPI. By definition, D-PPI is measured by compiling the producer prices of domestically manufactured products, which exclude indirect taxes such as VAT, SCT etc. On the other hand, CPI is compiled by using final sales prices, which include these taxes. Therefore, inclusion of items such as fuel and tobacco products in CPI explain most of the divergence between CPI and D-PPI given high share of indirect taxes in the final prices of these products (Atuk et al., 2013). Another significant factor causing CPI and D-PPI to differ is the fact that services prices, which constitute about 30 percent of the consumption basket, are not included in producer prices.² Yet, it should be

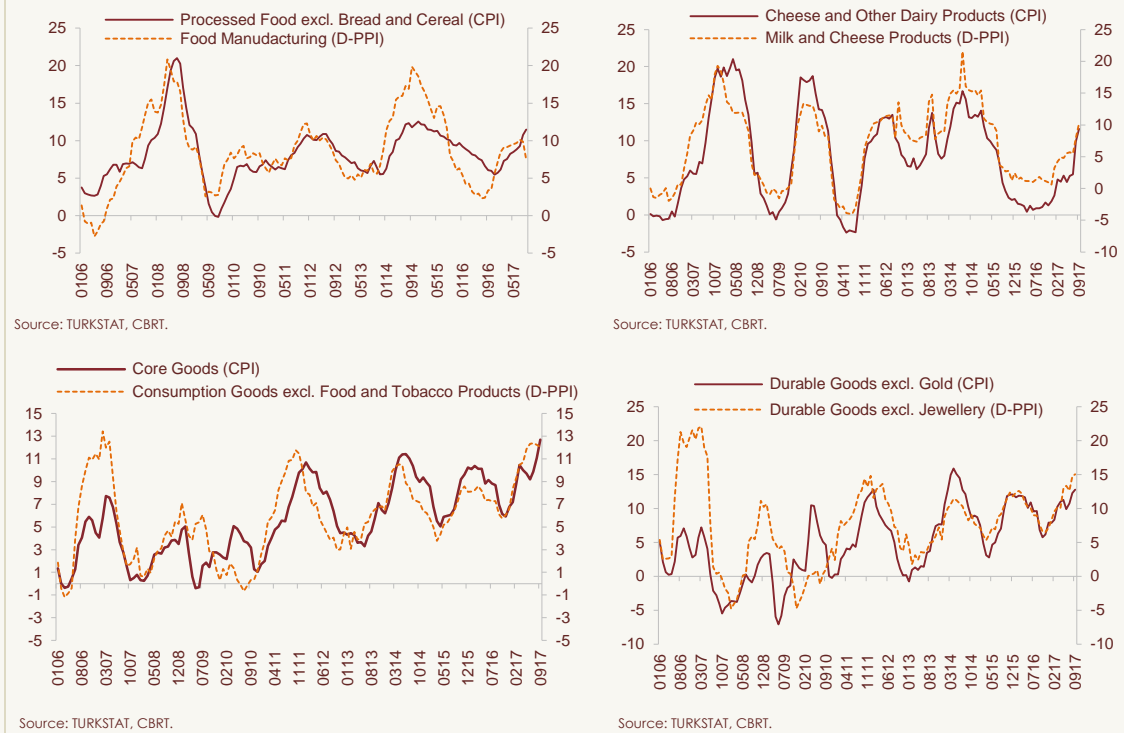
¹ Since D-PPI excludes agricultural products, D index is used as the consumer price counterpart, which is CPI excluding unprocessed food, alcoholic beverages and tobacco products.

² Agricultural products have been excluded from D-PPI as of 2014 and published separately as A-PPI. It should be noted that before 2014, fresh fruits and vegetables were not included simultaneously in producer and consumer prices. This is another source of divergence between CPI and D-PPI. For details, see Atuk et al. (2013).

noted that even adjusted for these factors, consumer prices may not display a full pass-through from producer prices, which prompts structural and cyclical factors such as market structure, pricing behavior and varying sensitivity of index items to economic developments to be taken into account in explaining this divergence.

In order to have a better understanding about how these factors may cause a divergence between CPI and D-PPI, pass-through is analyzed across subcategories. In particular, when solely focused on core goods that exclude fuel and tobacco products and the services sector, it can be seen that producer and consumer prices exhibit a more similar pattern over time (Chart 2, Table 1). For example, compared to D-PPI and CPI, annual inflation in food manufacturing is more closely associated with annual inflation in processed food excluding bread and cereal, and the link is even stronger in the sub-detail for cheese and dairy products. Similarly, excluding food and tobacco products from both indices, both CPI and D-PPI seem to be more correlated with each other. The same conclusion can be drawn for durable goods excluding gold.

Chart 2. Annual Inflation in CPI and D-PPI by Subcategories (Percent)



Long-term average annual inflation rates do not differ significantly between CPI and D-PPI (Table 1).³ The same observation is true for subcategories, which exhibit even higher correlation by further sub-details. For example, the coefficient of correlation between annual D-PPI and the D index inflation is 0.65, whereas the coefficient of correlation between annual inflation in food manufacturing and annual inflation in processed food excluding bread and cereal is 0.77, and the correlation is even higher at 0.89 in a further subcategory for fats and oils. Thus, adjusted for differences in definitions and scope, producer and consumer prices seem to be more closely correlated.

³ Johansen co-integration test results indicate a long-term relationship between the two series (Atuk et al., 2013).

Table 1. Correlation Between Annual Inflation in Producer and Consumer Prices by Subcategories*

	Average Annual Inflation (Percent)	Correlation
D-PPI	8.10	0.65
D Index	7.85	
Consumption Goods excl. Food and Tobacco Products (D-PPI)	5.40	0.68
Core Goods (CPI)	5.42	
Food Manufacturing(D-PPI)	8.87	0.77
Processed Food excl. Bread and Cereal (CPI)	8.28	
Vegetable and Animal Oils and Fats (D-PPI)	8.39	0.89
Fats and Oils (CPI)	9.32	
Milk and Cheese Products (D-PPI)	7.08	0.90
Cheese and Other Dairy Products (CPI)	8.12	

* The correlation between D-PPI and CPI is 0.64.

The pass-through from D-PPI to CPI is analyzed econometrically for headline indices as well as narrower price definitions (Table 2). Accordingly, 4-variable VAR models are constructed, which include producer and consumer prices, TL-denominated import prices and the output gap as endogenous terms. Global demand was also included in these models as an exogenous variable.⁴ The models use quarterly data between 2005Q1-2017Q3.

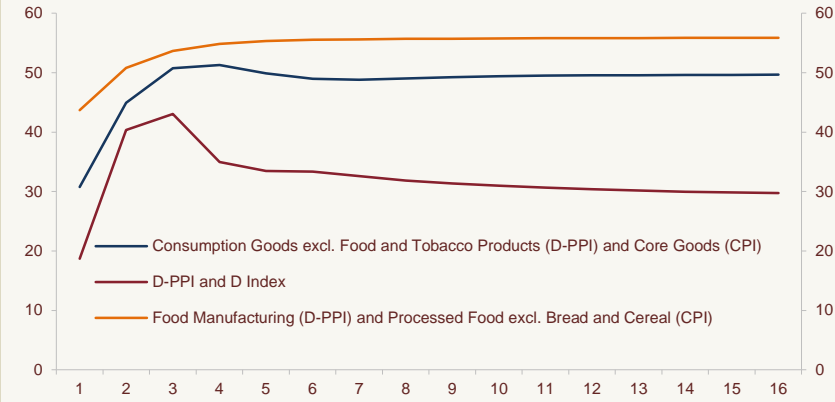
Table 2. Price Indices Used in VAR Model

Producer Prices	Consumer Prices
D-PPI	D Index
Consumption Goods excl. Food and Tobacco Products	Core Goods
Food Manufacturing	Processed Food excl. Bread and Cereal

The first VAR model includes TL-denominated import prices, output gap, D-PPI and the D index. The other models estimate the pass-through using narrower definitions of producer and consumer prices given in Table 2. Estimation results are depicted in Chart 3. Accordingly, the cumulative pass-through is around 30 percent between D-PPI and the D index, whereas it is estimated to be 50 percent for core goods and 56 percent for food. A great portion of the pass-through is completed in three quarters for food, whereas the pass-through is slower for broader price definitions. The estimation results show that the pass-through from producer to consumer prices is not one-to-one even for narrower price definitions.

⁴ The series used in the models are quarterly differenced 3-month averages in logarithms. TL-denominated import prices are obtained by multiplying the USD-denominated import unit value index by the TL/USD exchange rate.

Chart 3. Quarterly Cumulative Pass-Through*
(Percent)



* Denotes the cumulative response of the relevant consumer prices to a 1-unit shock in the respective producer prices.

In sum, being more sensitive to cost shocks compared to consumer prices, annual inflation in producer prices has recently posted a faster increase, hovering well above the CPI inflation. On the basis of this observation, this box analyzes the reasons for the divergence between producer and consumer prices and the pass-through between these two prices. By their nature, producer prices have faster pass-through from the exchange rate and import price shocks. Also, differences in definition and scope are other reasons for the divergence between producer and consumer prices. Estimations using VAR models point to a stronger pass-through for subcategories, which exclude certain price items causing a weak correlation between producer and consumer prices.

References

Atuk, O., F. Ögünç, M.U. Özmen and Ç. Sarıkaya, 2013, An Assessment of the Link Between Producer and Consumer Prices in Turkey, CBT Research Notes in Economics No. 2013/21.

