

4. Supply and Demand Developments

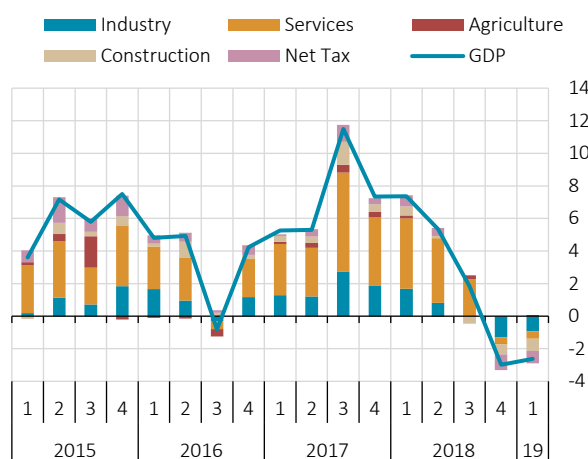
Economic activity displayed a partial recovery in the first quarter of 2019, as envisaged in the April Inflation Report. In terms of contribution to quarterly growth, net exports remained flat while the increase in domestic demand stood as the main driver of the recovery. The improvement in the risk premia, the narrowing of loan-deposit rate spreads, the robust loan growth and the accommodative fiscal stance all supported domestic demand. Accordingly, private consumption expenditures rose in quarterly terms while the increase in public spending made a large contribution to quarterly growth. On the other hand, fixed capital investments decreased, driven by the construction sector.

The moderate recovery in economic activity continued in the second quarter of the year. In this period, although the lagged effects of the first quarter's strong loan growth continued, heightened risk premia due to increased financial volatility and tight financial conditions restrained private sector demand, primarily investments. Weaker public spending also put a drag on domestic demand. However, despite the signals of sluggish global growth, exports of goods and services continued to increase due to the accommodative impact of the export tendency of domestic demand-sensitive sectors, firms' market diversification flexibility, and the cumulative depreciation in the Turkish lira. In particular, the robust tourism supported economic activity both directly and through the associated sectors such as non-durable goods and transportation.

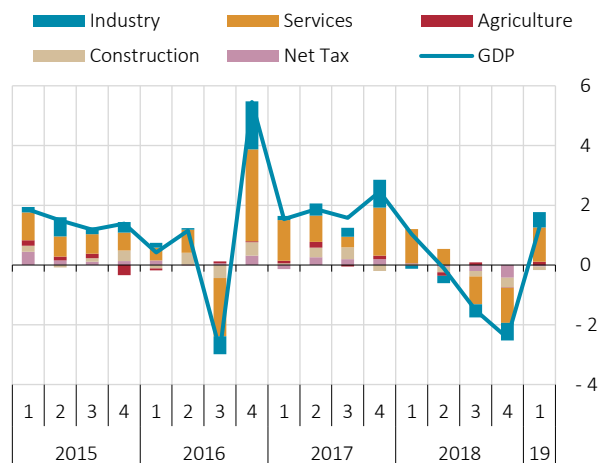
The moderate recovery in domestic demand is expected to continue in the second half of the year as a result of the improving inflation outlook and reduced country risk premium. It is estimated that developments in competitiveness will continue to support the exports of goods while the exports of services will remain robust in this period. Against this background, it is projected that the moderate recovery in economic activity as well as the disinflationary contribution of aggregate demand conditions will continue. On the other hand, besides geopolitical developments, ongoing uncertainties over the global economic activity pose a downside risk to domestic growth via capital flows and foreign trade channels.

4.1 Supply Developments

In the first quarter of 2019, GDP increased quarter-on-quarter by 1.3% in seasonally and calendar-adjusted terms, whereas it contracted year-on-year by 2.6%. In this period, the recovery in economic activity spread across all sectors except the construction sector, with the services sector making the largest contribution to quarterly growth. In annual terms, excluding the limited positive contribution of the agricultural sector, all sectors negatively contributed to growth (Charts 4.1.1 and 4.1.2).

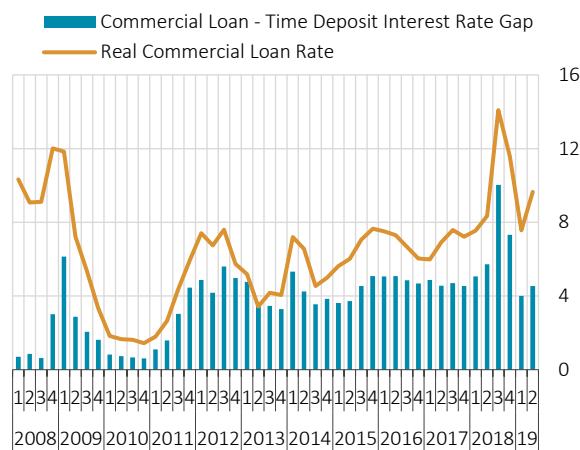
Chart 4.1.1: Contributions to Annual GDP Growth from the Production Side (% Points)

Sources: CBRT, TURKSTAT.

Chart 4.1.2: Contributions to Quarterly GDP Growth from the Production Side (Seasonally Adjusted, % Points)

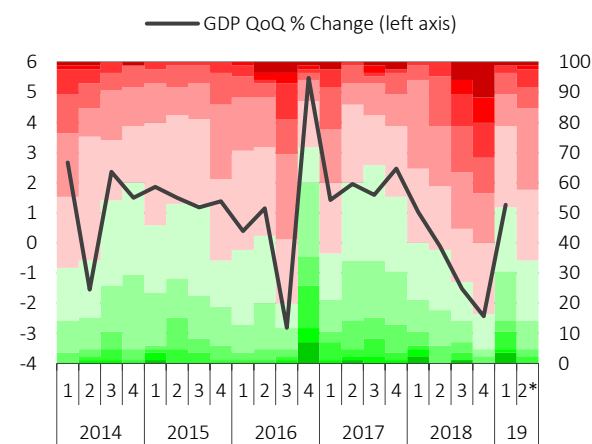
Sources: CBRT, TURKSTAT.

Financial conditions that had significantly tightened in the second half of 2018 posted a partial improvement in the first quarter of 2019 and supported the recovery in economic activity. However, in the second quarter of the year, real commercial loan rates and the loan-deposit rate spread rose again, albeit at a rather moderate rate (Chart 4.1.3). Increased financial volatility put a drag on the recovery in economic activity. In the meantime, the economic activity heat map derived from leading indicators suggests that the first quarter's favorable economic activity outlook will somewhat weaken in the second quarter of the year (Chart 4.1.4).

Chart 4.1.3: Commercial Loan-Deposit Rate Spread and Real Commercial Loan Rate* (Annual, Simple, %)

Sources: CBRT, TURKSTAT.

* Deflated by 12-month ahead CPI expectations.

Chart 4.1.4: Economic Activity Heat Map and Quarterly GDP Growth**

Sources: Details on the methodology and sources of data are given in Box 4.3 in the April 2019 Inflation Report.

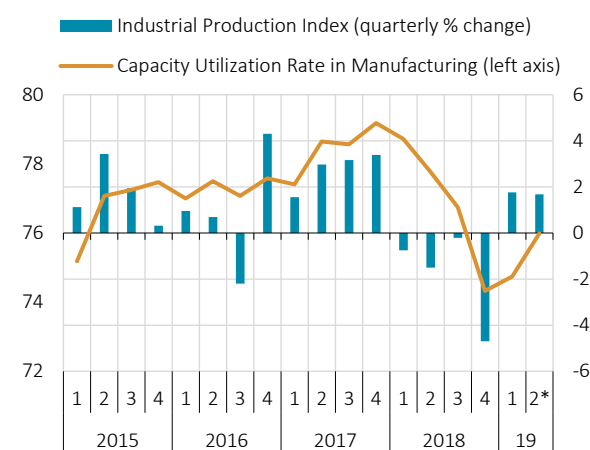
* As of 26 July.

**Larger area in green denotes favorable course in a larger portion of the indicators monitored with respect to economic activity.

In the first quarter, economic activity in the industrial sector posted a quarterly increase due to a consistently strengthening uptrend in the first months of the year. Second quarter developments in industrial production reveal that following the deceleration in April, the industrial sector posted a strong increase in May with the support of the other transportation vehicles item, registering a 1.7% rise compared to the first quarter. Exports brought forward due to the religious holiday and the bridge-day effect are estimated to have limited the production in June, causing it to register a more moderate increase in the second quarter compared to the first quarter. The increase in the capacity utilization rate data also continued in the second quarter, which supports this outlook (Chart 4.1.5). Real turnover

indices suggest that the recovery in industrial production was driven by domestic demand in the first quarter while the increase in the second quarter is also attributed to the positive contribution of sales abroad. On the other hand, the weak course in construction-related sectors continued, restraining the total industrial production. Although they remained below the threshold, PMI data recorded a fairly strong increase in June (Box 4.1) and displayed a favorable outlook. When new orders are considered, it is observed that the domestic demand-driven increase was more apparent (Chart 4.1.6).

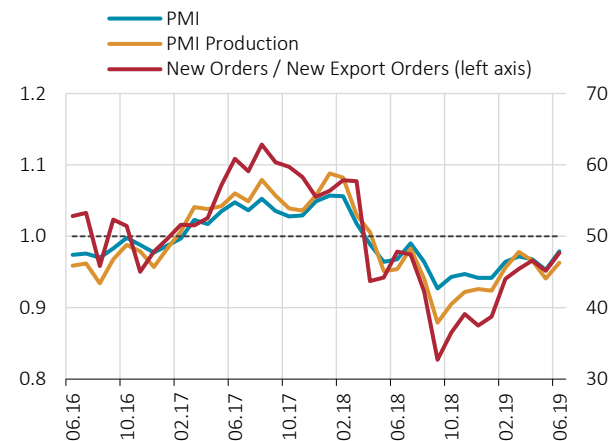
Chart 4.1.5: Industrial Production Index and Capacity Utilization Rate (Seasonally Adjusted, Quarterly % Change)



Sources: CBRT, TURKSTAT.

* Industrial production covers the April-May period.

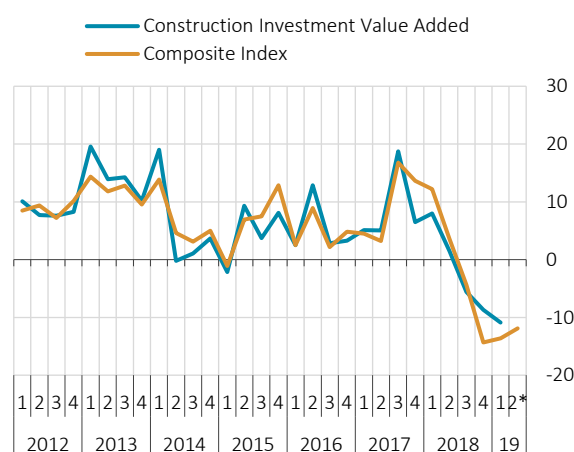
Chart 4.1.6: PMI and PMI Production (Seasonally Adjusted, Level)



Source: IHS Markit.

In the first quarter, the construction sector value added continued to contract on a quarterly basis and decreased by 10.9% annually. Along with the composite indicator of construction, developments in construction-related sectors in the manufacturing industry and the persistent losses of employment in this sector indicate that the ongoing quarterly fall in the sector's value added may also continue in the second quarter (Charts 4.1.7 and 4.3.4). Of the confidence index indicators for the construction sector, the building activity over the past three months and current order books confirm the weak course of activity in the sector (Chart 4.1.8).

Chart 4.1.7: Value Added and Composite Indicator of Construction (Annual % Change)**

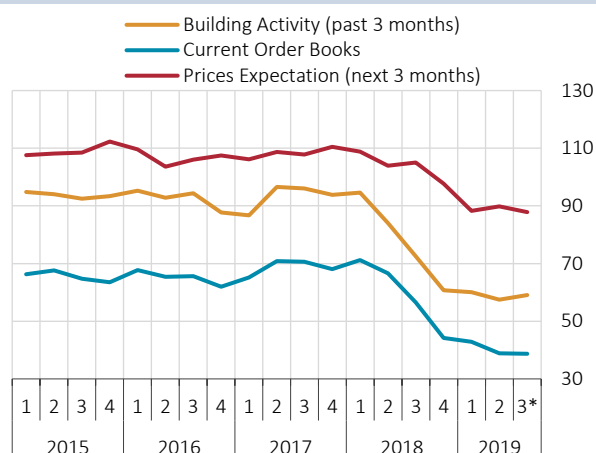


Source: CBRT, TURKSTAT.

* As of May.

** The composite indicator of construction is measured by the annual percentage change in domestic real turnover in fabricated metals and other non-metallic minerals. Weights obtained from linear regression.

Chart 4.1.8: Confidence Index Indicators for the Construction Sector (Seasonally Adjusted, Level)**



Source: TURKSTAT.

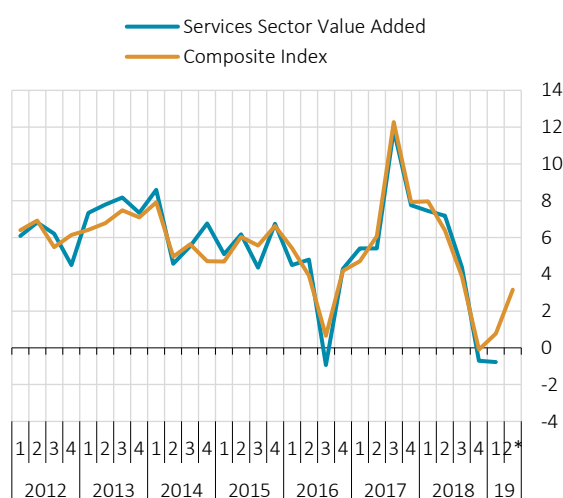
* As of July.

** An index value greater (smaller) than 100 denotes the sector is optimistic (pessimistic) about the current and future period.

In the first quarter of 2019, the services sector value added decelerated on an annual basis but rose in quarterly terms (Chart 4.1.9). The composite indicator suggests that the sector will register both an annual and a quarterly growth in the second quarter backed by strong exports of services. The confidence index for the services sector also slightly rose in the second quarter, supporting the projection for an uptrend (Chart 4.1.10).

An overall reading of indicators for the second quarter shows that weak outlook in the construction sector is the foremost factor that catches attention and it continues to restrain economic activity. On the other hand, despite tightened financial conditions, a more positive outlook prevails in industrial and services sectors which are believed to post quarterly increases.

Chart 4.1.9: Value Added and Composite Indicator of Services (Annual % Change)**

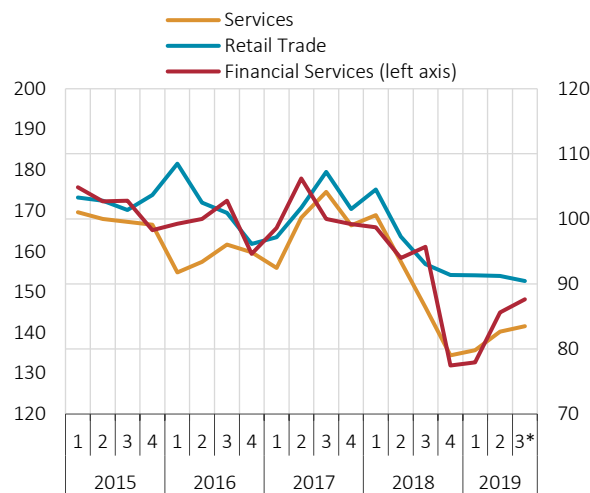


Sources: CBRT, TURKSTAT.

* As of May.

** The composite indicator of services is measured by the annual percentage change in industrial production, real services exports and non-food retail sales data. Weights obtained from linear regression.

Chart 4.1.10: Sectoral Confidence Indices (Seasonally Adjusted)



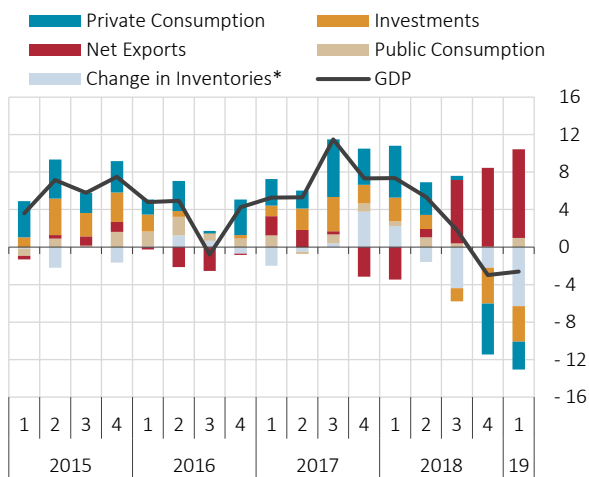
Sources: CBRT, TURKSTAT.

* As of July.

4.2 Demand Developments

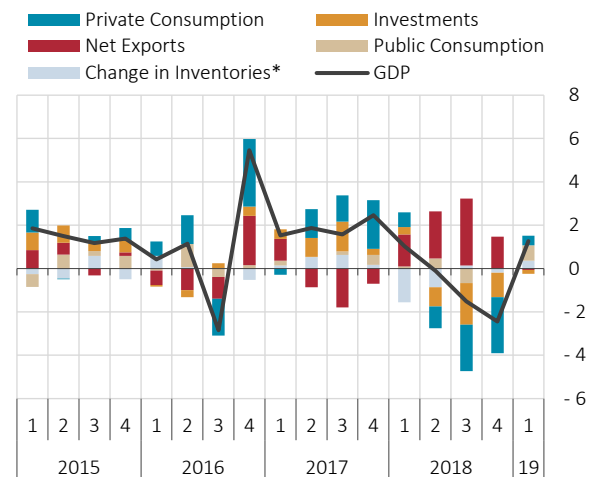
On the expenditures side, the GDP data suggest that the quarterly growth in the first quarter was driven by domestic demand. Net exports, which made the largest contribution to year-on-year growth, remained flat on a quarterly basis due to the decline in both exports and imports.¹ Despite the weak employment outlook, private consumption expenditures rose quarterly due to the partial improvement in exchange rate volatility and financial conditions as well as real increase in wages. The increase in private consumption expenditures was driven by both goods and services items. Public consumption was another item that positively contributed to quarterly growth. On the other hand, machinery-equipment investments recorded a strong quarterly increase whereas construction investments continued to decline and total investments negatively contributed to growth (Charts 4.2.1 and 4.2.2).

¹ Box 4.2 includes observations revealing that Turkey can create larger value added on products imported from external markets than do other OECD countries.

Chart 4.2.1: Contributions to Annual GDP Growth from the Expenditure Side (% Points)

Sources: CBRT, TURKSTAT.

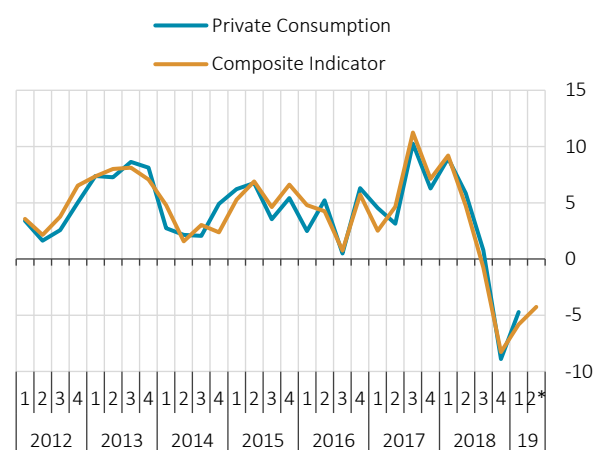
* Includes inventories and statistical discrepancy due to chain linking.

Chart 4.2.2: Contributions to Quarterly GDP Growth the Expenditure Side (% Points)

Sources: CBRT, TURKSTAT.

* Includes inventories and statistical discrepancy due to chain linking.

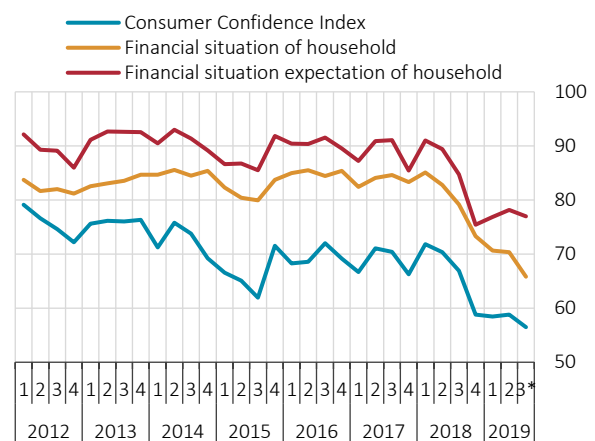
The recovery trend in private consumption expenditures continued in the second quarter of the year. The weak outlook in the employment market suppressed consumption expenditures while public transfers had an accommodative role. Domestic real turnover indices suggest that the increase in sales of non-durable goods continued from the first quarter through the April-May period at a decelerating pace and the moderate course in sales of durable goods was maintained. In fact, the composite indicator that provides all data pertaining to consumption together shows that the annual rate of decrease in private consumption expenditures will somewhat decelerate in the second quarter, which would mean a quarterly increase (Chart 4.2.3). On the other hand, the flat course observed in the consumer confidence index in the first quarter of the year persisted in the second quarter. The flat course of consumer confidence indices at low levels despite quarterly increases in consumption points to an elevated level of consumer cautiousness (Chart 4.2.4).

Chart 4.2.3: Private Consumption Expenditures and Composite Indicator (Annual % Change)**

Sources: Ministry of Treasury and Finance, CBRT, TURKSTAT.

* As of May.

** The composite indicator is the weighted average of the annual percentage changes in the industrial domestic real turnover in non-durable goods, the import quantity index for consumption goods, tax revenues, and the volume index for non-food retail sales. Weights obtained from regression analyses.

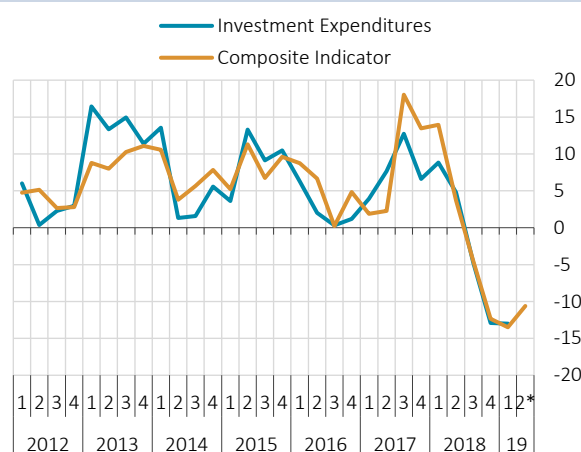
Chart 4.2.4: Consumer Confidence Index (Seasonally Adjusted, Level)

Source: TURKSTAT.

* As of July.

It is evaluated that investments continued to be weaker than consumption in the second quarter. Financial volatility and tightened credit conditions continue to limit investment expenditures. In April and May, imports of investment goods declined compared to the first quarter whereas production of these goods slightly increased. The decline in public capital expenditures and transfers in the second quarter, which rose strongly in the first quarter of the year, is another reason that brings a weak course in investments.. Although the composite indicator suggests a modest deceleration in the annual contraction in investment expenditures, this corresponds to a fall in quarterly terms (Chart 4.2.5). The Business Tendency Survey (BTS) data for fixed capital investment tendency remained flat in the second quarter of the year while the relatively positive outlook in exporting sectors was maintained in this period (Chart 4.2.6).

Chart 4.2.5: Investment Expenditures and Composite Indicator (Annual % Change)**

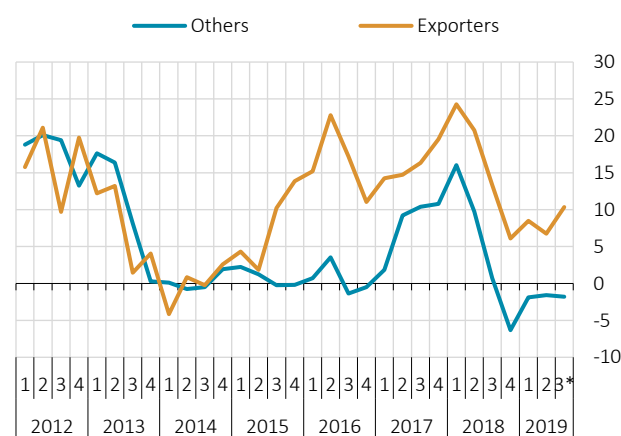


Sources: CBRT, TURKSTAT.

* As of May.

** The composite indicator is the weighted average of the annual percentage changes in the production of other non-metallic minerals and machinery-equipment, domestic real turnover in capital goods industry, and import quantity index for capital goods. Weights obtained from regression analyses.

Chart 4.2.6: Fixed Capital Investment Tendency by Sectors Based on BTS (Seasonally Adjusted, Up – Down, %)

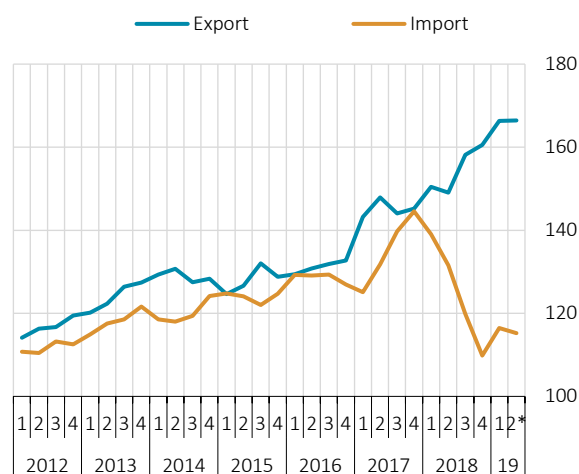


Source: CBRT.

* As of July.

The contribution of net exports to quarterly growth increased in the second quarter, and they continued to be the primary component that made the largest contribution to annual growth (Chart 4.2.7). External demand that remained relatively strong despite the signals for a partial slowdown in global growth - particularly in European Union countries, and firms' orientation towards external markets due to the cumulative depreciation of the real exchange rate and the deceleration in domestic demand stand out as factors supporting the exports of goods. In addition to favorable developments in exports of goods, the number of foreign visitors hit historically high levels and the number of visitors from Europe returned to levels recorded in 2015. In line with the increase in tourism revenues, other services revenues such as transportation are also on the rise (Chart 4.2.8). The favorable course of these items supports domestic demand also through second-round effects.

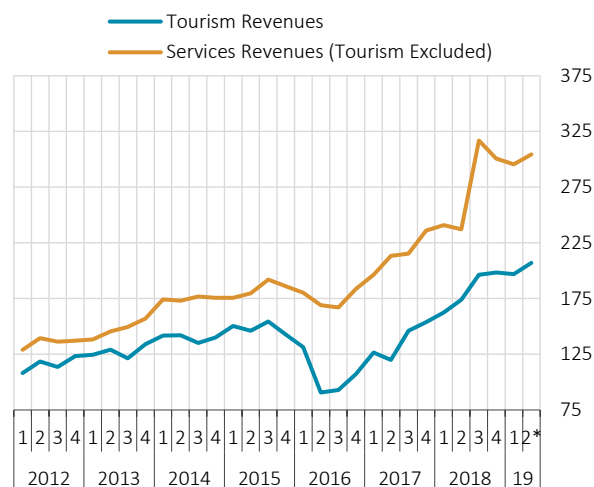
Chart 4.2.7: Quantity Indices for Exports and Imports
(Excl. Gold, Seasonally Adjusted, 2010=100)



Sources: CBRT, TURKSTAT.

* Actual figures for April and May, forecast for June.

Chart 4.2.8: Tourism and Services Revenues (Real, Seasonally Adjusted, 2010=100)**



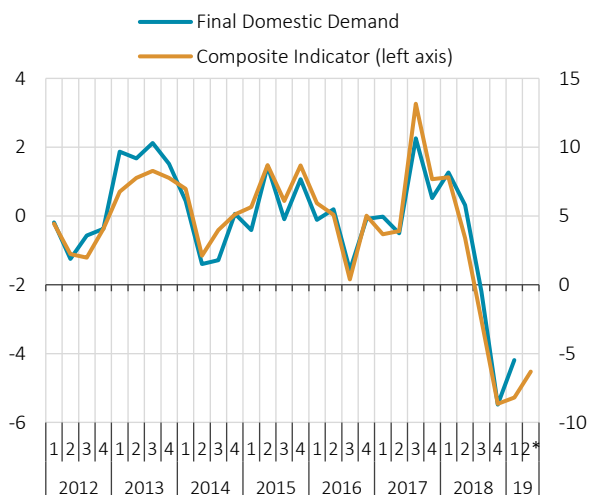
Sources: CBRT, TURKSTAT.

* Actual figures for April and May, forecast for June.

** Deflated by CPI.

An overall evaluation of the second quarter developments indicates that the moderate recovery in economic activity continued. Composite indicators for final domestic demand suggest a continued contraction on an annual basis but an almost horizontal course in quarterly terms (Chart 4.2.9). Net exports are expected to maintain their strong contribution to annual growth, albeit at a lower rate, and to make a larger contribution to quarterly growth (Chart 4.2.10).

Chart 4.2.9: Final Domestic Demand and Composite Indicator (Annual % Change)**

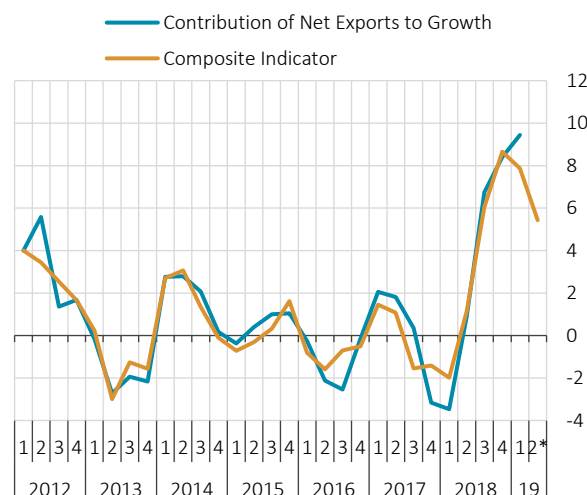


Sources: Ministry of Treasury and Finance, CBRT, TURKSTAT.

* Indicators for production and turnover are as of May and those for tax and loans as of June.

** Composite indicator is the principal component of annual percentage changes of 10 different indicators selected among domestic turnover, industrial production, tax revenues and loans.

Chart 4.2.10: Contribution of Net Exports and Composite Indicator (% Points)**



Sources: CBRT, TURKSTAT.

* Actual figures for April and May, forecast for June.

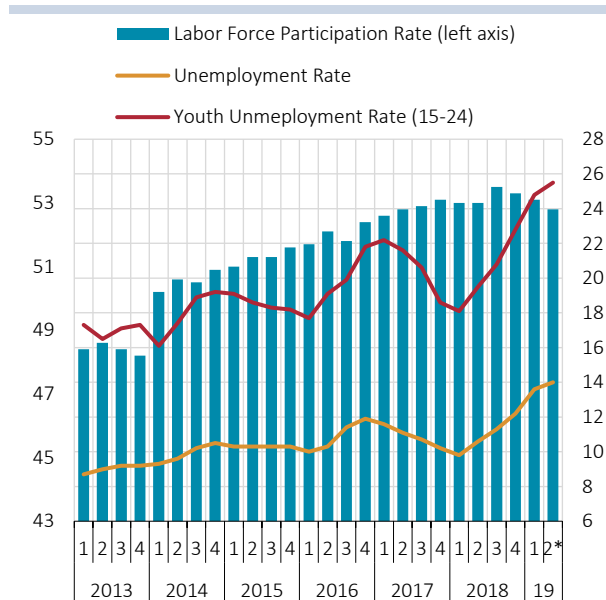
** Composite indicator is formed by using data for exports and imports of goods, and the number of international passengers. Weights obtained from linear regression.

It is projected that the moderate recovery in economic activity and the economic rebalancing will continue in 2019 while aggregate demand conditions will have a disinflationary impact. In this period where external demand positively affects economic activity, besides geopolitical developments, uncertainties over the global economic activity keep the downside risks to growth alive via the channels of capital flows and foreign trade.

4.3 Labor Market

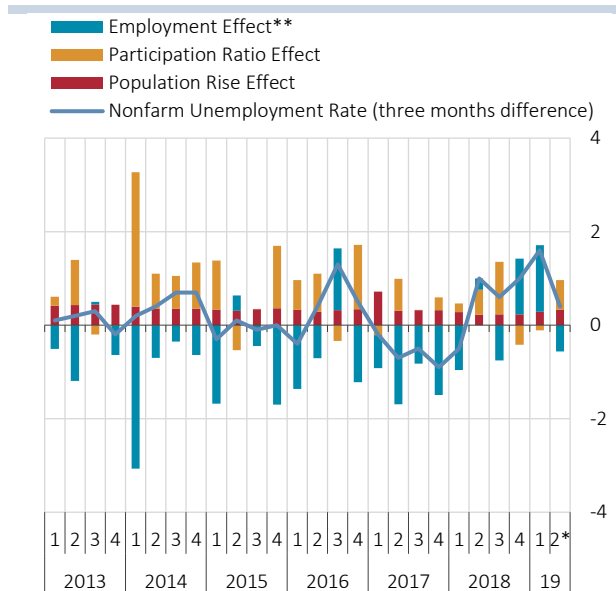
In the first quarter of 2019, the uptrend in unemployment rates continued compared to previous quarter despite the recovery in economic activity (Chart 4.3.1). Seasonally adjusted total and non-farm unemployment rates increased quarter-on-quarter by 1.4 and 1.6 points to 13.6% and 15.8%, respectively. While the rise in the unemployment rate was mainly driven by losses of employment particularly in construction and industrial sectors, it was restricted by the decline in the labor force participation rate (Chart 4.3.2). Unemployment rates posted a more limited increase in the second quarter of the year. In the April period covering the months of March and May in 2019, seasonally adjusted total and non-farm unemployment rates stood at 13.8% and 16.0%, respectively.

Chart 4.3.1: Unemployment and Labor Force Participation Rates (Seasonally Adjusted, %)



Source: TURKSTAT.
* As of the April period.

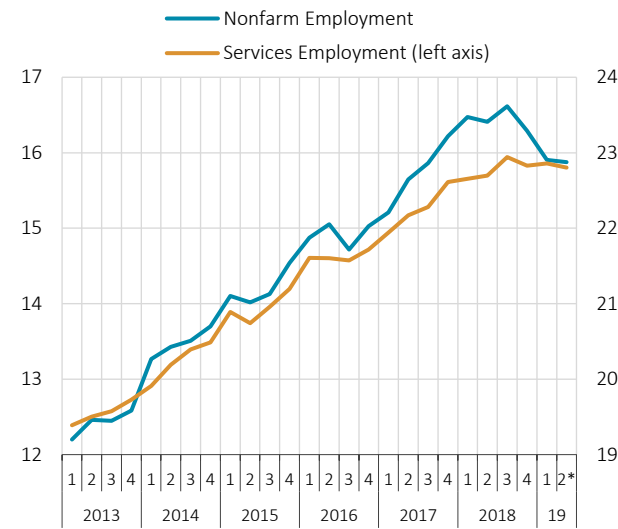
Chart 4.3.2: Contributions to Quarterly Changes in Non-Farm Unemployment Rate (Seasonally Adjusted, % Points)



Sources: CBRT, TURKSTAT.
* As of the April period.
** Employment growth pushes non-farm unemployment rate down.

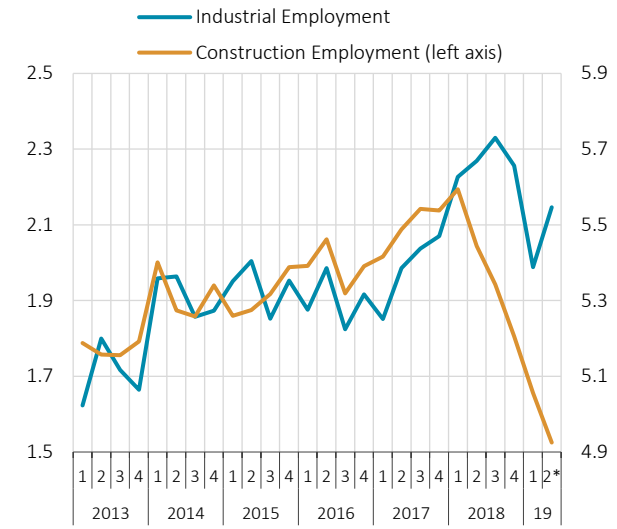
In the first quarter of 2019, non-farm employment dropped by 1.6% compared to the previous quarter (Chart 4.3.3). While employment in the services sector increased at a very modest rate, employment in industrial and construction sectors sharply decreased by 4.7% and 7.8%, respectively (Chart 4.3.4). Yet, the public sector continued to support employment in this period. In the April period, employment in the industrial sector significantly increased whereas services employment decreased due to sectors sensitive to domestic demand despite the strong contribution of the tourism-related accommodation-food sector, and employment in the construction sector maintained its downtrend (Chart 4.3.5). It is assessed that the employment stimulus package introduced at end-February may have had a positive impact on the labor market in the recent period as it brought forward employers' recruitment of seasonal workers in sectors such as tourism-related ones.

Chart 4.3.3: Non-Farm and Services Employment
(Seasonally Adjusted, Million People)



Source: TURKSTAT.
* As of the April period.

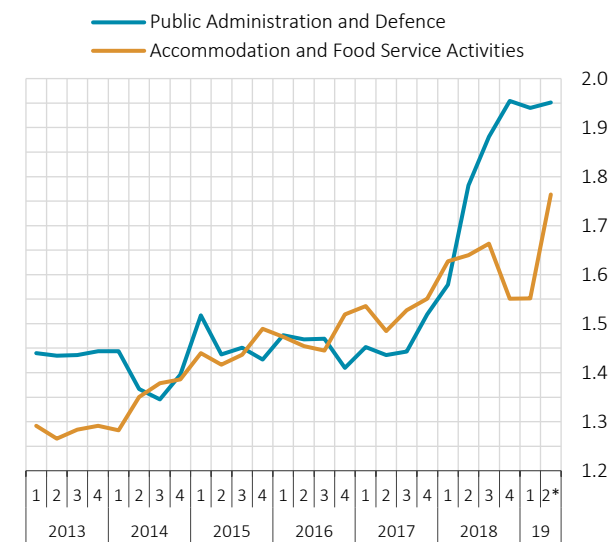
Chart 4.3.4: Industrial and Construction Employment
(Seasonally Adjusted, Million People)



Source: TURKSTAT.
* As of the April period.

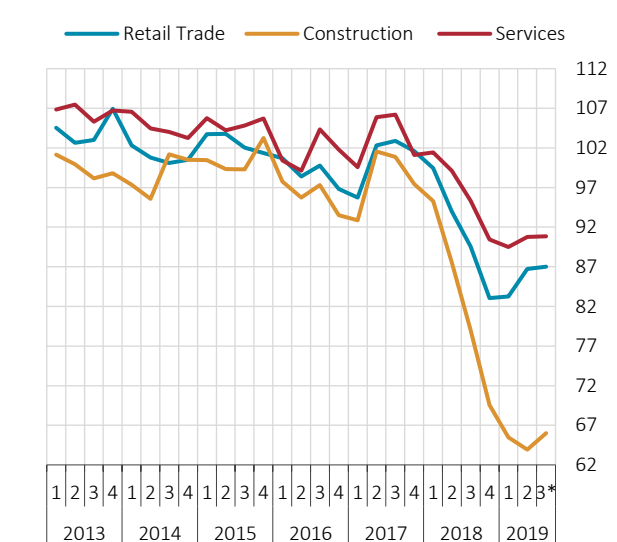
An analysis of leading indicators reveals that there is a moderate increase in employment expectations in trade and services sectors whereas the decline continues in the construction sector (Chart 4.3.6). The rise in the number of applications per job posting on Kariyer.net, which moves in tandem with the non-farm unemployment rate, also indicates that unemployment rates will remain elevated for some time (Chart 4.3.7).

Chart 4.3.5: Employment in Selected Services Subsectors
(Seasonally Adjusted, Million People)



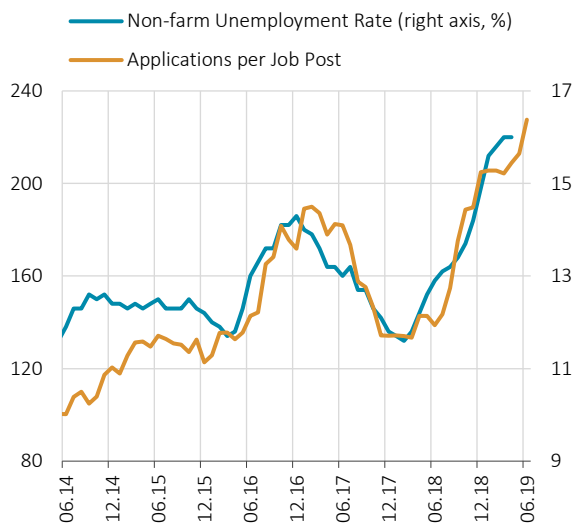
Sources: CBRT, TURKSTAT.
* As of the April period.

Chart 4.3.6: Expected Number of Employees by Sectors for the Next 3 Months
(Seasonally Adjusted, Level)



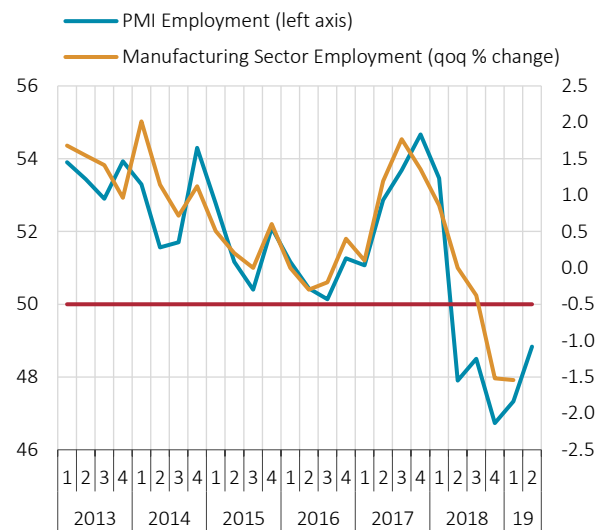
Source: TURKSTAT.
* As of July.

Both BTS and PMI indicators for industrial employment suggest an increase in the second quarter (Chart 4.3.8). In addition to these developments, industrial production data in terms of the average of April and May increased compared to the first quarter, which supports employment rise expectations in the sector. Moreover, the employment stimulus package introduced at end-February is believed to have affected the labor market positively in tourism-related sectors as of the April period.

Chart 4.3.7: Applications per Posting on Kariyer.net and Non-Farm Unemployment* (Seasonally Adjusted)

Sources: Kariyer.net, CBRT, TURKSTAT.

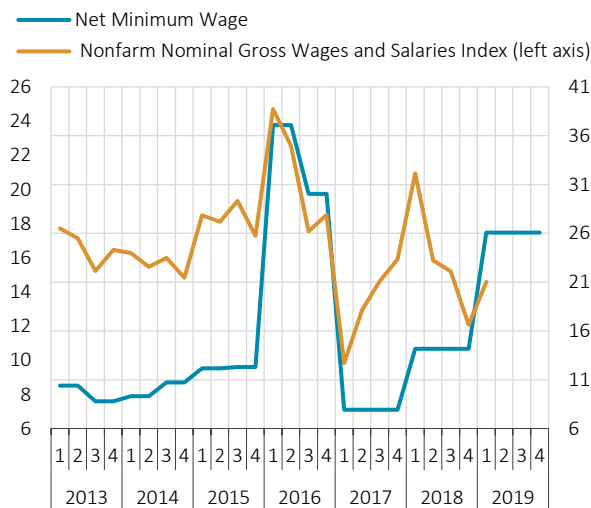
* Kariyer.net data is as of June, unemployment rate as of the April period.

Chart 4.3.8: Manufacturing Industry Employment and PMI Employment (Seasonally Adjusted)

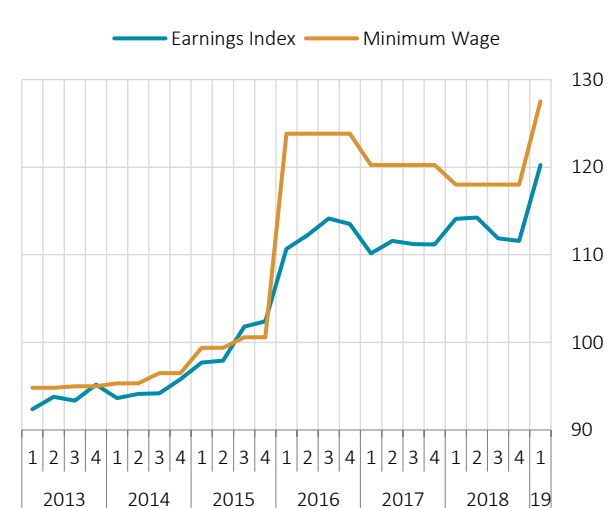
Sources: IHS Markit, CBRT, TURKSTAT.

4.4 Wages and Productivity

In 2019, the minimum wage was raised by 26% to net TRY 2,020. Accordingly, the annual rate of increase in non-farm nominal wages became 14.6% in the first quarter of 2019 (Chart 4.4.1). As the quarterly rate of increase stood above the inflation rate, real wages rose on a quarterly basis (Chart 4.4.2).

Chart 4.4.1: Non-Farm Wage Index and Net Minimum Wage (Nominal, Annual % Change, 2015=100)

Sources: Ministry of Family, Labor and Social Services, CBRT, TURKSTAT.

Chart 4.4.2: Non-Farm Hourly Earnings Index and Minimum Wage (Real*, Seasonally Adjusted, 2015=100)

Sources: CBRT, TURKSTAT.

* Deflated by the CPI.

In the first quarter of 2019, the partial recovery in economic activity had a limited effect on the labor market and accordingly, partial labor productivity in the non-farm sector (non-farm value added/non-farm employment) increased (Chart 4.4.3). Since the rise in the per capita real wage outpaced the productivity growth, non-farm real unit wages (per capita real wage/productivity) surged in the first quarter (Chart 4.4.4).

Chart 4.4.3: Partial Labor Productivity by Sectors*
(Seasonally Adjusted, 2015=100)

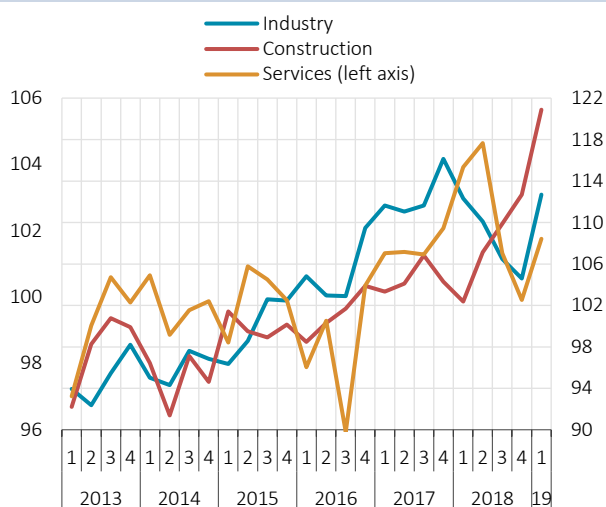
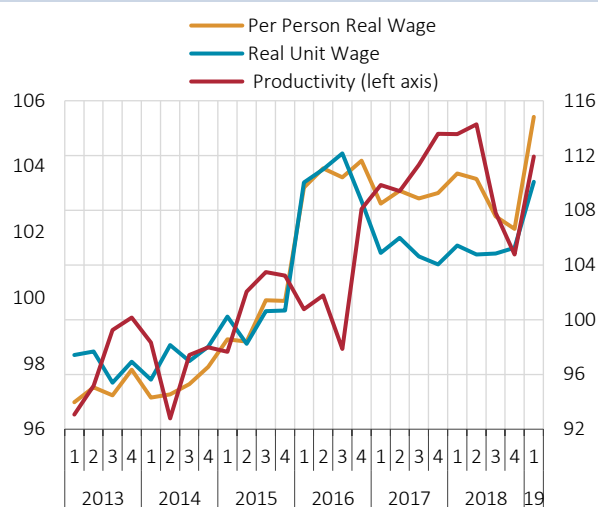
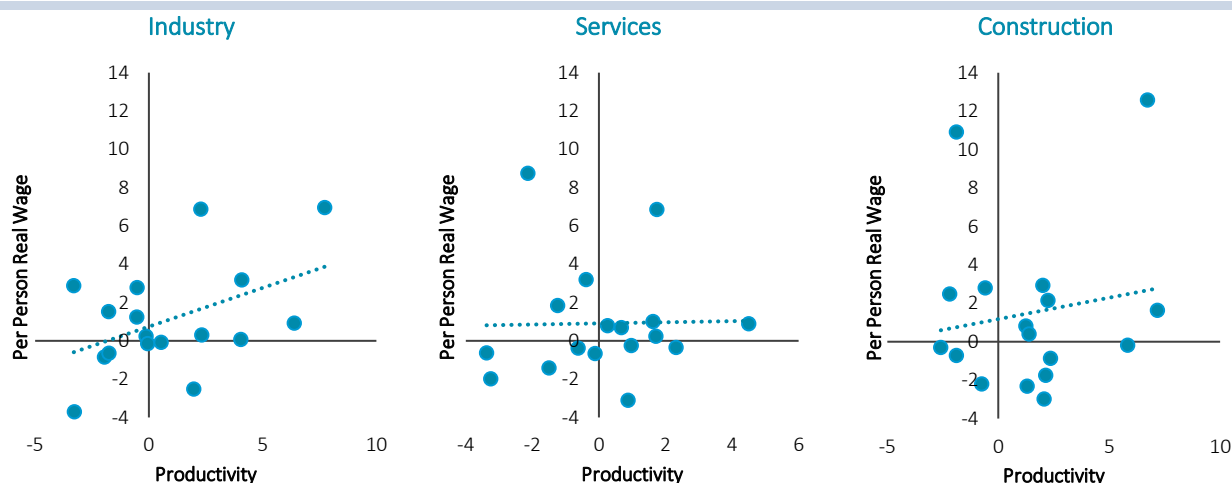


Chart 4.4.4: Non-Farm Partial Labor Productivity*, Per Capita Real Wages and Real Unit Wages** (Seasonally Adjusted, 2015=100)



In terms of unit wages, it is noteworthy that the productivity growth affected wages to a limited extent in the overall economy. The fact that the recent productivity growth mainly stemmed from the contraction in the construction sector employment suggests that it will exert no additional wage pressure on the economy. However, during employment loss periods as the composition of employment changes in favor of the skilled labor force and puts an upward pressure on average wages, it becomes difficult to reach a conclusion about the wage-setting behavior. A general evaluation suggests that the productivity-wage relationship is most valid in the industry sector among the main sectors, whereas the productivity-wage transmission is more limited in the overall non-farm sector (Chart 4.4.5).

Chart 4.4.5: Productivity and Real* Per Capita Wages by Sectors (Seasonally Adjusted, Q-o-Q Change, Quarters Between 2015 and 2019)

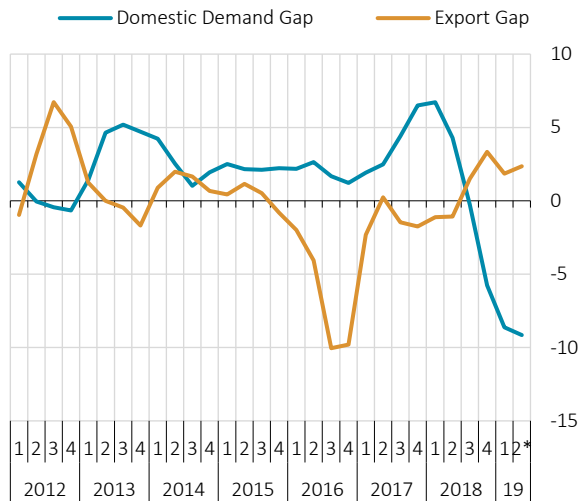


In conclusion, due to the high rate of increase in the minimum wage and the strong backward-indexation in the determination of other wage adjustments, the rates of increase in nominal wages are expected to be higher in 2019 than the previous year. However, it is projected that the weak outlook of the employment market will partially limit this increase.

4.5 Output Gap

To assess the cyclicality of the economy and the demand-driven pressures on inflation, the CBRT monitors output gap indicators estimated by several methods.² Based on the breakdown of the output gap by its components, it is estimated that exports remained above and domestic demand remained below their long-term trends in the first half of 2019 (Chart 4.5.1). Meanwhile, the total output gap indicates that the disinflationary contribution of demand conditions continued (Chart 4.5.2).

Chart 4.5.1: Breakdown of Output Gap by Demand Components** (2-Quarterly Moving Average, %)

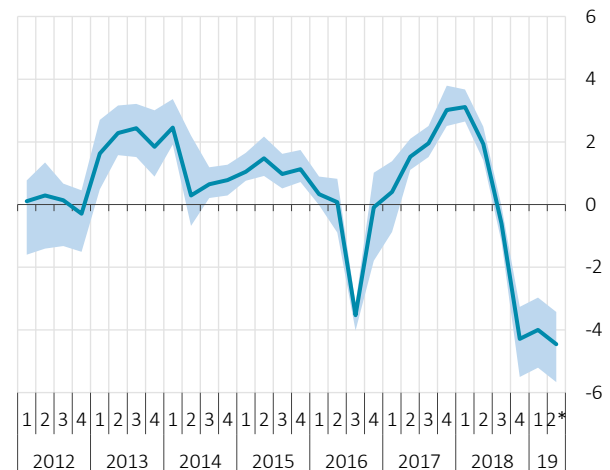


Source: CBRT calculations.

* Constructed with second quarter forecasts.

**Output gap series constructed from demand components (See Inflation Report 2018-III Box 4.1).

Chart 4.5.2: Output Gap Indicators (Average and Min-Max Band, %)



Source: CBRT calculations.

* Constructed with second quarter forecasts.

² See Inflation Report 2017-1, Box 4.2, "Alternative Indicators for Output Gap", p. 52-56.

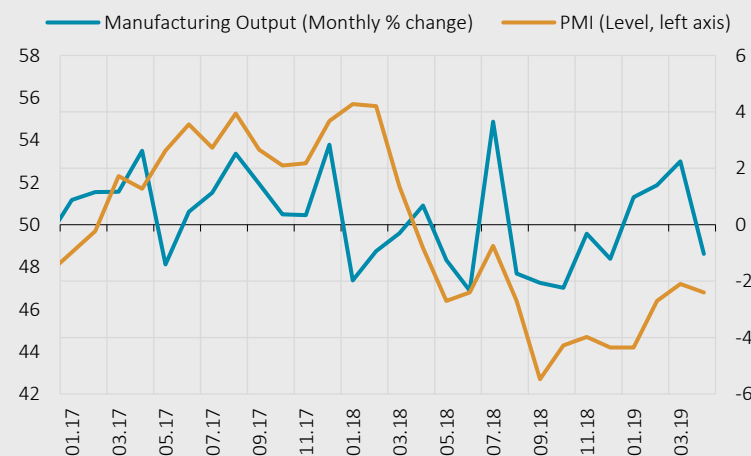
Box 4.1

The Relation Between Manufacturing Output and PMI Indicators

The Purchasing Managers Index (PMI) is one of the key indicators monitored for the course of economic activity.¹ The PMI reveals the previous month's developments on the first business day of each month, which increases the importance of the survey in terms of timely information. Responses of survey participants define the direction of activity in comparison with the previous month. Then, the aggregated responses are transformed into a diffusion index. The index has a threshold value of 50, and a reading below (above) this threshold refers to a contraction (expansion) in manufacturing output.

When we examine recent developments, we see that the headline value of the index has remained below the threshold of 50 since April 2018. This has led to market comments that manufacturing output is set to contract. However, since manufacturing output has recorded monthly expansions in certain months during this period, most visibly in 2019, one should be careful when extracting information from the index (Chart 1).

Chart 1: Manufacturing Output and the PMI (Seasonally Adjusted)



Sources: IHS Markit - Istanbul Chamber of Industry, TURKSTAT.

In this box, following Koenig (2002), we seek answers to these questions:

- Does the threshold value differ from value of 50 in practice?
- Do the monthly changes of the index matter as much as the PMI level?
- Do these relations change over time?

There are a number of factors that call for a close investigation of the information content of the index.² For one, the PMI survey is conducted with large-scale firms and only information related to direction is pursued - in other words, there is no information with respect to the magnitude of the change. Additionally it is possible that participants may tend to be more pessimistic during times of financial turbulence. To assist with such an investigation, the following equation, in which the quarterly change of manufacturing output is explained by the PMI level and the

¹ PMI Survey in Turkey is co-organized by the Istanbul Chamber of Industry and IHS Markit.

² Eren (2014) studies the threshold value for Turkey. In this study, GDP is used as the dependent variable.

quarterly change of the index, is estimated for the 2005Q2-2019Q1 period. In order to observe whether the relations have changed over time, we repeated the estimation for the sub-periods of 2005-09, 2010-14 and 2015-19. We conducted the same analysis for the production sub-index in addition to PMI headline data, and reported the findings. All the data used in the analysis are seasonally adjusted.

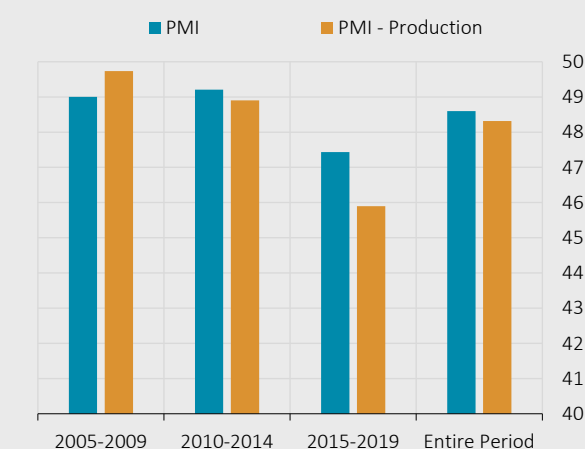
$$(\Delta mnfp_t / mnfp_{t-1}) * 100 = c(1) * (pmi_t - c(2)) + c(3) * \Delta pmi_t + \varepsilon_t$$

In the equation, the $c(2)$ coefficient refers to the threshold value while the $c(1)$ coefficient measures the effect of the gap between the PMI level and the threshold, and $c(3)$ measures the effect of the quarterly change in the PMI on the quarterly change in manufacturing output.

The first significant finding is that the threshold value ($c(2)$ coefficient) differs from the 50 mark and changes over time. While the threshold value was found to be at 48.6 when the analysis was conducted for the entire period, it declined to 47.4 for the 2015-2019 period. When the analysis is repeated for the production sub-index, the estimate for the threshold value declines to 45.9 from 48.3 for the same periods (Chart 2).

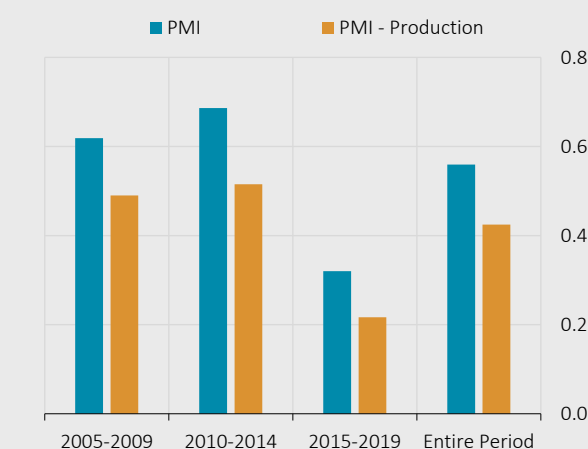
The coefficient of $c(1)$, which shows the effect of a deviation from the threshold value on the change in manufacturing output, is estimated to be 0.56 for the entire period. This implies that when the PMI exceeds the threshold value by one point, manufacturing output increases by about 0.6%. This coefficient takes a lower value (0.32) in the estimation conducted for the 2015-19 period. Repeating the analysis for the sub-index yields a similar outlook (Chart 3).

Chart 2: Threshold Value Estimate - $c(2)$



Source: Authors' calculations.

Chart 3: The Estimated Coefficient of the Deviation from the Threshold Value - $c(1)$



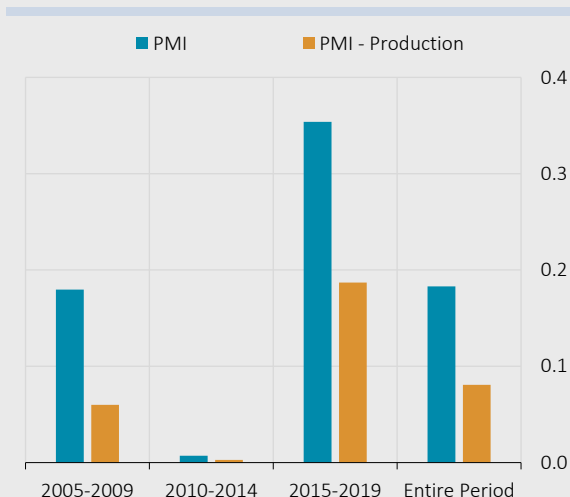
Source: Authors' calculations.

When the impact of the quarterly change in the PMI on manufacturing output, $c(3)$, is examined for the entire period, it is found that the coefficient is statistically significant at the 0.18 value³. This observation indicates that during recovery periods following a contraction (for instance during the first half of 2009), even though the index remains below the threshold value, an increase in the index may imply a rise in manufacturing output. The estimated coefficient of the PMI change obtained from the regression for the 2015-19 period increases to 0.35, suggesting a rise in the importance attributed to the change in the index. When the analysis is repeated for the production sub-index, the coefficient estimate increases over time, and the t-value, which expresses the statistical significance, rises as well (Charts 4 and 5).

³ The horizontal line in Chart 5 indicates the critical value.

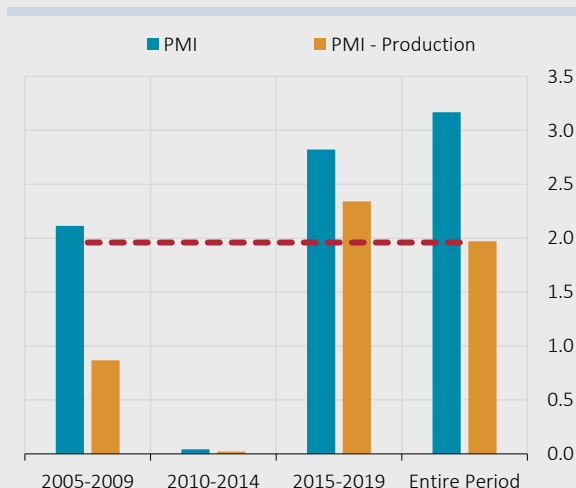
When the explanatory power of the estimated equation is examined, it is observed that the adjusted coefficient of determination (R^2) assumes a high value in the analysis conducted for the entire period. Yet, the estimations conducted for the five-year periods reveal that the adjusted coefficients of determination tend to decrease, and their explanatory power weakens considerably for the 2015-19 period (Chart 6). On the other hand, the inclusion of the PMI change in the equations increases the adjusted coefficients of determination in the analyses carried out for sub-periods (except for the 2010-14 period) and for the entire period.

Chart 4: Estimated PMI Change Coefficient - $c(3)$



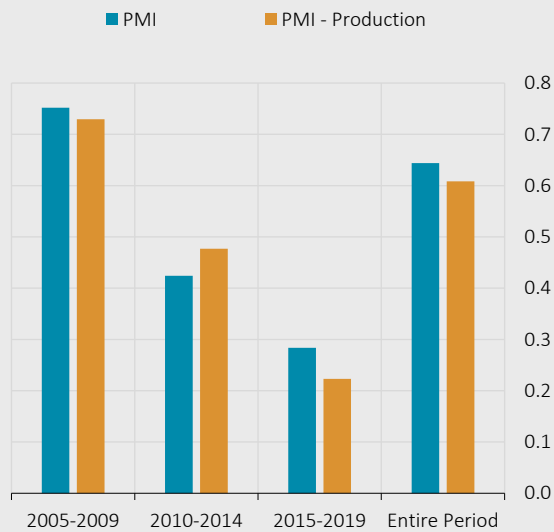
Source: Authors' calculations.

Chart 5: Statistical Significance of the PMI Change Coefficient (t-value)



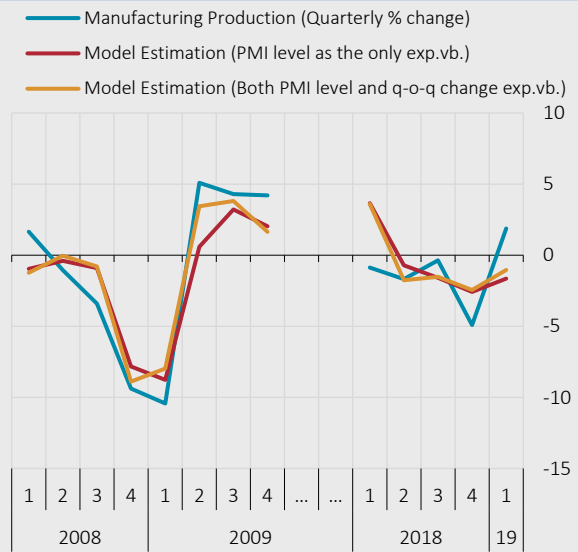
Source: Authors' calculations.

In this box, we examined the explanatory power of PMI indicators, which are frequently monitored to obtain information regarding the course of economic activity, to explain the quarterly percentage change of manufacturing output. Our findings reveal that the change in the index matters as much as the index level and that the threshold level differs from the 50 level. When the analysis is repeated for sub-periods, the coefficient estimates may vary and lose their statistical significance. Our estimations for the headline PMI and for the last 5-year sub-period suggest that both the threshold value and the explanatory power of a deviation from this level decreased while the importance attached to the change in the PMI rose. Therefore, we assess that drawing conclusions about manufacturing output by simply comparing the headline PMI value with the 50 threshold might be misleading. Nonetheless, even when the change in the index is factored in, the relation between the PMI and manufacturing output seems to have weakened in recent years (Chart 7). Sectoral contributions to the manufacturing industry change periodically, and therefore the relation between hard data and surveys, which have relatively fixed sampling, may weaken over time. For instance, despite the relatively positive recent performance of sectors such as other transport equipment and basic pharmaceutical products, the weakening in sectors linked to construction, motor vehicles and machinery-equipment might account for the fall in the information content of the index.

Chart 6: Adjusted Coefficient of Determination (R^2) Values

Source: Authors' calculations.

Chart 7: Manufacturing Output and Model Estimations



Source: Authors' calculations.

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Box 4.2

The Position of Turkey in Global Value Chains

When we take a look at the general tendency in the global economy, we see that production, trade and investments are subject to a process called global value chains, where different stages of production are conducted in different countries. The fact that stages of production take place in different sectors and countries has led to a significant rise in the volume of global trade. Therefore, countries that create the greatest amount of value added in the value chains have become important players in world trade. Thus, understanding the position of countries in global value chains and how this position evolves over time is an important consideration in terms of the size of share obtained from the global trade pie.

Recently, the international trade literature has shown growing interest in the notion of *upstreamness* in, which has been developed as a metric to measure the distance of a certain industry from its final use (Antrás et al. 2012). It shows the required number of production stages until the final usage and reflects the capability of countries in creating value added. For an economy where there is N-available number of industries, the upstreamness measure of an industry $i \in \{1, \dots, N\}$ is defined as follows:

$$U_i = 1 \cdot \frac{F_i}{Y_i} + 2 \cdot \frac{\sum_{j=1}^N d_{ij} F_j}{Y_i} + 3 \cdot \frac{\sum_{j=1}^N \sum_{k=1}^N d_{ik} d_{kj} F_j}{Y_i} + 4 \cdot \frac{\sum_{j=1}^N \sum_{k=1}^N \sum_{l=1}^N d_{il} d_{lk} d_{kj} F_j}{Y_i} + \dots \quad (1)$$

Here the total output of industry i and its use as a final good are denoted as Y_i and F_i , respectively. And d_{ij} is the dollar amount of industry i 's output required to produce one dollar's worth of industry j 's output. The more upstream an industry is, the greater number of production stages its output visits, and the more value added is created in each respective sector. Notice that the output of industry i is used both as a final good and as an intermediate good by other sectors in the value chain. It can be seen from equation (1) that the initial industry in the value chains is denoted as i and the terminal industry where its output is finally converted to final good is shown as j . Other intermediate industries between i and j are described as l and k (in this case we assume there are four different industries in the economy). The output of industry i is processed in both of these intermediate sectors to gain value until it meets the industry j , i.e., final demand. To better grasp the tendency of the usage of the output of sector i by the other sectors, Antrás and Chor (2013) suggest computing the (weighted) average position of industry i 's output in the value chain, by multiplying each terms in equation (1) by their distance from final use plus one and dividing by the output of sector i . To illustrate, let's consider the initial industry i . If the output of sector i is not used by the other sectors in value chains as an intermediate good, then only the first term at the right hand side of equation (1) will be meaningful and since the total output equals the final use, upstreamness will take a value of one. If the output of sector i is used as an input only by sector j , then the first two terms at the right hand side of the equation will constitute the related upstreamness measure. Furthermore, if the output of sector i is first processed by sector k and then then used as an input by sector j , the upstreamness of sector i will depend on first three terms. Thus, upstreamness is an analytical measure showing the required number of stages until the final use. The industries whose outputs are directly consumed are expected to have an upstreamness value close to 1 whereas those whose outputs are supplied to other sectors as an input are expected to have an upstreamness value largely above 1. Values closer to 1 imply that the respective output is destined directly for final use.

For example, Antrás et al. (2012) provide the upstreamness values for a list of industries, in which upstreamness of the petrochemical industry is 4.65. That means the output of petrochemical industry is used in at least four different sectors before meeting the final demand. Similarly, the upstreamness of the breakfast cereal industry is 1.05. In other words, the upstreamness value of a sector producing intermediate goods will inevitably be different from that of a sector producing final goods.

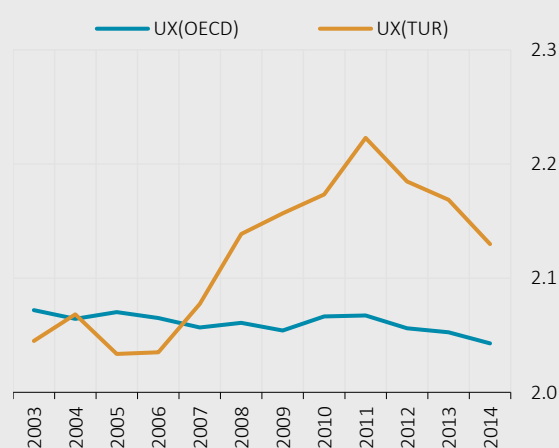
This box explores the position of Turkey in global value chains in comparison with OECD countries within the context of upstreamness. To this end, we compute export and import upstreamness values of Turkey¹ and show how they have evolved in time.² We use the following measures by Antrás and Chor (2013):³

$$U_{TUR,t}^M = \sum_{i=1}^N \frac{M_{TUR,it}}{M_{TUR,t}} U_i \quad U_{TUR,t}^X = \sum_{i=1}^N \frac{X_{TUR,it}}{X_{TUR,t}} U_i$$

Here $M_{TUR,it}$ ($X_{TUR,it}$) shows the value of Turkey's imports (exports) for product type i at time t ; $M_{TUR,t}$ ($X_{TUR,t}$) denotes the total value of imports (exports) at time t . U_i is the upstreamness value for each sector i . An increase in import upstreamness means Turkey processes the imported goods within its domestic plants to create more value added in each production stage instead of consuming as final goods. If the export upstreamness falls, Turkey's export composition starts consisting of final products aimed to be directly served to the final foreign demand. Following the same reasoning, if the import upstreamness decreases, Turkey starts losing its capability to create value added to the imported products in domestic plants while the increase in export upstreamness shows the tendency for Turkish export composition to comprise relatively intermediate goods in world markets. In the latter case, other countries can have an advantage to seize the opportunity to bring more value added to the products imported from Turkey.

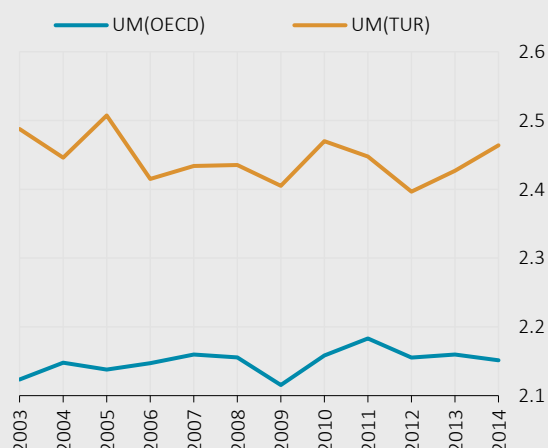
The charts below depict the evolution of export and import upstreamness between 2003 and 2014.

Chart 1: Evolution of Turkey's Export Upstreamness relative to OECD Countries



Source: CBRT calculations.

Chart 2: Evolution of Turkey's Import Upstreamness relative to OECD Countries



Source: CBRT calculations.

1 United Nation's UN Comtrade Database provides the export and import values of countries between 2003 and 2014 at available HS4 product categories.

2 Antrás et al. (2012) list the upstreamness values of 426 different industries in terms of 6-digit IO codes. Export and import upstreamness values are computed by weighting the upstreamness value of each industry in the list of 426 different sectors with their corresponding export and import values in UN Comtrade Database using a concordance mapping between HS4 and IO codes.

3 Antrás et al. (2012) conduct a series of rank correlation tests to stress that industry level upstreamness values of 426 sectors are indeed stable attributes across OECD countries and the export and import upstreamness values computed using these upstreamness values are assumed to be standard comparison measures.

While Turkey was mostly exporting final goods compared to the OECD average towards 2007, its relative position changed subsequently. Until 2011, Turkey's export composition became more intermediate goods-oriented. Given the relative fall in the average OECD export upstreamness, we can affirm that other countries had an opportunity to contribute more value added to Turkey's export products during the respective period (Chart 1). On the other hand, Turkey's import upstreamness displayed a rather wavy pattern well above the OECD average during the same period (Chart 2). This means Turkey was able to add more value to the products it imported from foreign markets relative to OECD countries. The difference between the import and export upstreamness denotes the span of production stages, which shows the depth of production stages operated within the domestic economy that can create value added. When we consider the rise in export upstreamness between 2006 and 2011 together with the import upstreamness that took relatively similar values both in the beginning and at the end of the same period, we observe a fall in the number of production stages that can create value added. However, after 2011, these factors worked in the opposite direction: the rise in import upstreamness, accompanied by the rapid fall in export upstreamness, had a positive impact enlarging production stages, hence creating more value added.

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