

4. Supply and Demand Developments

In the fourth quarter of 2018, economic activity remained subdued, consistent with the outlook presented in the January Inflation Report. In this quarter, the rebalancing process that started in the second quarter became more evident. The strong contribution from net exports continued to curb the domestic demand-led slowdown in economic activity.

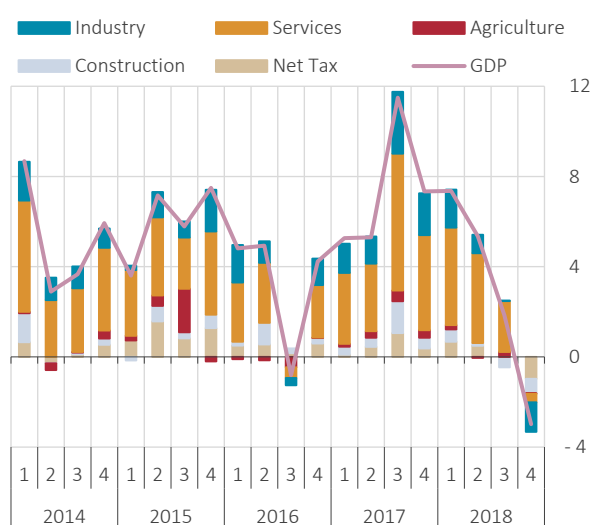
On the back of the policy steps and the measures taken, financial volatility and risk premium indicators displayed a partial improvement. Thus, backed also by the government spending, domestic demand and economic activity recovered following the contraction in the second half of 2018. On the other hand, despite the improvement in exports, the contribution of net exports to quarterly growth declined due to the partial increase in imports in response to domestic demand developments.

The tightness in financial conditions and the weak labor market outlook continue to limit domestic demand. While firms' orientation towards external markets amid sluggish domestic demand and their flexibility in market diversification stimulate exports of goods, lagged effects of exchange rates and the weak economic activity restrain import demand. Amid mild domestic demand and the sustained contribution of net exports to growth, the economic rebalancing process is projected to continue in 2019, with aggregate demand conditions pulling inflation down. In addition to geopolitical developments, the recent rise in uncertainties over global economic activity keeps downside risks to growth alive through the channels of both capital flows and foreign trade.

4.1 Supply Developments

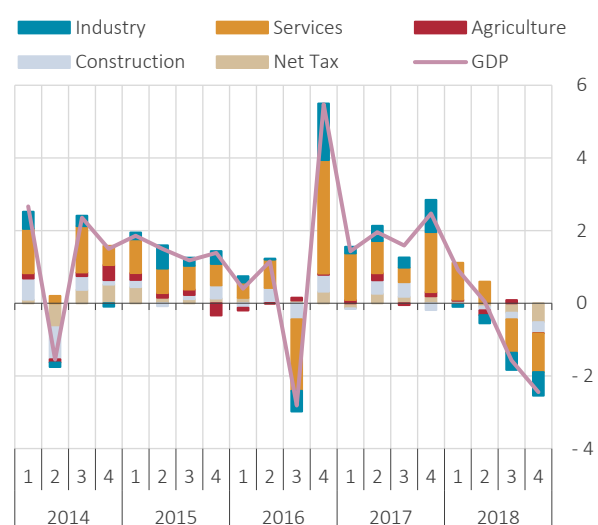
In the fourth quarter of 2018, gross domestic product (GDP) contracted by 3% year-on-year and by 2.4% quarter-on-quarter, adjusted for seasonal and calendar effects. Thus, in 2018, GDP grew by 2.6% in annual terms. In the fourth quarter, the slowdown in economic activity spread across the majority of the sectors, and the value added, both annually and quarterly, declined in all main industries (Chart 4.1.1 and Chart 4.1.2). The services sector that grew by 4.4% throughout 2018 remained the largest contributor to annual growth thanks also to the strong recovery in tourism.

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



Source: CBRT, TURKSTAT.

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

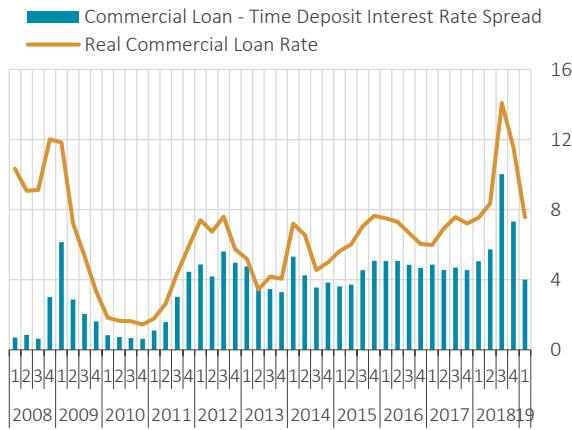


Source: CBRT, TURKSTAT.

Financial conditions that tightened due to the exchange rate volatility and increased risk premium weakened economic activity in the second half of 2018 (Chart 4.1.3). The favorable course of financial volatility and risk premium indicators as well as the partial improvement in financial conditions caused by

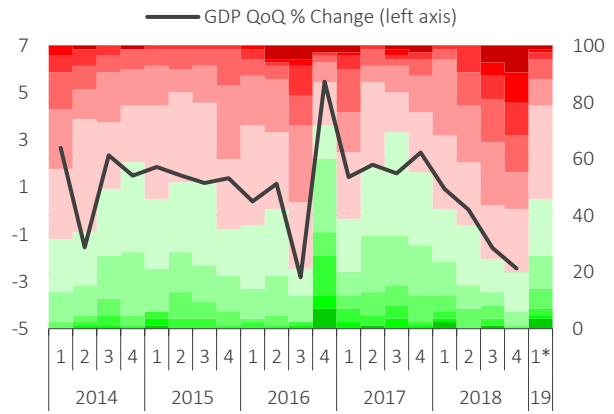
policy steps and measures taken underpinned economic activity in the first quarter of 2019. (Chart 4.1.4 and Box 4.3). In this quarter, the supportive stance of the public sector became a significant determinant of the economic recovery.

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



Source: CBRT.
* Deflated by 12-month ahead CPI expectations.

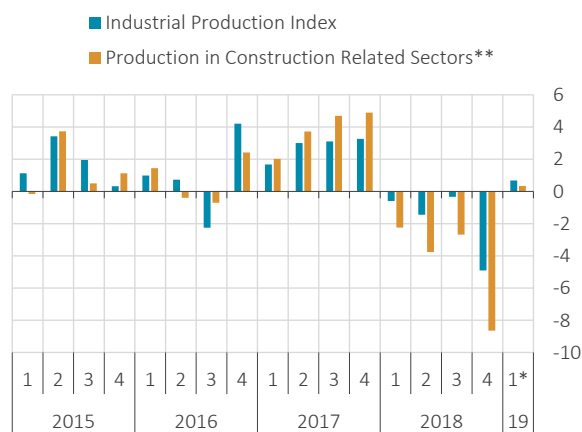
Chart 4.1.4: Economic Activity Heat Map and Quarterly GDP Growth**



Source: Details on the methodology and sources of data are given in Box 4.3.
*As of 25 April.
**Larger area in green denotes favorable course in a larger portion of the indicators monitored with respect to economic activity.

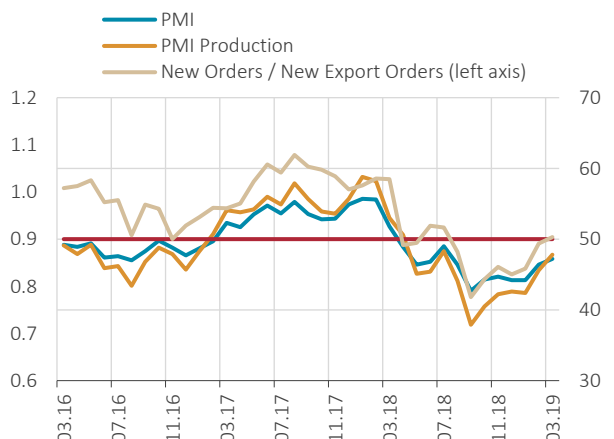
Economic activity in the industrial sector displays a partial recovery. While industrial production decreased by 6.2% year-on-year in the January-February period, the seasonally adjusted data suggest a 0.7% increase compared to the last quarter (Chart 4.1.5). In this period, while exporting sectors maintained a relatively favorable outlook, the contraction observed in the construction-related sectors throughout 2018 lost pace. In the January-February period, the gold-excluded exports quantity index increased further and domestic turnover indices reveal the support of domestic demand for industrial production. The survey data signal that the recovery in industrial production continued also in March (Chart 4.1.6).

Chart 4.1.5: Industrial Production Index (Seasonally Adjusted, Quarterly % Change)



Source: CBRT, TURKSTAT.
* January-February average.
**Includes rubber-plastics, other minerals, base metal industry and fabricated metal products.

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

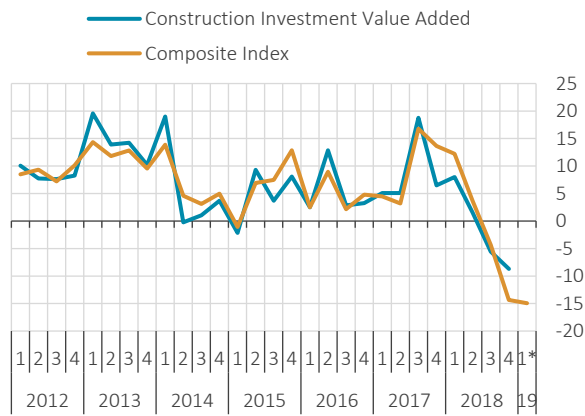


Source: IHS Markit.

Construction activity remains weak. In the last quarter of the year, the construction sector value added continued to decrease on a quarterly basis and contracted by 8.7% annually. The industrial production

and employment, along with the composite indicator of construction, suggest that the ongoing annual decline in the sector's value added continued in the first quarter (Chart 4.1.7 and Chart 4.3.4). Of the confidence index indicators for the construction sector, the building activity over the past three months and current order books remained moderately weak in the first half of the year (Chart 4.1.8).

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

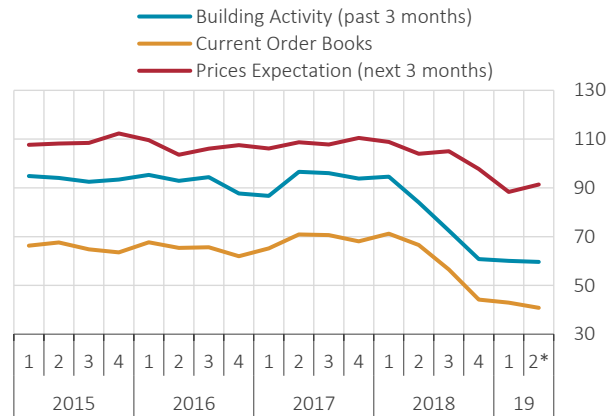


Source: CBRT, TURKSTAT.

*As of February.

**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 of Construction* (Seasonally Adjusted, Level)

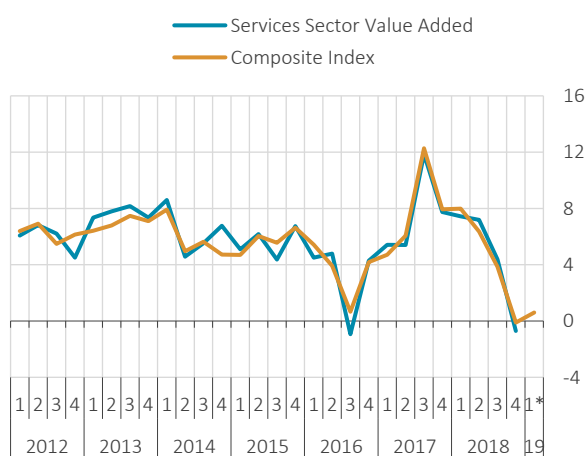


Source: TURKSTAT.

* As of April.

In addition to the downward trend in industry and construction sectors, services sector activity also weakened in the last quarter of 2018 (Chart 4.1.9). Indicators for the first quarter point to a partial recovery in the services sector. Confidence indices also signal that the services sector activity has started to recover (Chart 4.1.10). In sum, production, sales and foreign trade indicators pertaining to the first quarter imply recovery in industrial and services sectors, yet a relatively weaker outlook in the construction sector.

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

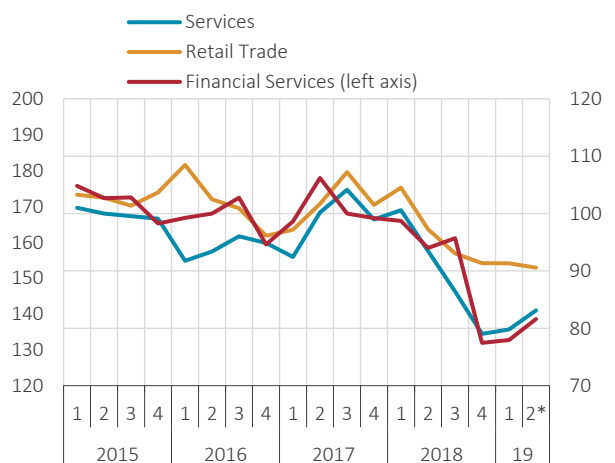


Source: CBRT, TURKSTAT.

* As of February.

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

Chart 4.1.10: Sectoral Confidence Indices (Seasonally Adjusted, Level)



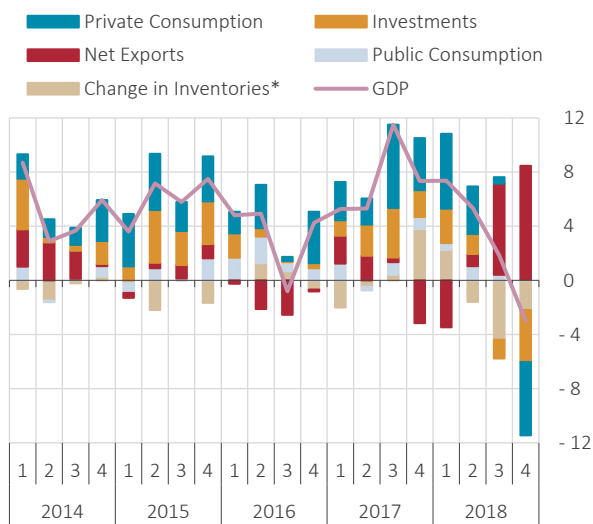
Source: CBRT, TURKSTAT.

* As of April.

4.2 Demand Developments

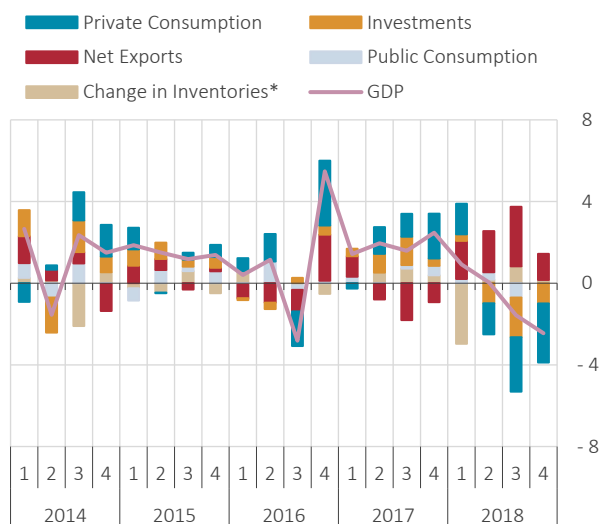
On the expenditures side, the fourth-quarter GDP data suggest that the economic slowdown was driven by domestic demand and net exports restrained the decline in economic activity (Chart 4.2.1 and Chart 4.2.2). The significant quarterly contraction in private consumption expenditures led by the ongoing financial volatility, the fall in real incomes and the weakening employment persisted in the last quarter. This contraction was mainly evident in durable goods demand but also seen in the consumption of both goods and services. Amid the depreciation of real exchange rates and rising financing costs, machinery-equipment investments plunged in quarterly terms. Construction investments also continued to fall in this quarter. While exports of goods and services increased to a limited extent in the fourth quarter, imports of goods and services continued to decrease due to the slowdown in domestic demand and the depreciation of real exchange rates. Thus, the economic rebalancing process remained in place, with net exports becoming the main driver of growth throughout 2018.

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



Source: CBRT, TURKSTAT.
* Includes inventories and statistical discrepancy due to chain linking.

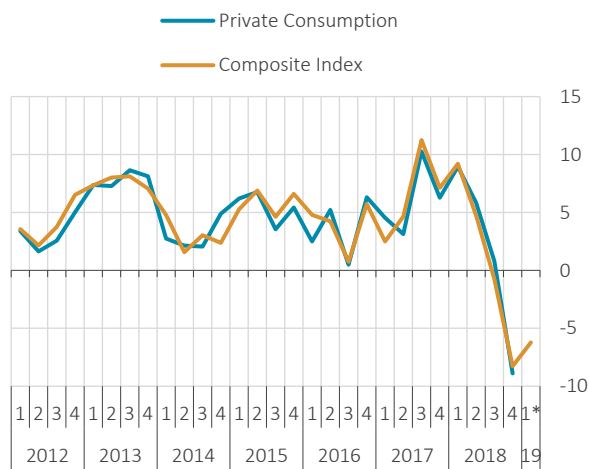
Chart 4.2.2: Contributions to Quarterly GDP Growth from the Expenditure Side (% Points)



Source: CBRT, TURKSTAT.
* Includes inventories and statistical discrepancy due to chain linking.

Private consumption recovered in the first quarter of 2019. While automobile and white goods sales posted quarterly increases in the first quarter, the domestic real turnover in non-durable goods also increased in the January-February period. The increase in the durable goods demand was partially attributable to tax cuts. The composite indicator that encapsulates consumption-related indicators implies that private consumption expenditures decreased annually but increased quarterly in the first quarter (Chart 4.2.3).

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

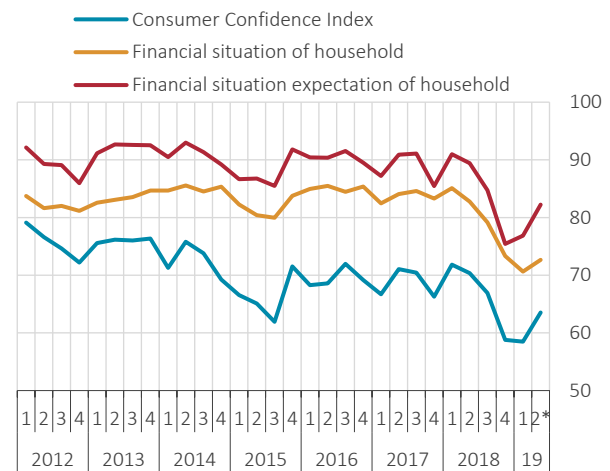


Source: Ministry of Treasury and Finance, CBRT, TURKSTAT.

* As of February.

** 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)



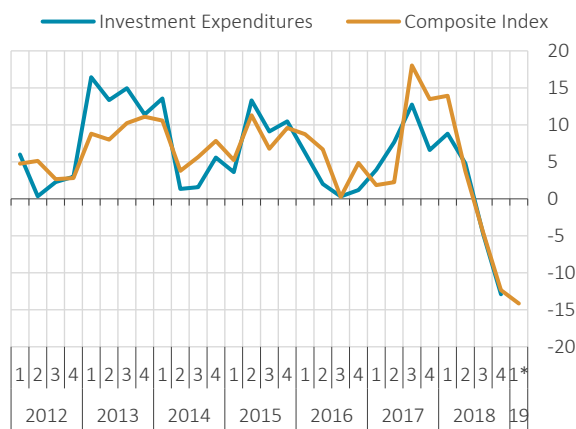
Source: TURKSTAT.

* As of April.

The weakening trend in the consumer confidence index was contained in the first quarter and improved by April in the second quarter (Chart 4.2.4). Amid the weak outlook in the labor market, the contribution of private consumption to growth may remain limited in the upcoming period.

Investments remain weaker than consumption. Imports of investment goods posted a significant rise in February, hence increased in the January-February period compared to the previous quarter. Production of investment goods dropped by a small margin in the same period. The related indicators signal a persistent contraction in investment expenditures on an annual basis without implying a noticeable recovery in quarterly terms (Chart 4.2.5). Although government capital expenditures and transfers increased, the total investment demand remained muted in this quarter (Chart 4.2.6).

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

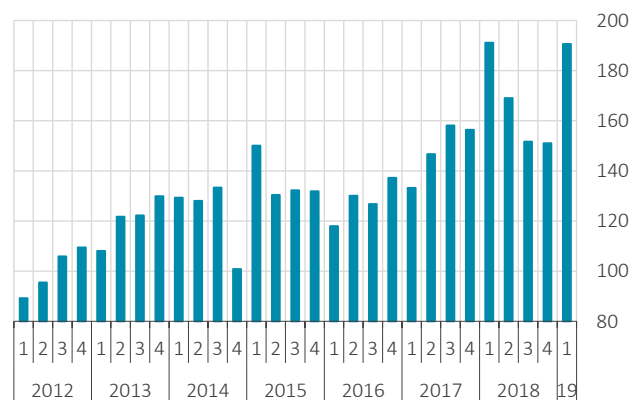


Source: CBRT, TURKSTAT.

* As of February.

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

Chart 4.2.6: Central Government's Capital Expenditures and Transfers* (Seasonally Adjusted, Real, 2012=100)



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

* Deflated by CPI.

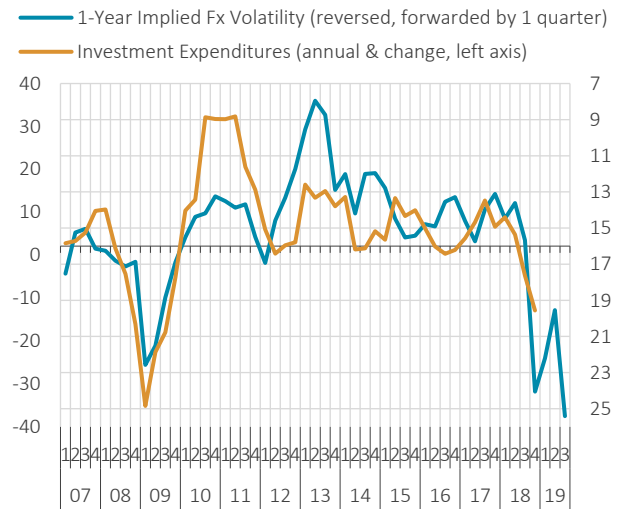
The Business Tendency Survey (BTS) points to an improvement in the investment trend for the next 12-month period, which hovers at higher levels in exporting sectors (Chart 4.2.7). On the other hand, the high course of financial volatilities and perceptions of uncertainty put a cap on investment expenditures (Chart 4.2.8).

Chart 4.2.7: Fixed Capital Investment Tendency by Sectors Based on BTS (Seasonally Adjusted, Up – Down, %)



Source: CBRT.
* As of April.

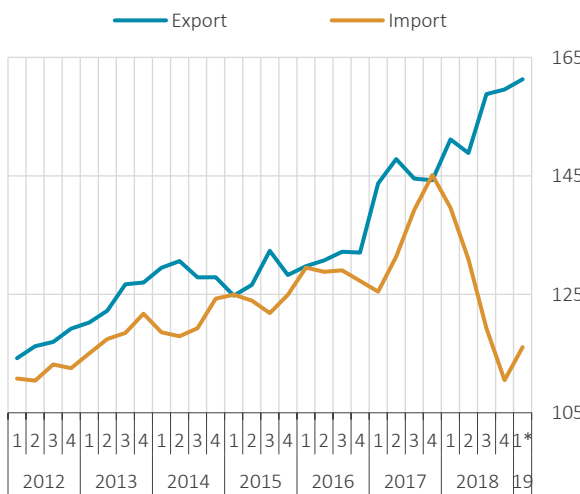
Chart 4.2.8: Investment Expenditures and Exchange Rate Volatility*



Source: Bloomberg, TURKSTAT.
*As of 25 April.

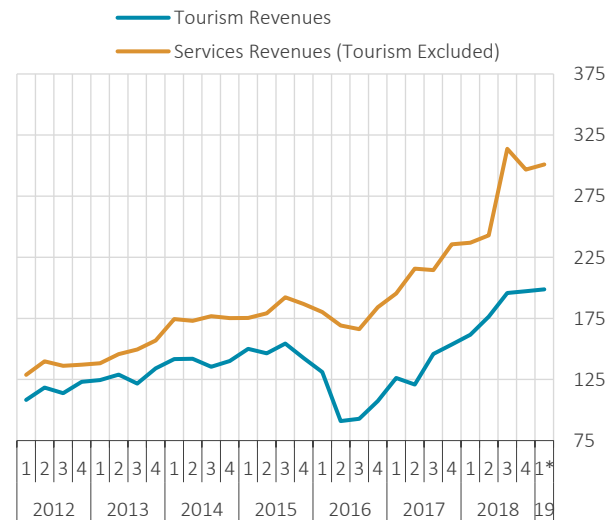
In the first quarter, while net exports' strong contribution to annual growth continued, its support to quarterly growth weakened. This is mainly attributed to the increase of imports on the back of the recovery in domestic demand (Chart 4.2.9). The export of goods was supported by firms' tendency to reach out to foreign markets and by their market diversification flexibility in response to the cumulative depreciation of real exchange rate and the slowdown in domestic demand (Box 4.4). In fact, despite signs of slowdown in the global growth outlook, the increase in gold-excluded goods exports accelerated and services revenues maintained their strong course (Chart 4.2.9 and Chart 4.2.10).

Chart 4.2.9: Quantity Indices for Exports and Imports (Excl. Gold, Seasonally Adjusted, 2010=100)



Source: CBRT, TURKSTAT.
* Actual figures for January and February, forecast for March.

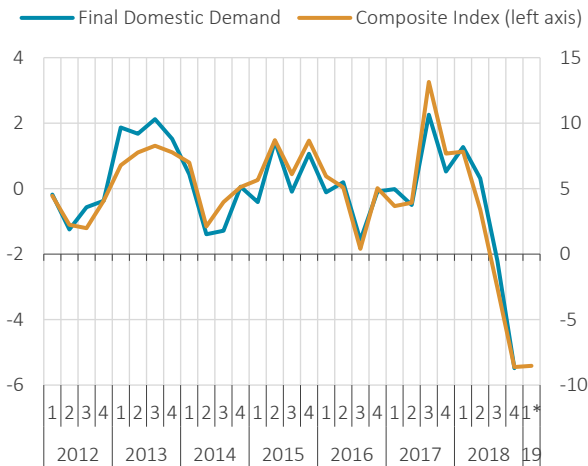
Chart 4.2.10: Tourism and Services Revenues (Real, Seasonally Adjusted, 2010=100)**



Source: CBRT, TURKSTAT.
* Actual figures for January and February, forecast for March.
** Deflated by CPI.

In sum, indicators for the first quarter suggest a recovery in economic activity. Composite indicators for final domestic demand signal a contraction in annual, but an increase in quarterly terms (Chart 4.2.11 and Box 4.2). It is expected that net exports will maintain their strong contribution to annual growth while making a smaller contribution to quarterly growth (Chart 4.2.12).

Chart 4.2.11: Final Domestic Demand and Composite Indicator (Annual % Change)**

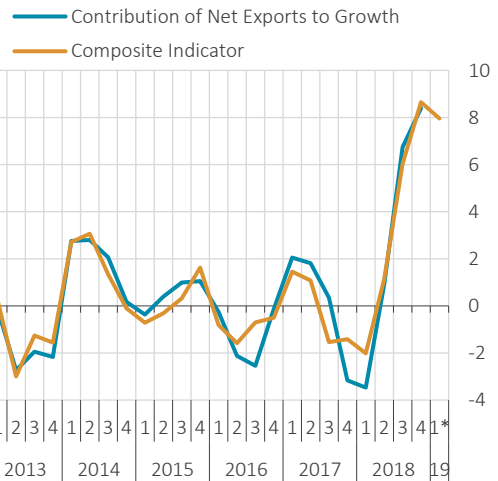


Source: Ministry of Treasury and Finance, CBRT, TURKSTAT.

* Indicators for production and turnover are as of February and those for tax and loans as of March.

** Composite indicator is the first principal component of annual percentage changes of 10 different indicators selected among domestic turnover, industrial production, tax revenues and loans. Selection of variables is based on the most frequently repeating indicators in four-variable models in Box 4.2, Table 2.

Chart 4.2.12: Contribution of Net Exports and Composite Indicator (% Points)**



Source: CBRT, TURKSTAT.

* Actual figures for January and February, forecast for March.

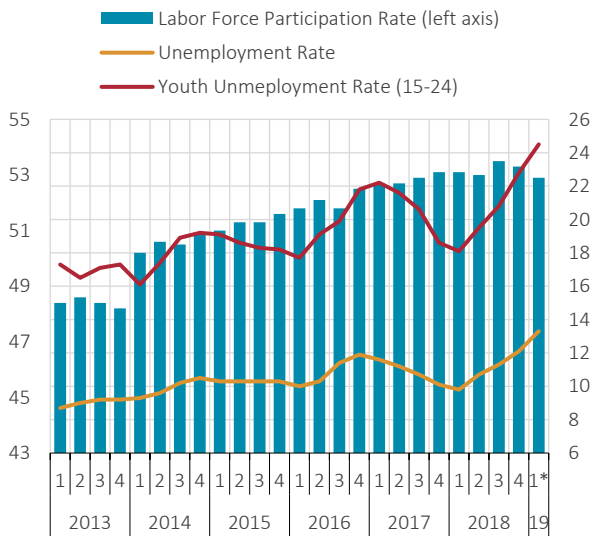
** Composite indicator has been formed by using data for exports and imports of goods and the number of international passengers. Weights obtained from linear regression.

In 2019, economic rebalancing is estimated to remain strong and aggregate demand conditions are expected to exert downward pressure on inflation (Box 4.1). In addition to geopolitical developments, the recent rise in uncertainties over the global economic activity outlook keeps downside risks to growth alive through the channels of both capital flows and foreign trade. The recently rising financial volatility and risk premium also add to the downside risks to domestic demand and the economic activity outlook.

4.3 Labor Market

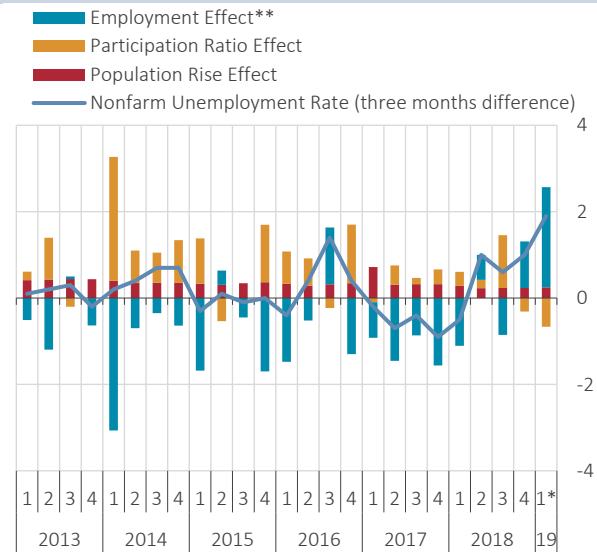
The rise in the unemployment rate that started in the second quarter of 2018 continued also in the last quarter (Chart 4.3.1). Seasonally adjusted total and non-farm unemployment rates increased by 0.8 and 1.0 points to 12.1 and 14.2%, respectively, compared to the third quarter. Thus, total and non-farm unemployment rates stood at 11% and 12.9%, respectively, throughout 2018. While this rise in the last quarter of 2018 was mainly driven by losses of employment, decrease in labor force participation limited this rise (Chart 4.3.2). A similar outlook also prevailed in the first quarter of 2019. Seasonally adjusted total and non-farm unemployment rates covering December 2018 as well as January and February 2019 became 13.3% and 15.5%, respectively.

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



Source: TURKSTAT.
* As of the January period.

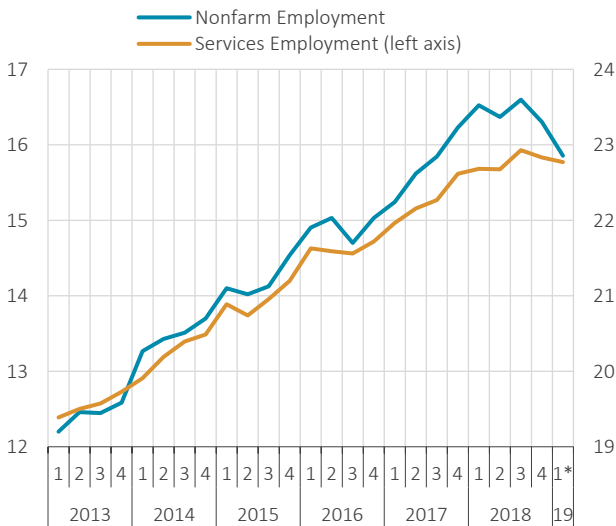
Chart 4.3.2: Contributions to Quarterly Changes in Non-Farm Unemployment (Seasonally Adjusted, % Points)



Source: CBRT, TURKSTAT.
* As of the January period.
** Employment growth pulls non-farm unemployment down.

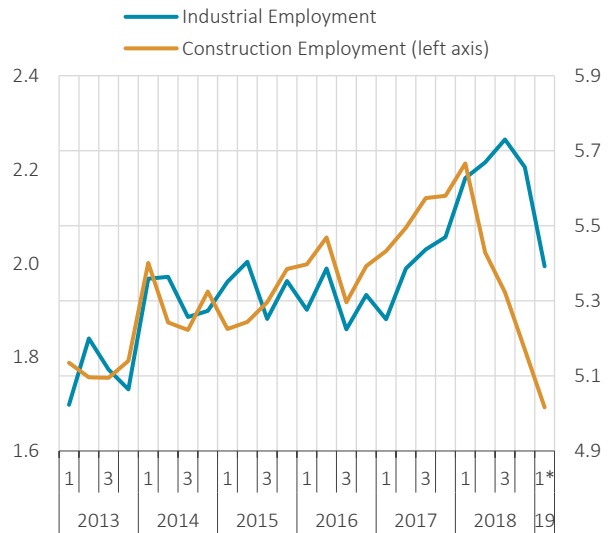
In the last quarter of 2018, non-farm employment decreased by 1.2% compared to the third quarter, with losses of employment diffusing across sectors (Chart 4.3.3 and Chart 4.3.4). Data pertaining to the January period suggest an ongoing decline in employment in the early months of the year and higher rates of employment loss in industry and construction sectors. Employment in the services sector decreased to a limited extent compared to other sectors, yet remained weak across sub-sectors (Chart 4.3.5).

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



Source: TURKSTAT.
* As of the January period.

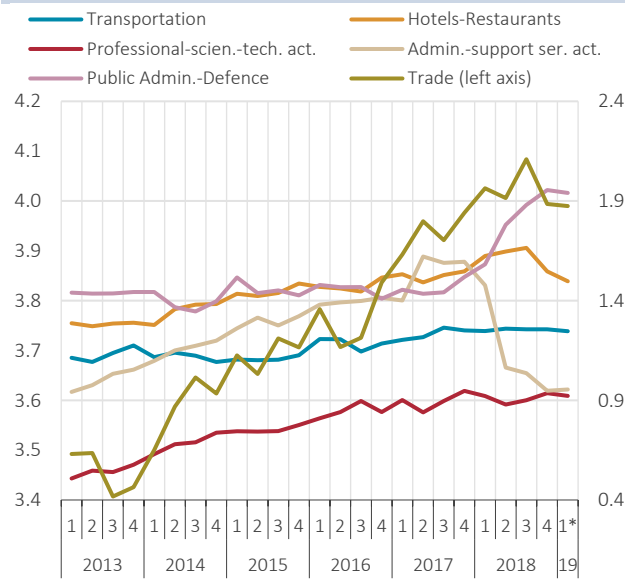
Chart 4.3.4: Industrial and Construction Employment (Seasonally Adjusted, Million People)



Source: TURKSTAT.
* As of the January period.

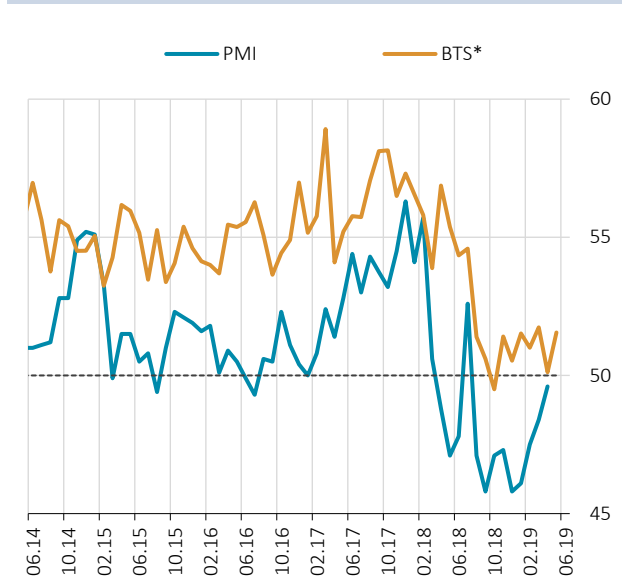
Industrial production data pertaining to the first quarter imply a partial recovery on a quarterly basis in the first quarter. The recovery in production reflected positively on industrial sector employment expectations, which resulted in increases, albeit limited, in employment expectations of the industrial sector in the first quarter (Chart 4.3.6).

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



Source: CBRT, TURKSTAT.
* As of the January period.

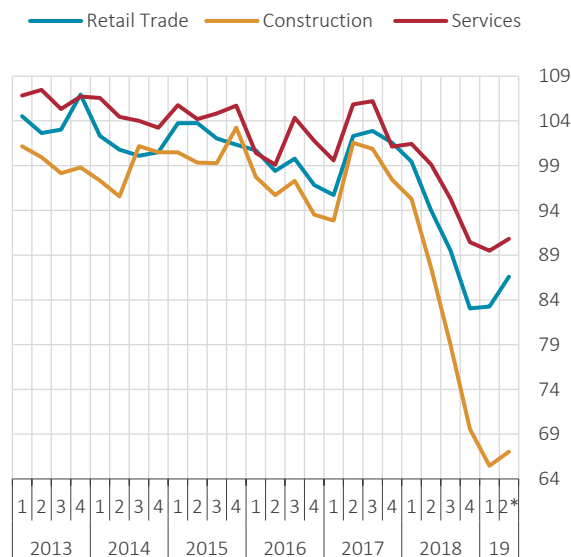
Chart 4.3.6: Industrial Sector Employment Expectations
(Seasonally Adjusted, Up – Down, %)



Source: IHS Markit, CBRT.
* BTS indicator's neutral level has been set at 50 in line with the PMI. The latest data for BTS is as of April, while that of PMI is March.

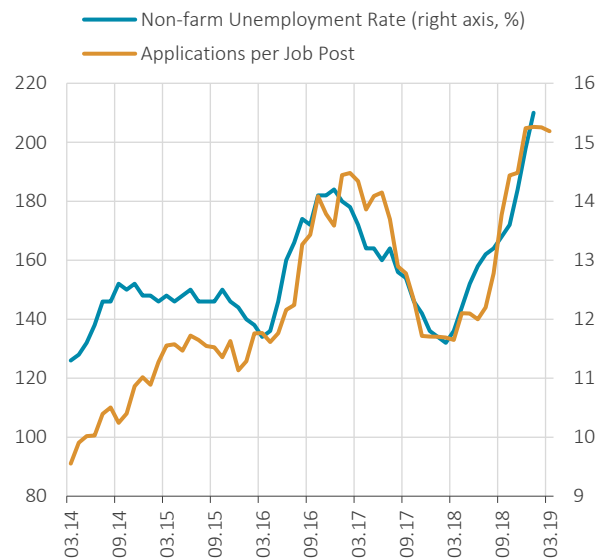
The partial recovery observed in domestic demand in the first quarter had positive implications for the labor force market. Data pertaining to April suggest mild increases in employment expectations in the construction, trade and services sectors (Chart 4.3.7). It is noteworthy that the number of applications per job posting on Kariyer.net, which moves in tandem with the non-farm unemployment rate, has recently flattened out (Chart 4.3.8).

Chart 4.3.7: Expected Number of Employees by Sectors for the Next 3 Months
(Seasonally Adjusted, Level)



Source: TURKSTAT.
* As of January.

Chart 4.3.8: Applications per Posting on Kariyer.net and Non-Farm Unemployment*
(Seasonally Adjusted)

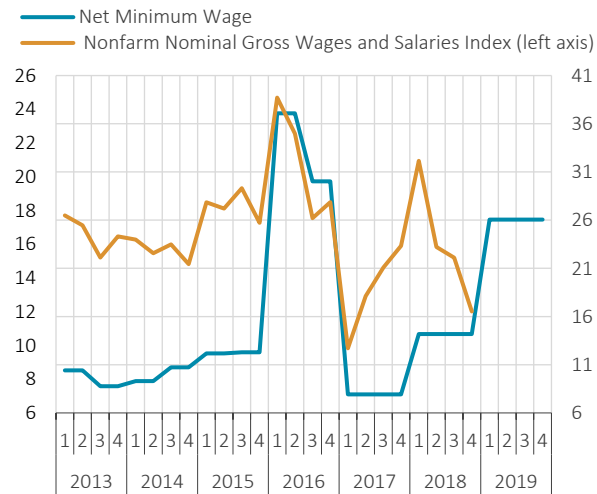


Source: Kariyer.net, CBRT, TURKSTAT.
* Kariyer.net data is as of March, unemployment rate as of January.

4.4 Wages and Productivity

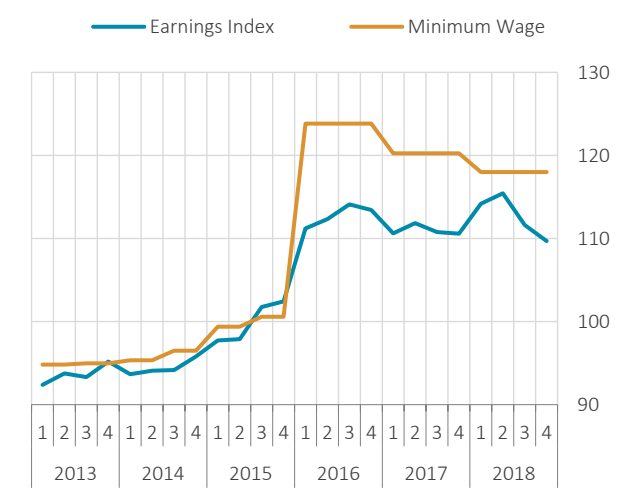
In the last quarter of 2018, during which the uptrend in unemployment rates continued, the annual rate of increase in nominal wages stood at 12%, below the inflation rate, hence driving an annual decline in real wages (Chart 4.4.1). The decrease in the seasonally adjusted real earnings index, led by the soaring inflation, continued also in the last quarter (Chart 4.4.2).

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



Source: MLSS, CBRT, TURKSTAT.

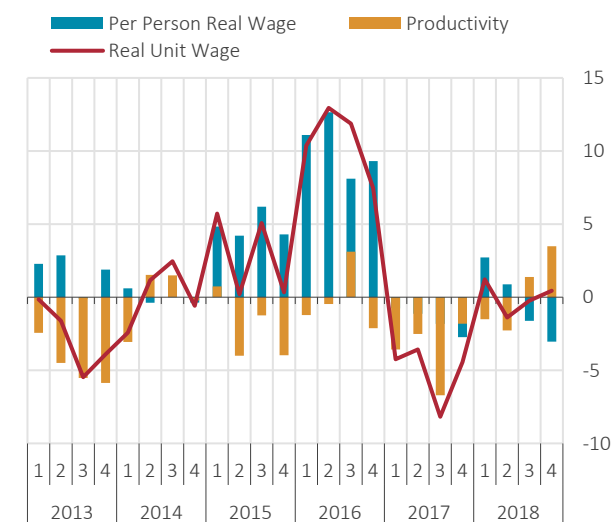
Chart 4.4.2: Non-Farm Hourly Earnings Index and Minimum Wage* (Seasonally Adjusted, 2015=100, Real)



Source: CBRT, TURKSTAT.
* Deflated by the CPI.

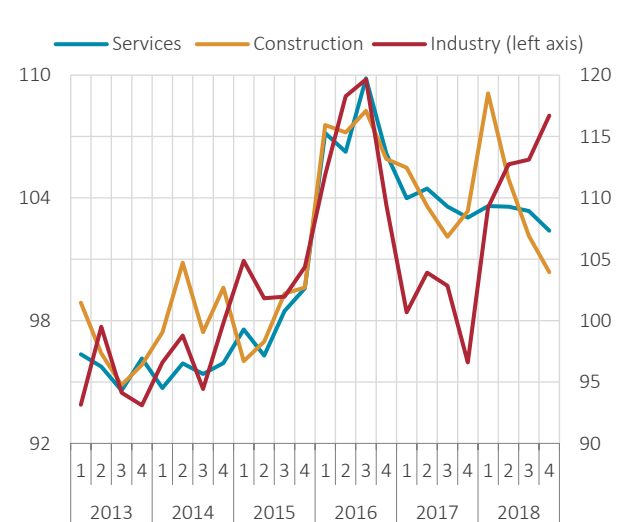
In periods when economic activity contracts, as production reacts more promptly than employment, partial labor productivity decreases. Actually, in the third quarter of 2018, partial labor productivity decreased by 1.4% year-on-year, yet this decrease reached 3.5% in the last quarter. However, since per capita real wage declined by a lower rate in the same quarter, real unit wages (per capita real wage/productivity) increased by a limited margin compared to the same period last year (Chart 4.4.3).

Chart 4.4.3: Partial Labor Productivity*, Per Capita Real Wages and Real Unit Wages (Non-farm, Annual Contribution)**



Source: CBRT, TURKSTAT.
* Non-farm value added/non-farm employment (HLFS). Inverted values are given for productivity series in the Chart.
** Per capita real wage x employment/value added.

Chart 4.4.4: Real Unit Labor Costs* by Sectors (Seasonally Adjusted, 2015=100)



Source: CBRT, TURKSTAT.
* Real labor cost/productivity (value added/HLFS employment).

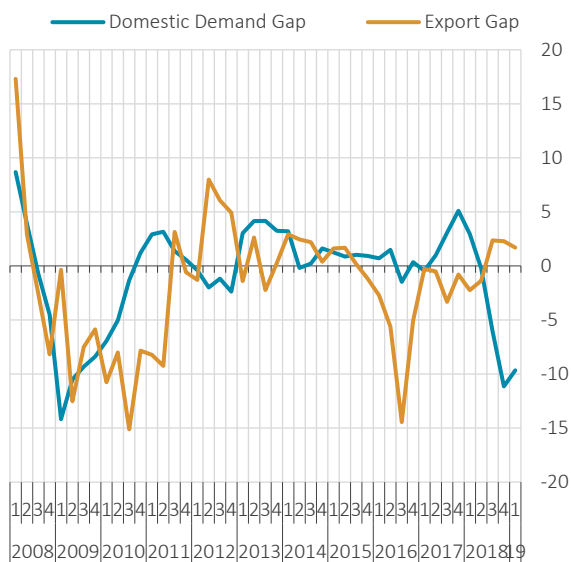
In the last quarter of 2018, the seasonally adjusted real labor cost per hour index decreased in the services and construction sectors, yet remained flat in the industrial sector. An analysis of productivity by sectors reveals that productivity losses in the services and industry sectors continued whereas the sharp fall of employment in the construction sector led to an increase in the sector’s partial labor force productivity. In the last quarter, while the real unit labor cost increased in response to a flat labor cost, it continued to decrease in other sectors (Chart 4.4.4).

Minimum wage, economic activity and inflation developments have a determining role in wage increases. An assessment of 2019 indicated that the 26-percent-rise in the minimum wage has an upward effect on wage increases across the economy; however, the output gap outlook and the weak course of the labor force market are expected to have a restrictive effect on wages. Nevertheless, it is estimated that high levels of inflation will continue to affect wages through indexation. In conclusion, the wage increases in 2019 are expected to be higher than the previous year due to the minimum wage adjustment and backward indexation, but this rise is expected to be partially curbed by economic activity and labor market outlook.

4.5 Output Gap

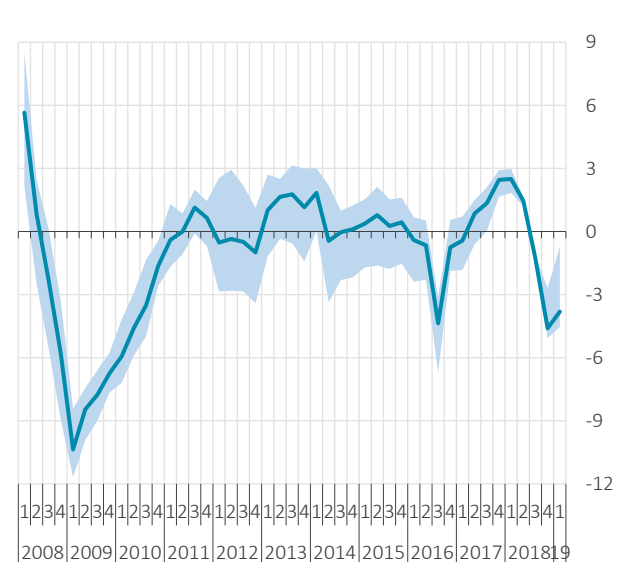
To assess the cyclicity of the economy and the demand-driven pressures on inflation, the CBRT monitors output gap indicators estimated by several methods.¹ Based on the breakdown of the output gap by its components, exports, despite a slight deceleration, are estimated to have hovered above their long-term trend in the first quarter of 2019 (Chart 4.5.1). However, the disinflationary contribution of aggregate demand conditions became more noticeable in the last quarter of 2018 due to the weak domestic demand. In fact, output gap’s maximum-minimum band compiled from various indicators suggests that economic activity has been well below its potential despite the recovery seen in the first quarter of 2019 (Chart 4.5.2).

Chart 4.5.1: Breakdown of Output Gap by Demand Components*



Source: CBRT calculations.
 * 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.

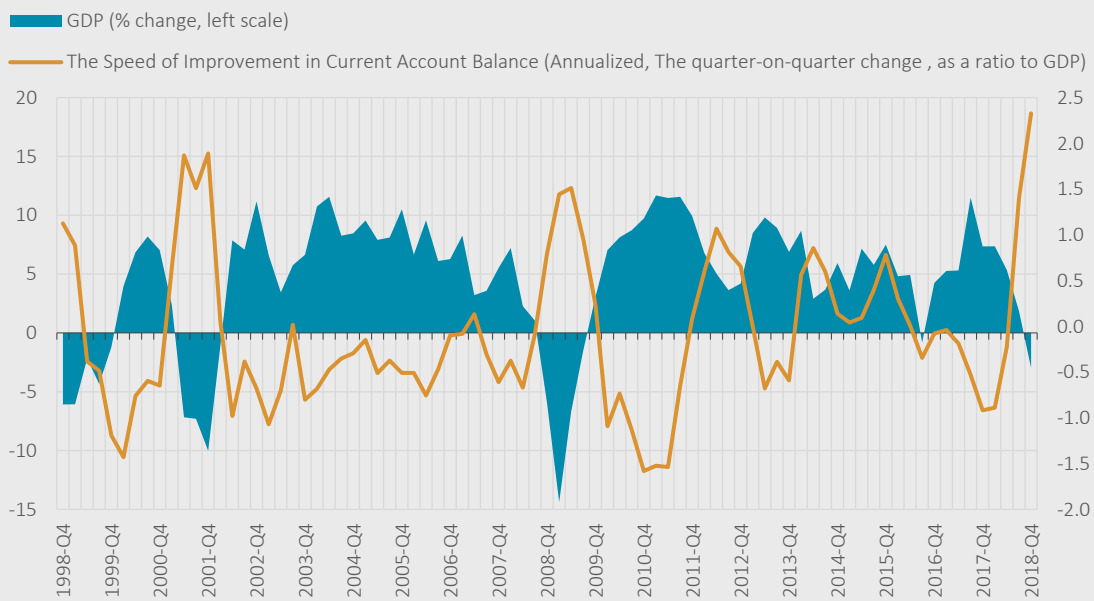
¹ See Inflation Report 2017-1, Box 4.2, “Alternative Indicators for Output Gap”, pp. 55-59.

Box 4.1.

Sources of the Rapid Improvement in the Current Account Balance

The improvement trend in the current account balance, which started in the third quarter of 2018, continued in the first quarter of 2019 thanks to the strong performance in exports of goods and services as well as the contraction in domestic economic activity. Indeed, the ratio of current account deficit to GDP, which had reached 6.6% in the second quarter of 2018, is estimated to have fallen below 2% in the first quarter of 2019. Historically, improvement in current account deficit in Turkey is usually observed in periods of significant contraction in economic activity. However; the recent improvement in current account deficit has different features compared to the previous periods. First of all, the improvement has the highest pace and magnitude among all the previous periods. Secondly, the rapid improvement occurred in a period in which economic activity was about to balance out and the decline in national income was gradual levels (Chart 1).

Chart 1: The Speed of Improvement in Current Account Deficit and GDP



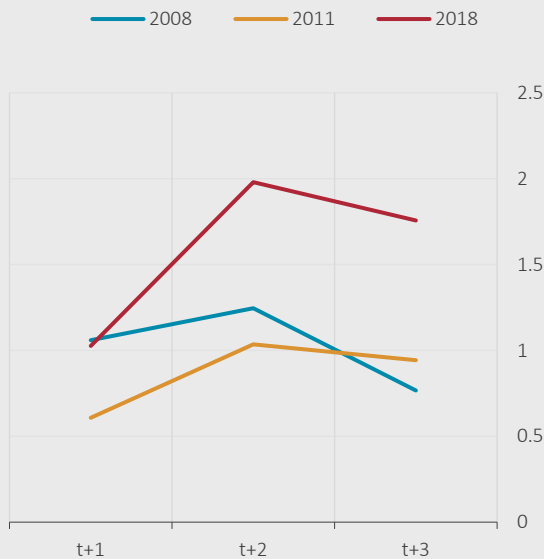
Source: TCMB calculations.

When compared to the 2008 global financial crisis and the 2011 eurozone debt crisis, there are substantial differences with respect to the magnitude and the sources of the improvement observed in the current account balance in 2018 (Chart 2 and 3). Chart 2 compares the improvement in current account balance, in 2008, 2011 and 2018, as a ratio of GDP for three successive quarters. Accordingly, the improvement in 2018 exceeded the improvement in other episodes, with respect to both the pace and the magnitude of the decline in current account balance. Chart 3 shows the magnitude and components of the improvement in the current account deficit for each of these three periods. The equation used for the comparison is shown below:

$$cab_t - cab_{t-1} = (x_t - x_{t-1}) - (m_t - m_{t-1}) + (r_t - r_{t-1}) \quad (1)$$

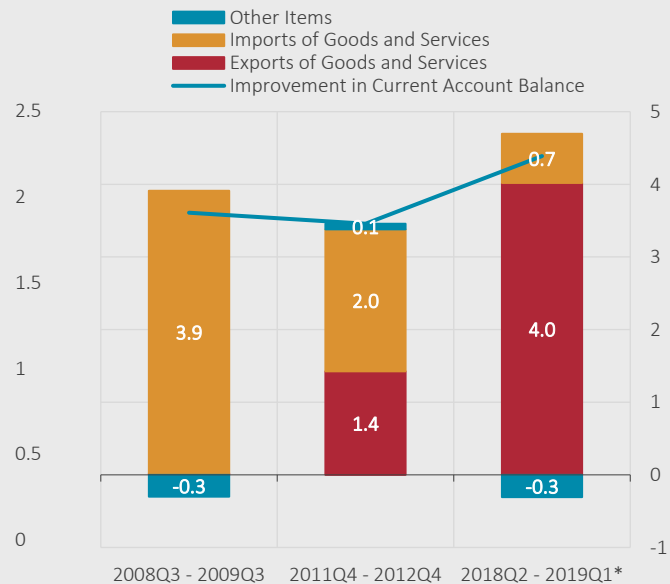
In equation (1), cab stands for current account balance, x and m denote the export and import of goods and services, respectively and finally r is the other components of current account balance. All of the variables are shown as a ratio to GDP, in terms of US Dollars.

Chart 2: The Speed of Improvement in Current Account Balance
(The Quarter-on-Quarter Change in the Ratio of Annual Current Account Deficit to GDP)



Source: TCMB calculations.

Chart 3: The Contributions to Improvement in Current Account Balance
(Annualized, as a Ratio to GDP)



* The values for May and February are used for 2018 Q2 and 2019 Q1, respectively. The end of the year value in 2018 is used to compute the ratio to GDP for February 2019.

While the ratio of the current account balance to GDP improved by approximately 3.5 percentage points in 2008 and 2011; the improvement in the period covering the second quarter of 2018 and the first quarter of 2019 was around 4.5 percentage points. Meanwhile, there are significant discrepancies between the compositions of improvement in these periods. During the 2008 global crisis and the 2011 Eurozone debt crisis, when foreign demand was low and the lira was above its historical averages in real terms, the improvement in current account deficit was mainly attributed to the fall in imports of goods and services and there was no positive contribution from exports of goods and services to the current account balance particularly during the global crisis period. Unlike these episodes, the positive contribution from exports of goods and services became a main source of improvement in the current account balance in the latest episode.

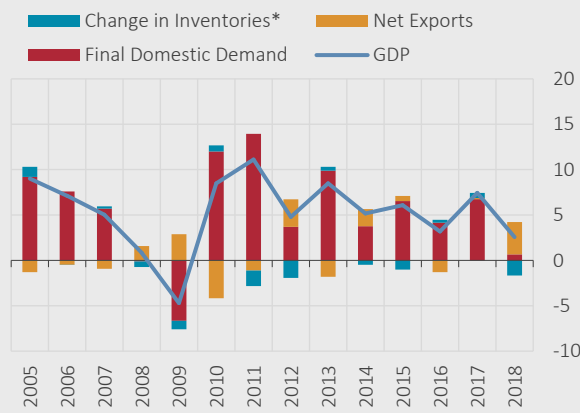
To sum up, currently, unlike the 2008 and 2011 periods, the relatively robust foreign demand conditions and the historically low levels of real exchange rates support exports of goods and services. This support provides steady and solid contribution to the recent bulk improvement in current account deficit. In this respect, the improvement in current account deficit is expected to continue in the first half of 2019 and to provide more positive contribution to the economic rebalancing process.

Box 4.2

Short-Term Forecasts of Domestic Demand

An analysis of the contribution of expenditure components to annual GDP growth shows that final domestic demand is generally the main driver of growth for the Turkish economy, while the relative contribution of net exports varies over time (Chart 1).¹ In addition to the level of growth itself, the domestic and external demand composition of growth is also important for main macroeconomic indicators such as inflation and current account that factors in the decision making process by policymakers (Chart 2). In this regard, it is important to determine the indicators that have information content about the recent trends of expenditure components.

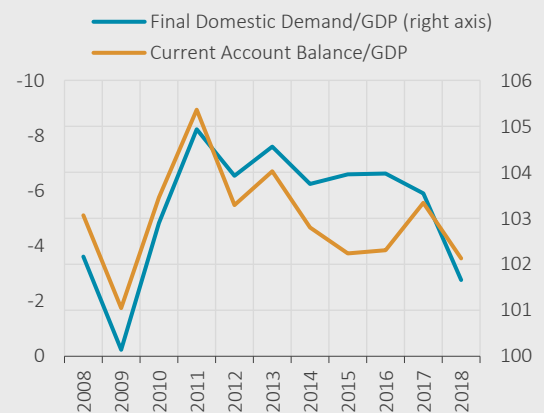
Chart 1: Contribution to Annual GDP Growth (% Points)



Source: CBRT, TURKSTAT.

* Includes statistical discrepancy.

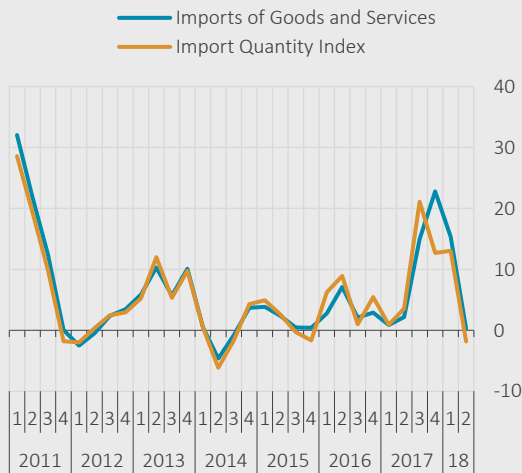
Chart 2: Share of Final Domestic Demand and Current Account Balance in GDP (%)



Source: CBRT, TURKSTAT.

In order to monitor developments in exports and imports of goods and services, which are published on a quarterly basis as part of the national accounts, there are monthly published indicators that are directly related to these components. For example, the monthly import quantity index that is published by TURKSTAT within 40-45 days following the relevant month displays similar movements to the imports of goods and services released within the scope of national accounts (Chart 3).

Chart 3: Imports of Goods and Services and Import Quantity Index (Annual % Change)



Source: TURKSTAT.

Chart 4: Exports of Goods and Services and Export Quantity Index (Annual % Change)²

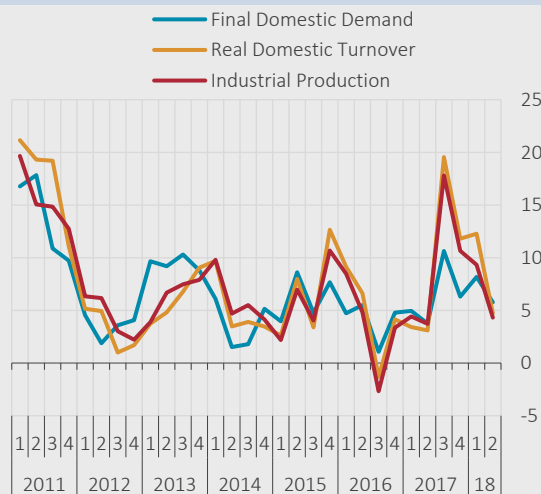


Source: CBRT, TURKSTAT.

The relationship between the export quantity index and the exports of goods and services under the national accounts is relatively weaker (Chart 4). The reason for this is that tourism and transportation revenues, which are evaluated within the scope of services exports, have a significant share in exports of goods and services. When goods exports and services revenues under the balance of payments data are used together, there is a relatively strong relationship with national accounts-defined exports of goods and services. Thus, timely information on net export developments can be obtained following the relevant monthly indicators.

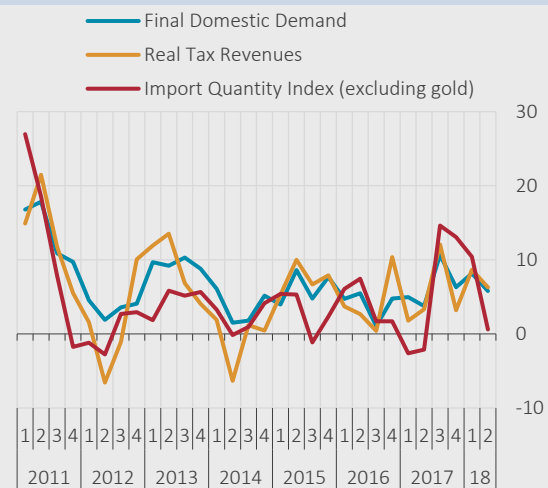
Indicators such as domestic real turnover in industry, industrial production, real tax revenues and import quantity index are expected to be related to domestic demand. The relationship between final domestic demand growth and these indicators is not as strong as the one observed between exports and imports of goods and services and related indicators of foreign trade (Charts 5 and 6). In this context, to monitor the developments in domestic demand, it is important to determine which indicators have more information content and develop forecast models accordingly. This box presents the results of an analysis based on the short-term forecast performance in the period of 2011-2018 conducted to determine the variables that may be useful for monitoring final domestic demand growth (Günay, 2019).

Chart 5: Final Domestic Demand, Real Domestic Turnover and Industrial Production (Annual % Change)



Source: CBRT, TURKSTAT.

Chart 6: Final Domestic Demand, Real Tax Revenues and Import Quantity Index (Annual % Change)



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

Indicators from the following groups are selected for short-term forecasts of final domestic demand: industrial production index, real domestic turnover index, import quantity index, vehicle and white goods sales, real tax revenues, central government real budget expenditures and real credit stock. In order to be able to interpret the results economically, a total of 50 indicators that are expected to be directly related to final domestic demand components are selected from a large pool of indicators from these groups.

Similar to Günay and Yavuz (2017), the analysis uses the advantage of the timeliness of indicators relative to GDP data. Bridge equations are estimated with year-on-year growth of final domestic demand at the quarterly frequency using the information set that would be available after the

¹ Final domestic demand is defined as the sum of consumption and investment.

² Services revenues and goods exports published in USD terms as part of the balance of payments data are converted to Turkish lira. Then, services revenues and goods exports are deflated with the consumer price index and non-domestic producer price index, respectively. The balance of payments-defined real exports of goods and services are obtained by aggregating these two components.

completion of the monthly data on the reference quarter. To evaluate the short-term forecast performance of the candidate indicators, regressions are estimated as in Equation 1. Since the GDP data are published at quarterly frequency, annual percentage changes are calculated by taking the quarterly averages of monthly indicators.

$$FDD_t = \beta_0 + \beta_1 \text{Candidate Indicator}_{1,t} + \beta_2 \text{Candidate Indicator}_{2,t} + \dots + u_t \quad (1)$$

For the 50 indicators used in the analysis, forecast performances of all combinations with one, two, three and four-variable models are examined through the recursive out-of-sample forecast exercise. The out-of-sample forecast performance is evaluated separately for 2011Q1-2013Q4, 2014Q1-2018Q2 and 2011Q1-2018Q2. The aim of analyzing sub-periods is to see whether the forecast performance is stable over time. Findings show that the lowest forecast error is achieved by using the average of the best-performing 10 models rather than using individual models (Table 1). This finding is consistent with the results obtained in the literature, which suggest that forecast combination yields better forecasts than relying on individual models (Stock and Watson, 2004).

Table 1: Best-Performing Models for 2014Q1-2018Q2

Number of Variables	Model	RMSE for 2014Q1-2018Q2*
Three	Average – Best-Performing 10 Models for 2014Q1-2018Q2	0.85
Four	Average – Best-Performing 10 Models for 2014Q1-2018Q2	0.87
Two	Average – Best-Performing 10 Models for 2014Q1-2018Q2	0.89
Three	Best-Performing Three-Variable Model for 2014Q1-2018Q2	0.92
Three	Average – Best-Performing 10 Models for 2011Q1-2018Q2	0.94

*RMSE: Root Mean Squared Error.

In addition to the analysis presented in Table 1 regarding the period averages, a comparison of the realizations and the forecasts via charts can give information about whether forecast errors increase substantially at certain times. In this context, forecasts and realizations are evaluated through charts, producing the following results:

- When the sensitivity of the forecast performance to the number of variables used in the models is analyzed, it is seen that the averages of the forecasts of the models estimated using two or more variables are close to each other (Chart 7).
- In Günay and Yavuz (2017), it is found that the forecast performance of the best 10 models selected separately for 2011Q1-2013Q4 and 2014Q1-2017Q1 substantially differs from one period to another. For final domestic demand, while there are occasional differences in the forecast performance of the best models selected for different sub-periods such as 2013 and the first half of 2018, the performances of models are relatively stable (Chart 8).

Chart 7: Forecasts of the Best 10 Models Based on the Performance in 2014Q1-2018Q2 and Realization (Annual % Change)

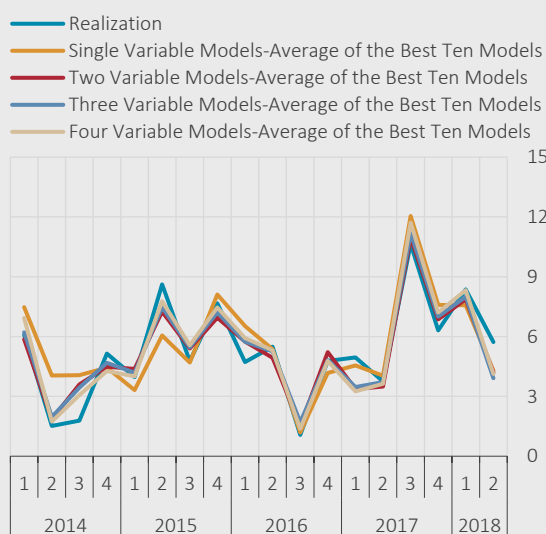
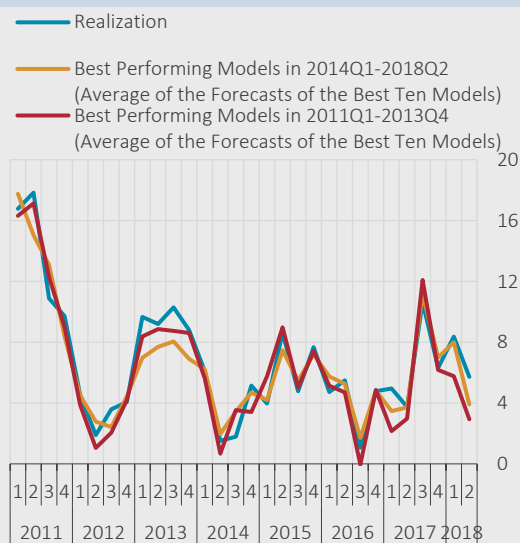


Chart 8: Performance of Three-Variable Models by Periods and Realization (Annual % Change)



Finally, for the 100 models that deliver the lowest forecast error for 2014Q1-2018Q2, indicators that most frequently appear in the one, two, three and four-variable models are examined (Table 2).

- Real domestic turnover indicators stand out in terms of contribution to the forecast performance. In addition to the total real domestic industrial turnover, the real domestic turnover in fabricated metal products, electrical equipment, capital goods and motor vehicles appear in the best-performing models relatively frequently. The fact that these are the indicators mostly related with investment and durable consumption goods expenditures implies that they are helpful in capturing the cyclical movements in the GDP.
- The industrial production index, indicators from real tax revenues, and housing credits also appear in the best-performing models.

Table 2: The Most Frequently Used 10 Indicators in the Best-Performing 100 Models*

Single-Variable Models	Two-Variable Models	Three-Variable Models	Four-Variable Models
IP-Total Industry	RDT- Electrical Equipment	RDT- Electrical Equipment	RDT- Electrical Equipment
IP- Electrical Equipment	RDT- Fabricated Metal Products	TAX- Total Tax Revenues	RDT- Fabricated Metal Products
IP-Machinery and Equipment	RDT-Capital Goods	RDT- Fabricated Metal Products	RDT-Total Industry
IP-Motor Vehicles	RDT-Total Industry	RDT-Capital Goods	TAX- Income Tax
RDT-Total Industry	IP-Total Industry	RDT-Total Industry	RDT-Capital Goods
RDT-Durable Consumption	TAX-Total Tax Revenues	RDT-Motor Vehicles	RDT-Motor Vehicles
RDT-Non-Durable Consumption	RDT-Machinery and Equipment	QM-Motor Vehicles	TAX- Total Tax Revenues
RDT-Capital Goods	IP-Machinery and Equipment	IP-Capital Goods	IP-Capital Goods
RDT-Other Non-Metallic Mineral Goods	IP-Capital Goods	IP-Total Industry	CR-Housing
RDT- Fabricated Metal Products	TAX- Stamp Tax	CR-Housing	IP-Total Industry

* For single-variable models, 50 models are used in the analysis. Indicators are listed in the order of their frequency. RDT: Real domestic turnover, IP: Industrial production index, TAX: Real tax revenues. QM: Import quantity index, CR: Real Credit Stock.

The composite indicator constructed using the indicators that stand out from the analysis presented above signals that in the first quarter of 2019, final domestic demand has declined relative to the same period of the previous year while it has increased relative to the last quarter of 2018 (Chart 4.2.11).

References

Günay, M. and Yavuz, A. A. (2017). "Revising the Short-term GDP Forecast Models with New National Income Series (in Turkish)", CBRT Research Notes in Economics No: 17/08.

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Box 4.3

Heat Map for Economic Activity in Turkey

Derivation of timely indicators that exhibit the current course of economic activity is important to effective implementation of economic policies. To this end, a heat map representation for Turkey is introduced in this box.

What is a Heat Map?

A heat map is a two-dimensional representation, in which variables are placed in rows and columns in a table format and the values in each cell are colored according to a scale. Heat maps are preferred because several variables can be displayed at the same time, ensuring an easier understanding of relationships between the variables and visual summary of the information content of comprehensive data sets.

Heat Map for Economic Activity in Turkey

One of the most important benefits of constructing a heat map for economic activity is to see the trends in different areas of the economy in a single graph. While providing information about the direction of the variables and economic activity, heat maps provide more limited information about the extent of the change in the economic activity.

In heat maps for economic activity, while columns indicate the time period, different approaches are adopted for the selection of row variables. Alternatives are using the level, the percentage deviation from trend, the percentage change, and standardized score of percentage change (z-score approach) of the variables.

In preparing the heat map for economic activity in Turkey, a z-score approach is preferred. Each colored cell in the heat map shows the interval into which the standardized value (z-score) of the seasonally and calendar-adjusted quarterly percentage change of the variable falls. The calculated z-score indicates the number of standard deviations the realized quarterly percentage change is above or below its historical mean.

The heat map is constructed using 85 indicators in 20 main headings (Table 1). The indicators were chosen to represent the main expenditure items (private consumption, public consumption, investments, export and import) that constitute the economic activity. All of the indicators are in real terms. Therefore, indicators originally available in nominal terms are deflated by the related price indices, which are Consumer Price Index (CPI), Domestic Producer Price Index and Non-Domestic Producer Price Index. In addition, instead of aggregate indicators, breakdowns that add up to the aggregates are preferred. For instance, instead of the Industrial Production Index (IPI), the five sectors that make up the IPI according to the MIGs classification are included in the heat map. The aim here is to reflect the differentiation in the components of an aggregate indicator, as they can move in different directions due to the conjuncture, and thus to display a more accurate economic outlook.

The heat map constructed by the indicators in Table 1 is presented in Figure 1. The z-scores in each cell of the map are colored by the tones of red and green, which indicate negative and positive z-scores, respectively. Each tone of the colors corresponds to 0.5-point interval of z-scores. As the colors get darker, the z-score increases in absolute terms. In other words, a darker red shows that the deceleration in the indicator grows stronger, whereas a darker green shows that the acceleration in the indicator grows stronger.

Table 1: Indicators in Heat Map

Main Headings	Series	# of series	Source
Shopping Mall Turnover Index (SMTI)*	Technology, Clothing, Shoes-Bags, Hypermarket, Food, Other	6	CSC
White Goods	Domestic Sales, Production, Exports, Imports	4	TURKBESD
Industry Domestic Turnover (DTI)**	Intermediate, Durable, Nondurable, Capital Goods and Energy	5	TURKSTAT
Industry Non-Domestic Turnover (NDTI) ***	Intermediate, Durable, Nondurable, Capital Goods and Energy	5	TURKSTAT
Export Volume Index (EVI)	Intermediate, Consumption and Capital Goods	3	TURKSTAT
Import Volume Index (IVI)	Intermediate, Consumption and Capital Goods	3	TURKSTAT
Ercan Türkan Consumption Index	Food, Non-food, Total, Total (including vehicles)	4	ETTE
Budgetary Expenditures *	Compensation of Employees, Social Security Contribution, Goods and Services Purchases, Capital Expenditures	4	MTF
Home Sales	First and Second Hand Sale (Mortgaged and Other)	4	TURKSTAT
Credit Stock*	Commercial (TRY), Commercial (FX, adjusted), Personal, Housing, Vehicle, Credit Card	6	BRSA
Company Establishment	Industry, Construction, Services	3	TOBB
Company Liquidation	Industry, Construction, Services	3	TOBB
Retail Sales Volume Index (RSVI)	Food, Non-food (exc. fuel), Automotive Fuel	3	TURKSTAT
Retail Payment System*	Total	1	CBRT
Industrial Production Index (IPI)	Intermediate, Durable, Nondurable, Capital Goods and Energy	5	TURKSTAT
Airline Statistics	Commercial Aircraft and Load (Domestic & International)	4	MTI
Maritime Load Statistics	Total Exports-Imports, Total Cabotage, Total Transit	3	MTI
Vehicles	Domestic Sales, Production, Exports (Auto, light-heavy comm. vehicles)	9	ADA, AMA
Foreign Visitors	Europe, CIS, America, Africa, Asia	5	CBRT
Tax Revenue*	Domestic VAT, VAT on Imports, SCT, Stamp Duties and Income Tax	5	MTF

* deflated by CPI or related CPI items.

** deflated by Domestic PPI.

*** deflated by Non-domestic PPI.

The intensification of red or green colors in the heat map provides information on whether the economic activity is in a contraction or expansion phase, and on the spread of the contraction/expansion across sectors. For example, in the third quarter of 2016, when seasonally and calendar-adjusted GDP contracted by 2.8 percent on a quarterly basis, the red colors intensified. However, in the rapid recovery recorded in the following quarter, the intensity of green colors increased significantly.

What Does the Heat Map Imply for 2019Q1 Growth?

As stated earlier, the explanatory power of heat maps for the direction of economic activity is more than their explanatory power for the extent of the change in economic activity.

Nevertheless, presentation of the z-scores as a percentage distribution may provide a better indication of the extent of the change in economic activity.

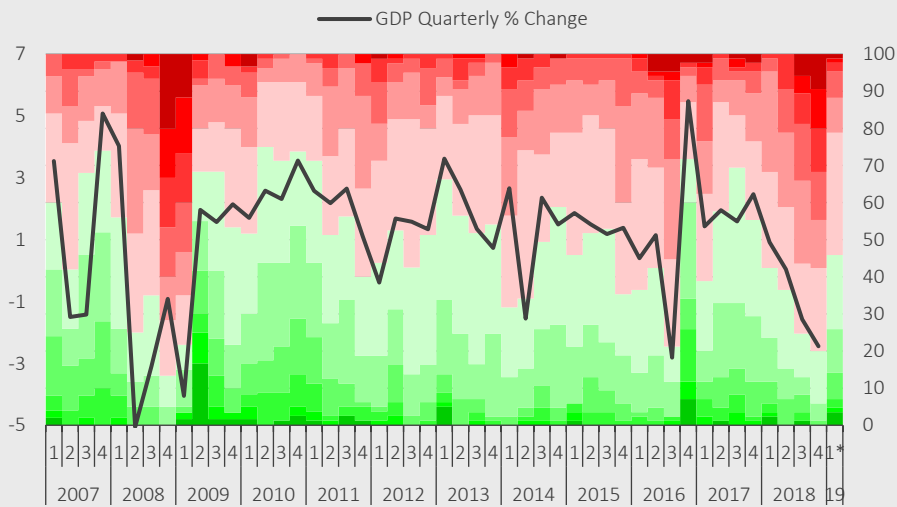
To illustrate the relationship between the heat map and percentage change of seasonally and calendar-adjusted GDP on a quarterly basis, the percentage distribution of the colors of z-score intervals and quarterly percentage change of GDP are graphed together (Figure 2). As depicted, in the quarters where economic activity contracted, negative z-scores in the heat map increased significantly. Similarly, when there is an increase in negative z-scores, the quarterly growth rate decelerates, and when there is an increase in positive z-scores, quarterly growth rate accelerates.

Figure 1. Heat Map for Economic Activity in Turkey



In this context, the relationship between the distribution of z-scores and the quarterly GDP growth is clearer compared to the heat map. Historically, in all contraction periods, the red colors are more common. Similarly, green-colored cells were denser in the strong growth period throughout 2017, while the number of red colors increased with the rebalancing process and the slowdown that started in the second quarter of 2018. However, it is noteworthy that this trend is interrupted in the first quarter of 2019 and there is a significant decrease in the number of indicators indicating a decline compared to past periods. Therefore, the heat map signals a mild recovery in the first quarter of 2019.

Graph 2: Percentage Distribution of Heat Map for Economic Activity in Turkey and GDP Quarterly Growth Rate



* The heat map is calculated with the available data as of April 25. Accordingly, the first quarter data of 50 of 85 series were completed, while for other variables the average of January-February was used.

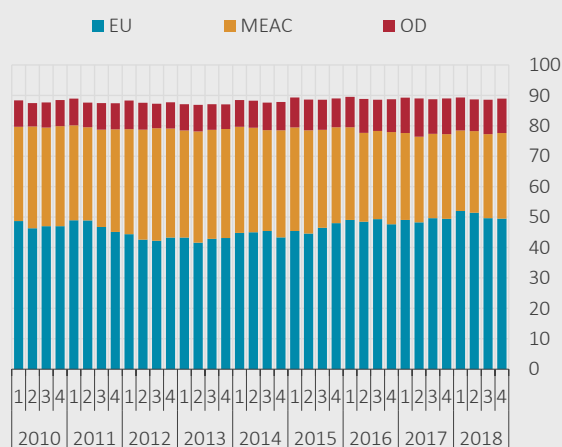
Box 4.4.

A Regional Breakdown of the Determinants of Exports

Understanding export dynamics is vital for projecting economic growth and the current account deficit. Export demand is basically determined by the income of trading partners and developments in the real exchange rate (as a measure of competitiveness). In this context, estimating demand and exchange rate elasticities and determining the drivers of exports emerge as a fundamental requirement for evaluating the current state of the economy and producing forecasts. Studies on Turkish exports are mostly focused on estimating aggregate exports while only a few studies offer a regional breakdown. However, Turkey's export partners vary widely in terms of level of development and geographical location, and hence, the dynamics of exports to different sub-groups can also differ significantly. Considering this, the elasticities mentioned above are likely to differ as well when a regional breakdown is made, and therefore, elasticities estimated at the macro level by using aggregate data may include aggregation bias.

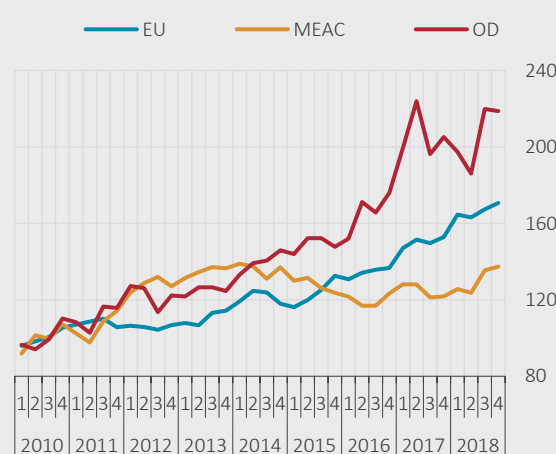
In this box¹, export dynamics are examined in three regions: the European Union (EU), Other Developed Countries (OD) and Middle East, Africa and the Commonwealth of Independent States (MEAC). For this purpose, regional export quantity indices are obtained by using sectoral nominal export data and unit value indices published by TURKSTAT.² Non-monetary gold exports are excluded when the quantity indices are being constructed. To capture regional demand changes, regional export-weighted income indices, which are based on real gross domestic product and export shares of the countries in each region, are used. Relative price changes are derived using the regional real exchange rate indices, which are obtained by using the CBRT's country set and methodology and take third-country effects into account. The analysis covers the period from the first quarter of 2003 (2003Q1) to the last quarter of 2018 (2018Q4).³

Chart 1: Regional Shares in Exports (Excluding Gold, % Share)



Sources: TURKSTAT and authors' own calculations.

Chart 2: Regional Export Quantity Indices (Seasonally and Calendar Adjusted, 2010=100)



Sources: TURKSTAT and authors' own calculations.

¹ This box presents the preliminary findings of the ongoing study by Eren, Kalafatçılar, and Yavuz (2019).

² TURKSTAT does not publish export quantity and unit value indices by country of destination but only nominal export figures in US dollars. Regional export quantity indices, excluding unprocessed gold are constructed by employing unit value indices for a total of 32 sectors according to SITC, Rev. 3, at either one digit or two-digit levels. In the first stage, for each region, sectoral real export figures are approximated by using both the sectoral nominal export figures for that region and the sectoral unit value indices in US dollars for total exports. These sectoral real export figures are then combined to estimate regional quantity indices.

³ The analysis for MEAC countries covers the period of 2005Q1-2018Q4.

The share of MEAC countries in Turkey's exports excluding gold fell by around 3 percentage points while the share of OD countries rose by 3 percentage points from 2010Q1 to 2018Q4 (Chart 1). On the other hand, the share of the EU remained around 49 percent despite its ups and downs during this period. Exports displayed a remarkable upward trend in all three regions until the end of 2014 but later followed notably different paths across the regions (Chart 2). Exports to the EU showed an uninterrupted upward trend in the post-2014 period, while exports to OD countries increased rapidly until the second half of 2017, but did not change significantly in the following periods and almost formed a plateau. Exports to MEAC decreased slightly in the period of 2015Q1-2016Q2, remained around the same level until the second half of 2018, and increased only marginally afterwards.

By employing the quantity indices obtained, we estimate export demand equations for each region through three different methods and observe to what extent income and relative price elasticities differ. All variables are introduced into the models in logarithmic terms. We present income and relative price elasticity estimates in Table 1 and Table 2. The alternative models used in the estimation are: (i) Vector Autoregressive Models (VAR), (ii) Error Correction Model, and (iii) Ordinary Least Squares (OLS). VAR and OLS estimations are computed with quarterly differenced data. Before the OLS estimation, the dependent variable is smoothed with a filter, and regional quantity indices are de-noised.⁴ Furthermore, the findings from the regional estimations are compared with those of total exports.

Table 1: Income Elasticity

	VAR ¹		Error Correction		OLS ²	
	Short	Long	Short	Long	Short	Long
EU	5.13**	3.80**	5.76***	3.31***	4.53***	3.61***
OD	2.60*	3.36*	3.89*	1.39***	2.70***	3.06***
MEAC	1.94*	3.64*	2.17***	1.69***	1.59***	2.09***
Total	3.87**	3.33**	2.58***	2.16***	4.23***	3.03***

***, ** and * correspond to 1, 5 and 10 per-cent significance levels, respectively.

¹ Elasticities are computed from the accumulated impulse-response functions. Short-run elasticity is calculated from the average of the first four quarters, while long-run elasticity is calculated from the values at the end of four years (16 quarters)

² Long-run elasticities are computed by adjusting short-run elasticities with the coefficients of lagged values of dependent variables used as explanatory variables.

⁴ De-noising is achieved by decomposing series into separate frequency components using discrete wavelet transform and then removing the highest frequency level (2 to 4 quarters).

Table 2: Relative Price Elasticity

	VAR ¹		Error Correction		OLS ²	
	Short	Long	Short	Long	Short	Long
EU	-0.18	-0.18	-0.15**	-0.18***	-0.17***	-0.13***
OD	-0.37*	-0.48*	-0.36**	-0.97***	-0.22***	-0.25***
MEAC	-0.42*	-0.48*	-0.21*	-0.02	-0.45**	-0.59**
Total	-0.15	-0.12	-0.07	0.06	-0.15***	-0.11***

***, ** and * correspond to 1, 5 and 10 per cent significance levels, respectively.

¹ Elasticities are computed from the accumulated impulse-response functions. Short-run elasticity is calculated from the average of the first four quarters, while long-run elasticity is calculated from the values at the end of four years (16 quarters)

² Long-run elasticities are computed by adjusting short-run elasticities with the coefficients of lagged values of dependent variables used as explanatory variables.

To sum up the findings from the three different methods executed for three regions and the total, the first point to be emphasized is that income elasticity is higher than that of relative price. Another important fact is that income elasticity is found to be higher for advanced countries, particularly for the EU. This finding is valid both in the long and short run. An equally important point is that the real exchange rate elasticity, for the statistical significance of which only limited evidence is obtained when aggregate data are used, displays a different outlook when regional data are employed. Findings from the models estimated for the EU, which constitutes almost half of Turkish exports, reveal that coefficients of the real exchange rate are either low or statistically insignificant. However, estimations for the remaining regions suggest statistically significant and larger coefficients. In other words, it is observed that when the focus is on aggregate exports with a macro view instead of regional details, the effect of the real exchange rate on exports cannot be gauged adequately due to the aggregation bias.

References

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