

## 4. Supply and Demand Developments

According to the GDP data of the last quarter of 2015, economic activity remained consistent with the outlook presented in the January Inflation Report and rose by 0.7 percent on a quarterly and 5.7 percent on an annual basis. Thus, growth stood at 4.0 percent in 2015. On the production front, industrial value added proved the highest contributor to quarterly growth in the last quarter. Therefore, industrial value added continued to increase faster than industrial production in 2015. Services value added was largely shaped by finance and insurance activities across the year. On the other hand, in line with the high levels of crop production, agricultural value added registered a significant increase, while the rise in the manufacturing of petroleum products led the net taxes to offer a considerable contribution to growth. In terms of expenditures, investment expenditures became the main driver of final domestic demand on a quarterly basis. In this period, consumption expenditures slowed remarkably, and external demand receded. All in all, 2015 was marked by a faster growth in private consumption than national income, a rebound in capital accumulation and a contraction in external demand.

Data on the first quarter of 2016 show that the uptrend in economic activity was maintained. Industrial production in the January-February period posted an increase by 1.6 percent compared to the previous quarter's average. Sales, production and import indicators of domestic demand signal that final domestic demand settled on a favorable course. Moreover, having increased during the January-February period, the non-gold export quantity index is expected to maintain its upward trend in the first quarter of the year. Hence, external demand is projected to contribute favorably to growth.

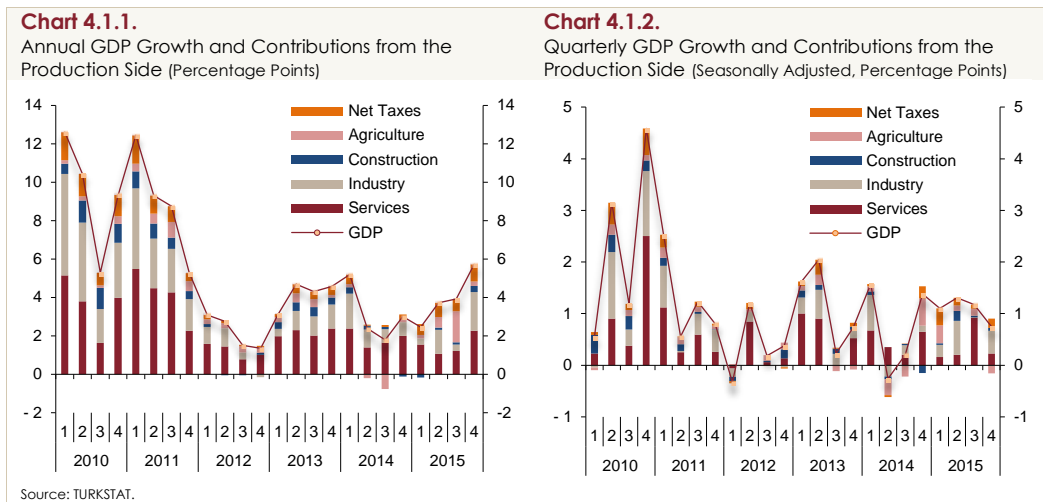
In 2016, domestic demand is estimated to provide a higher contribution to growth compared to 2015. This is attributable to wage increases, the low course in oil prices and the confidence channel. The moderate rebound in the global economy and the high market flexibility of our exports are expected to limit the adverse effects that could stem from geopolitical factors. Hence, external demand is expected to add more to growth. Accordingly, the GDP is envisaged to grow slightly stronger in 2016 on an annual basis even though external-demand-driven downside risks are present.

Implications of the structural change in the Chinese economy on commodity and financial markets as well as global trade, the possible negative income effect of the low oil prices on our oil-exporting trading partners and geopolitical developments pose downside risks to external demand. On the other hand, risks to domestic demand are considered to be more balanced in 2016. Investments, which were postponed in 2015 due to domestic uncertainties and tight financial conditions, may be realized in 2016, and this may place upside risks to domestic demand. Due to expectations for a more dovish stance on the Fed side and the ongoing easing policies implemented by the ECB, financial conditions are expected to be less tightening for the domestic demand. On the other hand, developments regarding services exports and higher costs driven by the wage increases pose downside risks to domestic demand through the employment channel. Against these risks, the income and confidence channels as well as the envisaged mild recovery in our export markets are expected to support the economic activity. In the upcoming period, spurred by the rise in the demand from the

EU as well as the low levels in commodity prices and also the present macroprudential context, the current account balance is expected to improve further, albeit at a diminishing pace.

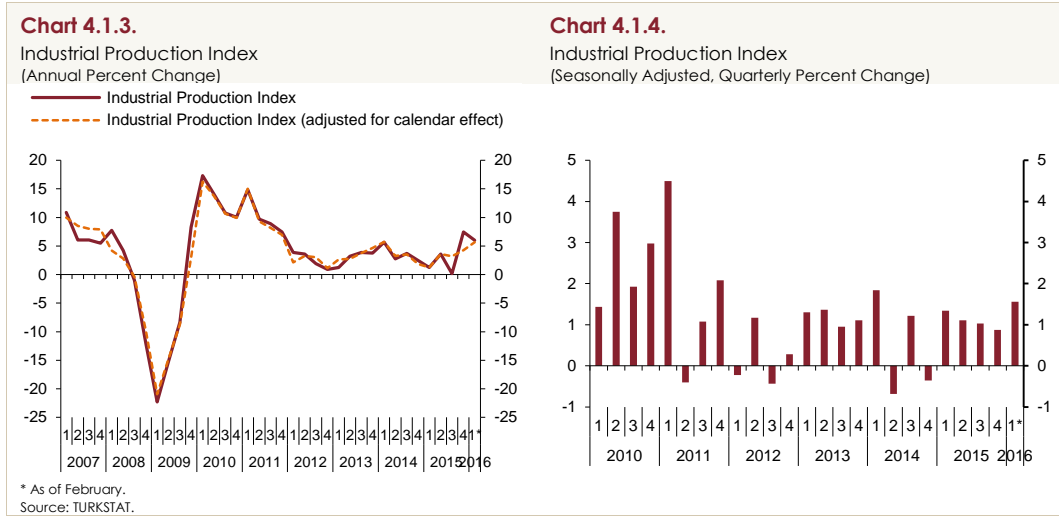
#### 4.1. Supply Developments

According to the data released by TURKSTAT, the GDP registered a year-on-year increase by 5.7 percent in the last quarter of 2015 (Chart 4.1.1). Thus, the growth rate in 2015 stood at 4 percent. The data adjusted for seasonal and calendar effects suggest that the GDP increased by 0.7 percent on a quarterly basis. In this period, industrial value added rose by 1.6 percent compared to the third quarter, and provided the highest contribution to quarterly growth (Chart 4.1.2). On the other hand, agricultural value added declined by 1.7 percent in the last quarter.

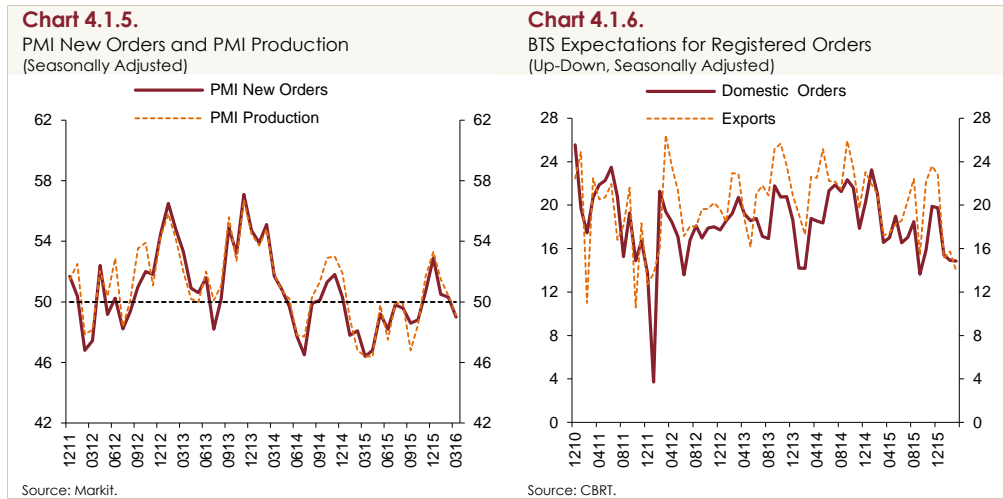


In 2015, contributions from agriculture, construction, industry and services stood at 7.6, 1.7, 3.7 and 3.0 percent, respectively. This proves that higher growth in 2015 compared to 2014 was owed to the agricultural sector. Having restrained growth in 2014 due to drought, agricultural value added surged by 7.6 percent year-on-year and added 0.7 points to growth in 2015. Annual growth rates of non-agricultural items edged up by 0.1 points to 3.6 percent on an annual basis.

The rise in the annual growth of industrial production in the last quarter of 2015 edged down in the January-February period (Chart 4.1.3). However, industrial production adjusted for calendar effects, which enables a more reliable interpretation of the underlying trends in annual changes, shows that production maintained the uptrend in annual terms and registered a year-on-year increase by 5.7 percent in the January-February period. The data adjusted for seasonal and calendar effects suggest that the robust trend in production was maintained, rising by 1.6 percent in the January-February period compared to the last quarter of 2015 (Chart 4.1.4).



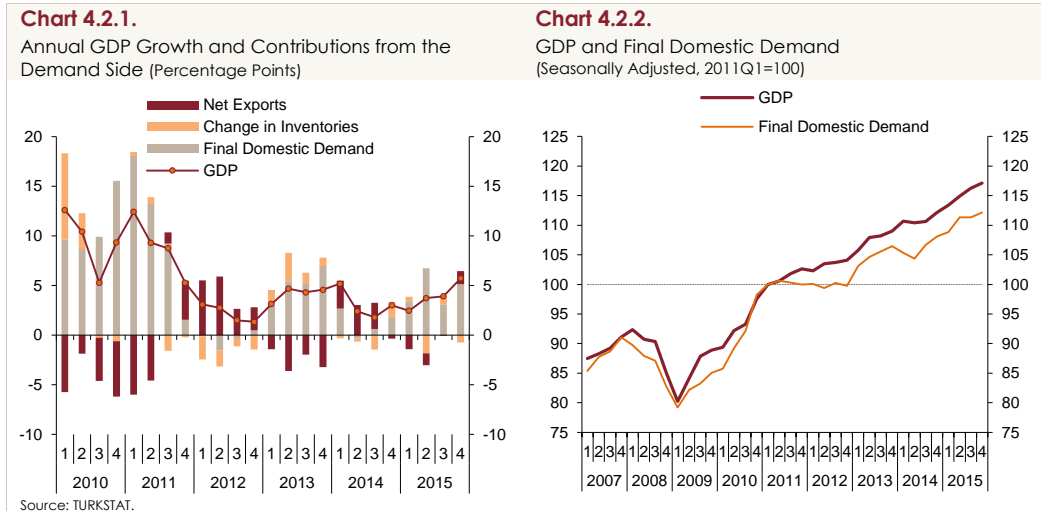
In the first quarter of 2016, survey indicators followed a weak track. Indicators on PMI new orders and PMI production trended downwards in the first quarter, but still remained above the neutral mark (Chart 4.1.5). The BTS expectations for 3-month-ahead domestic orders and exports also hovered below the previous quarter's average in the first quarter (Chart 4.1.6). Moreover, due to the weak course of consumer and investor confidence because of geopolitical risks, the confidence channel is not likely to provide production with a noticeable support. However, the recent divergence between confidence indices and growth prospects should also be taken into consideration. Therefore, production is expected to follow a modest course of increase in the period ahead.



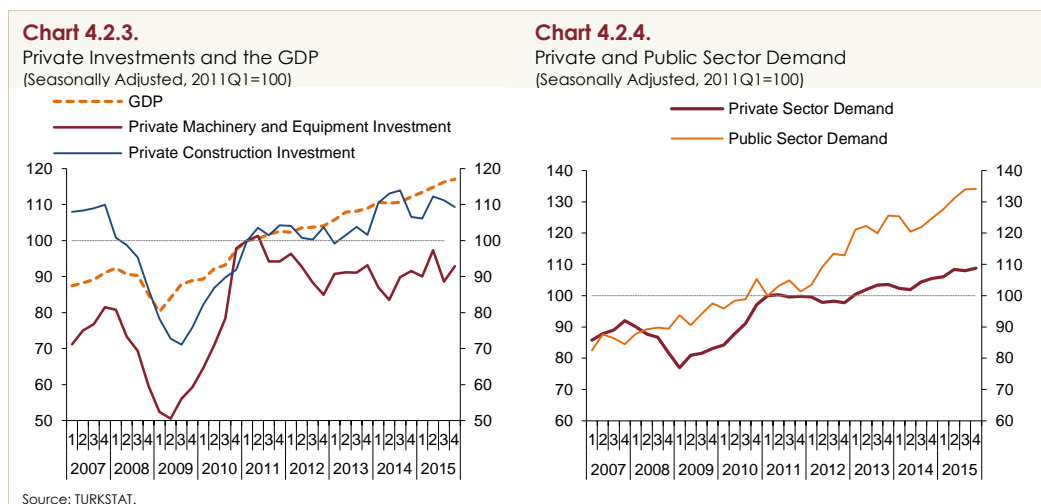
## 4.2. Demand Developments

The GDP data for the last quarter of 2015 on the expenditures side indicate that final domestic demand offered a larger contribution to annual growth on a quarterly basis, whereas net exports provided a positive support contrary to the preceding four quarters (Chart 4.2.1). The rise in consumption expenditures being more evident, the acceleration in final domestic demand in this quarter resulted from both consumption and investment expenditures. In seasonally adjusted terms, the GDP and final domestic demand grew at the same rate in the last quarter of 2015 (Chart 4.2.2).

Quarterly growth was fueled by domestic demand through investment expenditures in this quarter, but inhibited by net exports. The last-quarter data indicate that growth was induced by domestic demand across 2015, which was mainly driven by consumption. Meanwhile, contribution of investments stood more moderately, and net exports and change in inventories pulled annual growth down.

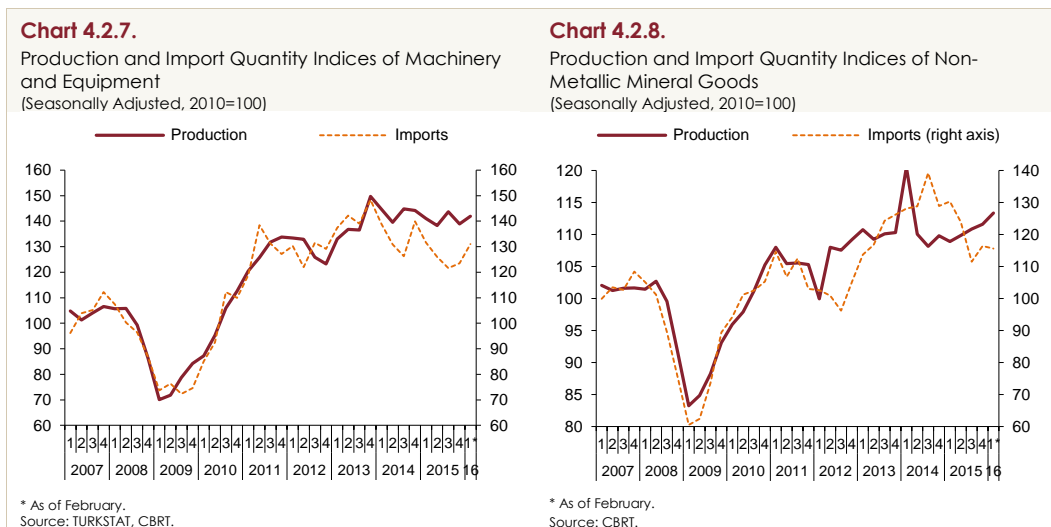
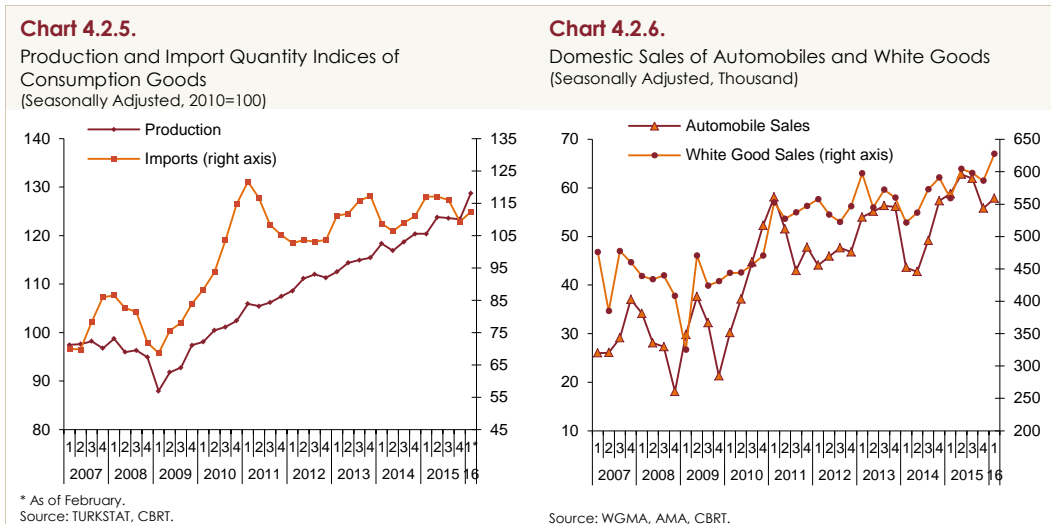


Private consumption expenditures followed a weaker course in the last quarter compared to the preceding quarters. Looking into details, consumption expenditures excluding durable goods remained on a more favorable track. Having plunged in the third quarter, investments recovered somewhat in the last quarter. Private investments increased due to machinery and equipment investments, whereas construction investments maintained a downward track (Chart 4.2.3). Thus, private demand registered a rise in the last quarter. Public demand recorded the lowest rate of increase in the last quarter of the year (Chart 4.2.4). Public consumption receded, while public investments exhibited an uptick in this period.



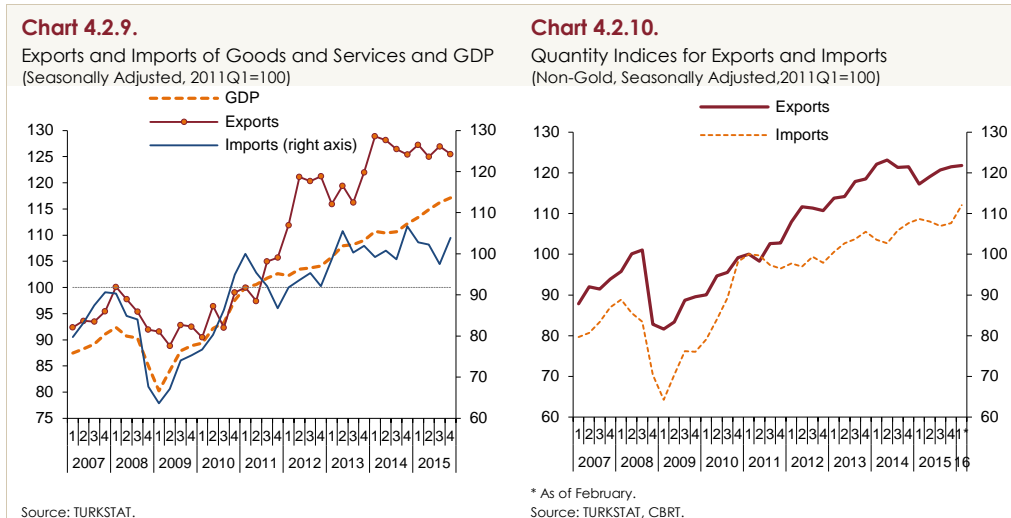
Economic activity was expected to have remained on an uptrend in the first quarter of 2016. In fact, production and imports of consumption goods, which fuel growth is on the increase (Chart 4.2.5). Likewise, having receded in the previous quarter, sales of automobiles and white goods are also

recovering (Chart 4.2.6). On the investments side, production and imports of machinery and equipment are increasing (Chart 4.2.7). Production of non-metallic minerals, which is closely associated with construction investments, increased, whereas the imports thereof edged down (Chart 4.2.8). Accordingly, current indicators signal that domestic demand may contribute more to quarterly growth in the first quarter of 2016.



In the last quarter of 2015, exports of goods and services declined, whereas their imports increased on a quarterly basis (Chart 4.2.9). Thus, net exports contributed negatively to growth in the last quarter. On the other hand, non-gold quantity indices, which provide a better understanding of the underlying trend of external trade, suggest that the last quarter was marked by an increase in exports and a rather milder rise in imports. Non-gold quantity indices posted a quarter-on-quarter increase both for exports and imports in the January-February period, which is more limited for exports (Chart 4.2.10). Meanwhile, geopolitical factors still constitute a downside risk to the positive contribution

of net exports to the current account balance and growth. However, the modest recovery in the global economy and the high market flexibility of our exports may contain these risks.



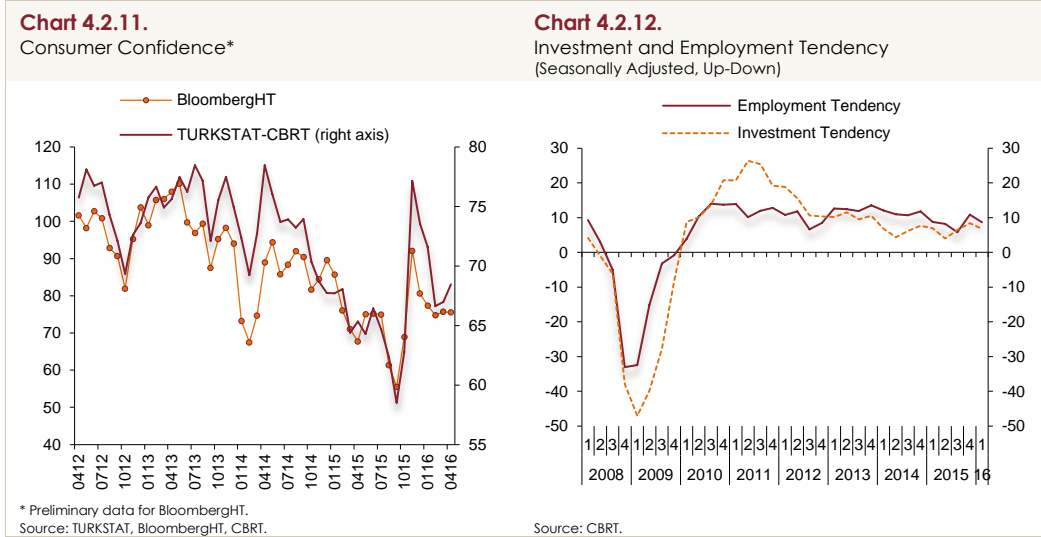
In sum, economic activity posted a stronger-than-expected growth in the last quarter of 2015 largely due to private investment expenditures. First-quarter indicators on sales, production and imports point to a quarterly upturn in domestic demand. Additionally, after edging up in the January-February period, the non-gold export quantity index is likely to maintain this trend in the first quarter, thus causing external demand to deliver positive support to growth in this quarter.

### Outlook for 2016

In the first quarter of 2016, current domestic demand realizations were consistent with the January Inflation Report. Consumption expenditures continued to support growth in the first quarter. Domestic sales of automobiles and white goods suggest an increase in durable consumption demand compared to end-2015 (Chart 4.2.6). As for non-durable consumption goods, which are supposed to best capture the effects of the rise in wages, production witnessed a surge in the January-February period. The fall in inflation owing especially to the food products with higher shares within the consumption baskets of low-income households and the mild course of consumer loans reduced the inflation-driven limiting effect on real wages. The rise in wages has not generated an adverse effect on employment yet. Under the assumption that a probable effect will be limited, the support to be provided by the income channel through rising wages is likely to continue throughout 2016. On the other hand, the confidence channel may deliver less support to consumption expenditures (Chart 4.2.11). Still, given these balanced risks, domestic consumption expenditures are likely to play a significant role in growth in 2016.

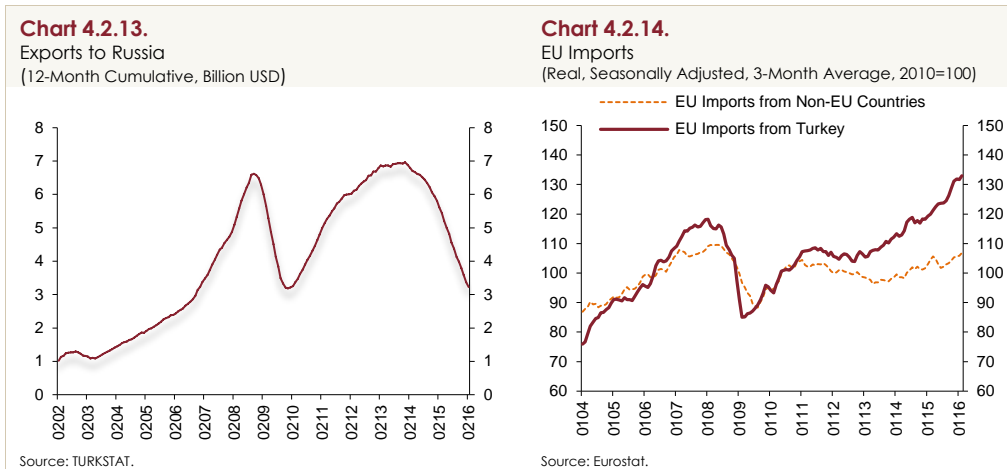
As private investments have followed a moderate course in the last few years, firms may tend to realize some of their postponed investments in 2016 in view of the relatively brisk demand outlook. However, investment tendency has not reached an optimistic level as of March compared to the January Inflation Report projections (Chart 4.2.12). Persisting geopolitical risks stand out as a hindrance against the appetite for higher capacity investments in 2016. Nevertheless, the stable pattern of

exchange rates may reduce both investment costs and the perceived vagueness, which may offset downside risks. On the other hand, public investments are projected to support growth in line with budget targets and MTP projections. Accordingly, the contribution of total investments to growth may prove higher in 2016 than in 2015.



Global monetary policies have recently grown less vague, resulting in accelerated capital inflows to emerging markets in the first quarter and a downward movement in the exchange rate basket. Moreover, the modest reduction in the upper band of the interest rate corridor also eased financial conditions. It is expected that global monetary policies in the upcoming period will prove less uncertain and domestic inflation will move down further, which will lead to more evident improvements in financial conditions.

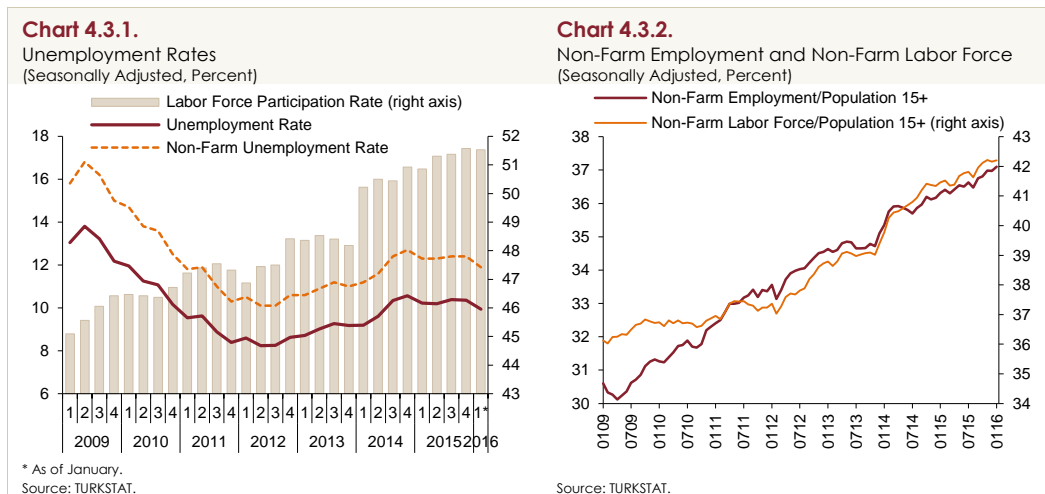
Downside risks to external demand described in the January Inflation Report continued in April. External trade data released by TURKSTAT and TEA indicate that trade of goods to Russia recorded a year-on-year decline by 61 percent in the first three months of the year. 12-month moving averages suggest a plunge in the export volume as well (Chart 4.2.13). Given the fall in exports of services, the contribution of the current account deficit and net exports to growth may be subject to downside risks. The economic slowdown in China, the ongoing geopolitical developments in Iraq and Syria as well as the reduced revenues of oil-exporting neighboring countries amid low oil prices are among downside risks to external demand. On the other hand, the reverberations of the recovery observed in the EU, which has a considerable share in our exports, on our export performance appeared noticeable in the first quarter of 2016 (Chart 4.2.14).



In short, 2016 is expected to witness a more robust domestic demand compared to 2015, and an EU-backed recovery in external demand despite geopolitical risks. Risks to domestic demand will be balanced in the upcoming period, while they are expected to be on the downside for external demand. In spite of this outlook for demand composition, macroprudential measures accompanied by low commodity prices are assessed to further improve the current account balance in 2016.

### 4.3. Labor Market

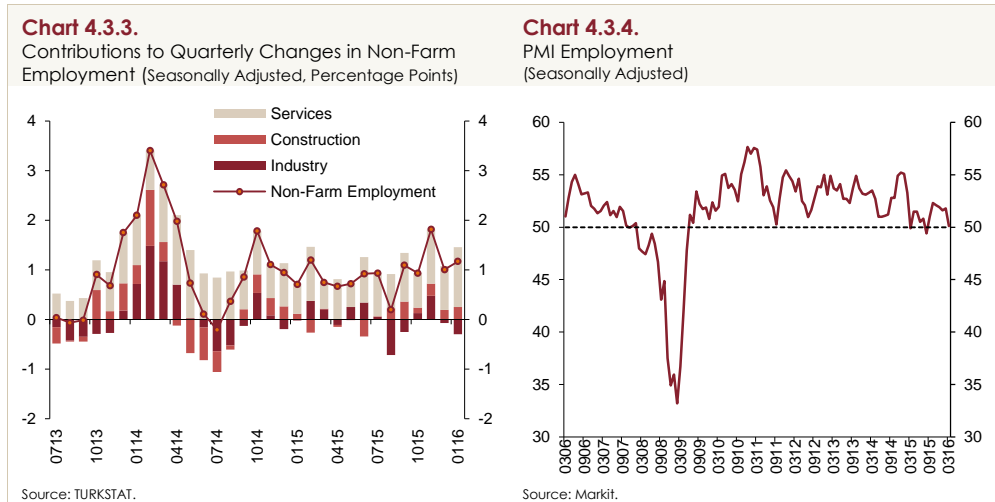
In 2015, the unemployment rate lost momentum and remained almost flat throughout the year (Chart 4.3.1). In comparison with 2014, employment did not record a noticeable acceleration, yet the slowdown in labor supply restricted the rise in unemployment rates (Chart 4.3.2). Non-farm employment growth hovered mildly below long-term averages. Employment increased moderately and labor supply remained relatively weak as of January 2016.



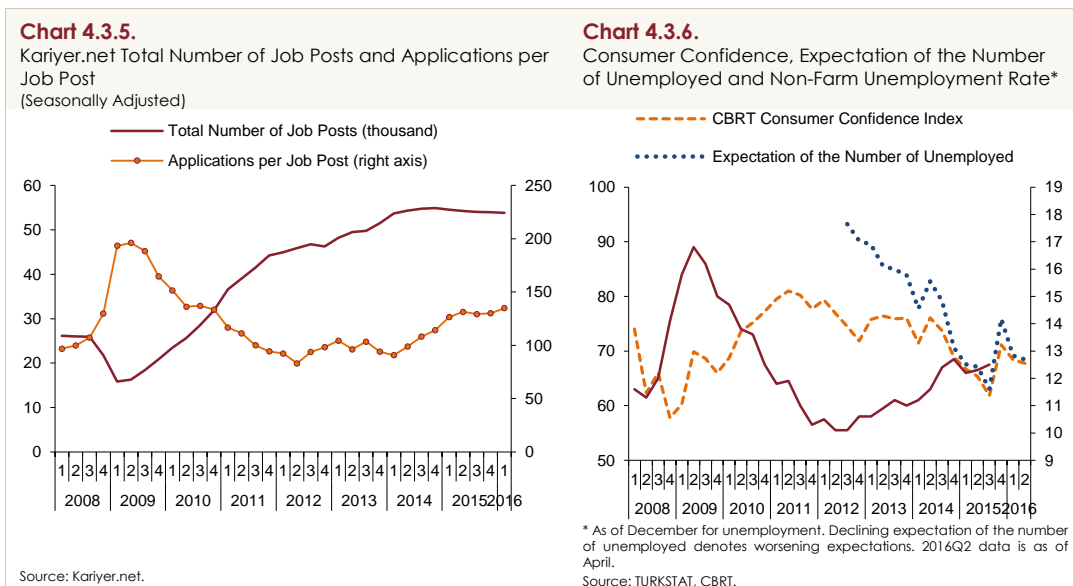
Non-farm employment was fueled by the services sector in 2015 (Chart 4.3.3). Having provided limited contributions to employment occasionally throughout the year, industrial and construction sectors did not record an apparent rise in employment in 2015. Aiming at short-term employment and training of the unemployed, Public Works Programs, which ensure the fulfillment of some jobs or services to benefit society, also created an employment opportunity at the services sector in this period. Under the scope of this program, approximately 523 thousand people were employed in 2015.



Industrial employment, which has fluctuated since the first half of 2014, receded in January 2016 compared to the last quarter of 2015. The mild upward trend in construction employment, which started in the third quarter of 2015, continued into January 2016. The PMI employment, which is a benchmark indicator for the manufacturing industry employment, decreased in March to almost its neutral level. Even though this decline hindered expectations for an increase in the industrial employment, the ongoing uptrend in industrial production continues to support employment (Chart 4.3.4).



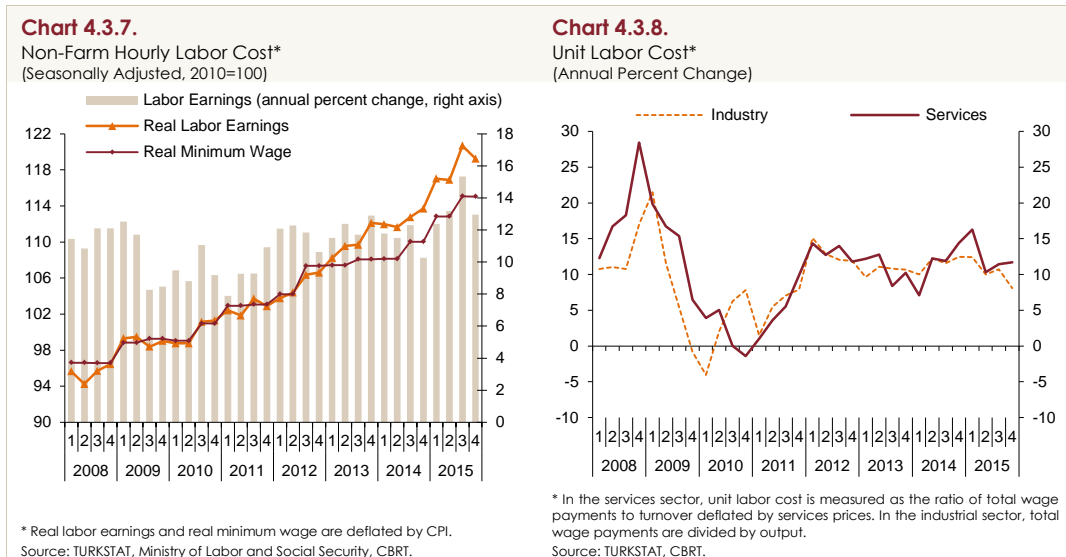
According to the data released by the Kariyer.net website, the total number of job posts continued to decline slightly in March despite new job posts. Applications per job posts, which are closely associated with the non-farm unemployment rate, came to a standstill in 2015, and edged up in the first quarter of 2016 (Chart 4.3.5). Moreover, having improved in the last quarter of 2015, consumer confidence and the expectation of the number of unemployed deteriorated somewhat in the first quarter (Chart 4.3.6). Against this background, leading indicators signal a slight worsening in the labor market in the first quarter compared to the last quarter of 2015.



In 2015, wages recorded an upturn in real terms (Chart 4.3.7). Alongside employment increases, the rise in wages underpinned household consumption through the income channel in 2015. On the other hand, limited increases in productivity led to further increases in the unit labor costs, and therefore on firms' costs. In the industrial and services sectors, the annual growth rate of unit labor costs stood above inflation, and labor costs emerged as a factor to dampen firms' profits (Chart 4.3.8).

The real increase in wages is likely to prove more evident in 2016 compared to 2015, due to minimum wage adjustments in 2016. Accordingly, the income channel is expected to provide higher support to household consumption in 2016.

On the costs front, wage increases are likely to continue to restrict firms' profits in 2016. The government subsidy introduced to employers' SSI premiums partially limits the effect of the minimum wage increase on the cost to the employers. However, the private investments on machinery and equipment, which are among the driving factors of productivity increases, remain steady. Thus, unit labor costs may prove slightly more marked in 2016.



In conclusion, rises in employment remained modest and unemployment was almost flat across 2015. Employment growth was mostly determined by the services sector. This outlook persists looking at the preliminary labor market outcomes in 2016. Given the minimum wage rise and current mild growth prospects, unemployment is not likely to fall notably in 2016. Moreover, probable employment losses due to the decline in exports of services are regarded as an upside risk factor on unemployment.

Box  
4.1

## Quality Adjustment in the Turkish House Price Index: Hedonic House Price Index

Houses are the most important wealth component of households. Meanwhile, mortgage loans comprise a significant portion of the consumer credit stock. Hence, it is crucial for central banks and regulatory authorities to have a reliable index for house prices. Due to absence of such an index for the Turkish economy, the CBRT started to publish a monthly house price index (HPI), which starts from January 2010, by using the median price method. The HPI measures nominal price changes for the Turkish housing market. In 2015, nominal house prices were above 80 percent higher on average than in 2010. However, like almost all products, houses may be subject to quality changes that stem from both consumer preferences and innovation. Therefore, changes in property prices can reflect pure price changes as well as changes in the quality of houses. Increase in a property price index might result from at least one of these two factors. Hence identifying big changes as a bubble may be misleading if the main driver of the increase is quality improvements. Against this background, this box employs a characteristic-prices-based hedonic regression method to measure and distinguish pure price changes and quality changes.<sup>1</sup>

The study uses the CBRT's monthly HPI data covering the January 2010-February 2016 period. The HPI is compiled from valuation reports prepared by real estate appraisal companies at the stage of approval of individual mortgage loans extended by banks.<sup>2</sup> The dataset includes information about the location of the housing (city, sub-city, neighborhood and the block number) in addition to a variety of observable property characteristics such as the gross area of use, heating type, year of construction, quality of construction, availability of an elevator or a security system in the building. This rich dataset enables us to identify the shadow prices of each quality component and to compute pure price changes by keeping average characteristics constant.

The HPI uses the stratified median price method to measure price movements in the Turkish housing market. In the current HPI implementation, heterogeneous properties are grouped together to form the most possible homogenous strata, while the median unit price for each stratum is weighted by the number of house sales obtained from the General Directorate of Land Registry and Cadaster to reach the overall price index. In geographical stratification, sub-cities with a sufficient number of observations are determined as strata, whereas in case of an insufficient number of observations in sub-cities, NUTS-Level 2 regions constitute one stratum. For reliability purposes, too expensive and too cheap properties are identified as outliers and are excluded from the calculation of the median unit prices. In the characteristic-prices-based hedonic regression method, which is similar to HPI with respect to stratification and exclusion of extreme values, hedonic regression models are used to estimate shadow prices of the features of a property. The log-linear model used in this study is as follows:

<sup>1</sup> For further details, see Hülagaü et al. (2016a, 2016b).

<sup>2</sup> For further details, see "Methodological Information on the "House Price Index" available at <http://www.tcmb.gov.tr/wps/wcm/connect/TCMB+EN/TCMB+EN/Main+Menu/STATISTICS/Real+Sector+Statistics/House+Price+Index/Methodological+Information>.

$$\ln p_n^t = \beta_0^t + \sum_k \beta_k^t z_{nk}^t + \varepsilon_n^t, \quad \forall n, t \quad (1)$$

Where  $p_n^t$  is the price of property  $n$  at time  $t$ , while  $z_{nk}^t$  is the characteristic  $k$  of the property  $n$  at time  $t$ .  $\beta_k^t$  is the shadow price for characteristic  $k$ ,  $\varepsilon_n^t$  is the error term. It should be noted here that regressions are run separately for each period and stratum. This allows the effect of housing characteristics on prices to vary across periods and strata. Thus, regression coefficients ( $\widehat{\beta}_k^t$ ) were estimated separately for each period and stratum using this method. Then, Laspeyres indices were constructed for each stratum to calculate prices for standardized property with fixed characteristics as follows:

$$P_i^t = \frac{\exp(\widehat{\beta}_0^t) \exp[\sum_k \widehat{\beta}_k^t \overline{z_{nk}^0}]}{\exp(\widehat{\beta}_0^0) \exp[\sum_k \widehat{\beta}_k^0 \overline{z_{nk}^0}]} \quad (2)$$

Where  $P_i^t$  denotes the hedonic house price index for stratum  $i$  at time  $t$ ,  $\overline{z_{nk}^0}$  indicates the average characteristics for the base period. Equation (2) denotes a quality-adjusted property price index because characteristics are kept constant in time. In order to avoid adverse effects of potentially problematic initial data points on the whole index, January 2012 is set as the base period ( $t=0$ ) to construct the Hedonic House Price Index (HHPI) as it can be accepted as a relatively stable period in the Turkish housing market.

Regressions are run for each period and stratum. However, Table 1 presents only a sample regression result given the impossibility to disclose all the estimations. Accordingly, the results for the Küçükçekmece sub-city of İstanbul show that all independent variables used in this regression are statistically significant and signs of all coefficients are consistent with economic theory. In other words, all shadow prices, i.e. the additional contribution of a coefficient to appraisal value, result in an increase in the house price. For example, keeping other physical characteristics constant, a 100 square-meter larger house is 50 percent more expensive than average. Higher quality houses are valued at a 10.9 percent higher price on average while an elevator in the building adds 13.3 percent to its value. Security is another important characteristic for this stratum, meaning that if a house receives security service then one would expect its price to be 33.3 percent higher on average. On the other hand, keeping all characteristics constant, houses built one year later are 0.3 percent more expensive on average.

Even though the HHPI series obtained by the analysis follows a parallel course of increase with the HPI, discrepancies exist in numeric terms. In particular, Chart 1 shows that the HPI increased by 102.3 percent (31.5 in real terms deflated by the CPI), and the HHPI increased by 76.8 percent (15.0 in real terms) in almost six years.<sup>3</sup> These findings suggest that 25.5 percent (14.4 percent) of this increase was due to quality improvements in housing characteristics in the given period. In other words, it is estimated that almost half of the real increases in HPI across Turkey stem from quality improvements.

<sup>3</sup> The HHPI is re-based into 2010 from January 2012 to make a comparison with the HPI.

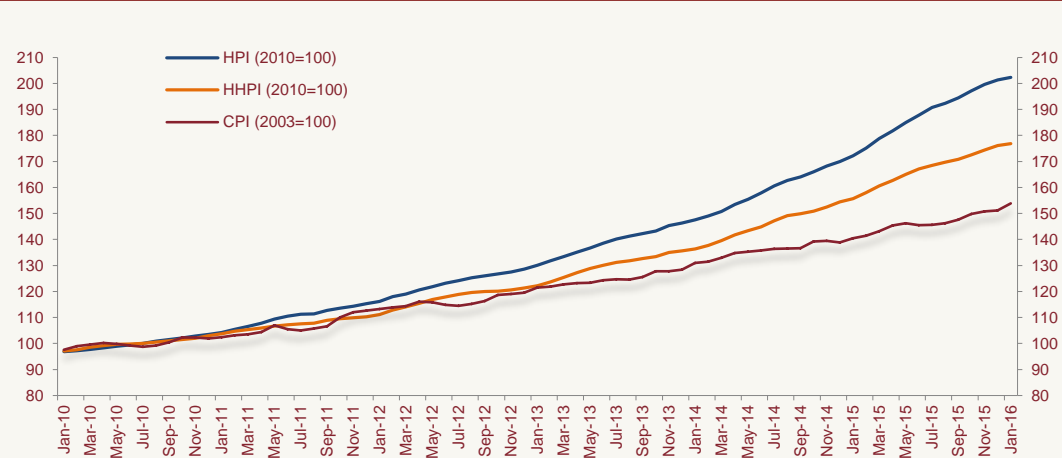
Table 1. Sample Hedonic Regression Results

Characteristics	Küçükçekmece (İstanbul)	Küçükçekmece (İstanbul)	Kepez (Antalya)	Kepez (Antalya)
	2012 January	2015 January	2012 January	2015 January
Gross Area of Use (m <sup>2</sup> )	0.005*** (0.000)	0.008*** (0.000)	0.004*** (0.000)	0.004*** (0.000)
Quality of Construction	0.109*** (0.022)	0.053*** (0.014)	0.019*** (0.017)	0.101*** (0.011)
Year of Construction	0.003** (0.001)	0.003*** (0.001)	0.004 (0.001)	0.009*** (0.001)
Number of Rooms	0.033** (0.017)	0.006** (0.003)	0.109*** (0.015)	0.084*** (0.010)
Number of Bathrooms	0.084*** (0.029)	0.069*** (0.017)	0.121*** (0.026)	0.077*** (0.017)
Number of Balconies	0.071*** (0.017)	0.072*** (0.009)	0.048*** (0.012)	0.026*** (0.008)
Security Service	0.333*** (0.032)	0.452*** (0.019)	0.262*** (0.045)	0.066** (0.028)
Heating	0.118*** (0.045)	0.015 (0.020)		
Elevator	0.133*** (0.028)	0.087*** (0.015)	0.099*** (0.019)	0.044*** (0.011)
Constant	5.655*** (2.040)	5.093*** (1.859)	2.647 (2.052)	-6.280*** (1.383)
Number of observations	621	1383	780	1774
R <sup>2</sup>	0.641	0.729	0.561	0.511

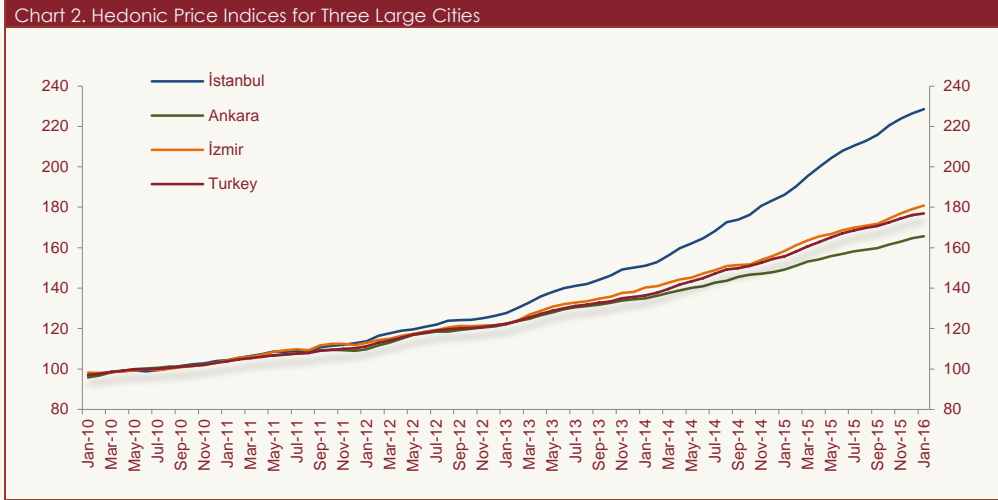
Dependent variable  $\ln p_{it}$  is the logarithm of total appraisal value of the house in Turkish Lira. Standard errors are in parenthesis. \*\*\* and \*\* denote statistical significance at 1 and 5 percent, respectively. Quality of construction is a dummy variable equal to 1 for high quality houses and 0 for low (medium or low) quality houses. Heating is a dummy variable equal to 1 for houses with central heating system or wall-hung gas boiler system and 0 for those with stoves or other heating systems. Security services and elevator are dummy variables equal to 1 for houses with security and elevator, respectively, and 0 otherwise.

The general tendency of hedonic prices in the three largest cities in Turkey, i.e. İstanbul, Ankara and İzmir, followed the same pattern until early 2012 and diverged after mid-2012. Chart 2 shows that hedonic prices in İstanbul displayed a faster pace and disassociated from the other two cities. In particular, the highest nominal increase in six years is seen in İstanbul by 128.6 percent, while the increase in İzmir is 80.8 percent and in Ankara is 65.6 percent. The official HPI increases are similarly seen in the HHPI (154.1, 94.8 and 71.6 percent for İstanbul, İzmir and Ankara, respectively). The lowest quality change is observed in Ankara with only 6 percent (less than one-tenth of total change) whereas the average house quality increase observed in İstanbul is 25.5 percent (almost one-sixth of the total change).

Chart 1. Comparison of HPI and HHPI\*



\* The HHPI is re-based into 2010 from January 2012 to make a comparison with the HPI.



In sum, a quality-adjusted property price index is computed by using the hedonic regression method in order to distinguish between quality changes and pure price increases in Turkey. According to the results, one-fourth of the nominal and one-half of the relative property price increase can be attributed to quality improvements in general.

#### REFERENCES

Eurostat, 2011, Handbook on Residential Property Price Indices, available at <http://ec.europa.eu/eurostat/en/web/products-manuals-and-guidelines/-/KS-RA-12-022>.

Hülagü, T., E. Kızılkaya, A.G. Özbekler and P. Tunar, 2016a, A Hedonic House Price Index for Turkey, CBRT Working Paper No. 16/03.

\_\_\_\_\_, 2016b, Türkiye Konut Fiyat Endeksi'nin Kalite Değişimi Etkisinden Arındırılması: Hedonik Konut Fiyat Endeksi (in Turkish), CBT Research Notes in Economics No. 16/02.

Box  
4.2

## Effects of Minimum Wage Increases on Consumer Loans

Approximately one-third of the working population in Turkey receives an income close to the minimum wage. This fact indicates that the high-rated minimum wage adjustments in January 2016 may have various economic implications. Accordingly, this box elaborates on the effects of the minimum wage rise on consumer loans.

The analysis uses two alternative data sets. Firstly, the quarterly data from the Banks Association of Turkey entailing the average education and income levels of loan utilizing customers of banks for the 2011–2015 period were employed to measure the ratio of consumer loan customers with the minimum wage. Then, weekly flow loans were obtained for all sub-groups of consumer loans in the 2012-2016 period using the CBRT data set.

The empirical model used in the study is based on the "triple differences" method. According to this method, firstly, a 4-month observation window is set between November 2015 and February 2016. This is centered at January 1, 2016, the time when the minimum wage hike was put into effect. The first difference is the comparison of the loan behavior before and after the minimum wage rise within the observation window. However, such a comparison is not sufficient by itself as it lacks information about the consumer loan behavior under a scenario that no minimum wage rise occurs in the same observation window. Therefore, the observation window of the previous year (November 2014-February 2015) was also included in the model and the second difference was constructed. This difference is important to capture the differences between consumer loan behavior for two subsequent years in the November-December and January-February periods. Additionally, by calculating the ratio of customers with income at the minimum wage band using the data from the CBRT, the ratio of the low-income loan customer variable was constructed on a bank basis. Taking the ratio of the low-income loan customer variable into account, the difference-in-differences method was provided with a third dimension. In other words, by including the ratio of the low-income loan customer variable in the analysis, changes in borrowing behavior of low-income loan customers may be observed following the minimum wage rise.

According to the above definitions, the "triple differences" equation is as follows:

$$\ln(L_{b,m,w}) = \alpha_0 + \alpha_1 (A_m \times P \times Z_b) + \alpha_2 (A_m \times Z_b) + \alpha_3 (P \times Z_b) + \alpha_4 (A_m \times P) \\ + \alpha_5 P + f_b + f_m + f_w + \varepsilon_{b,m,w}$$

In the equation,  $b$ ,  $m$  and  $w$  indicate bank, month and week indices, respectively. Dependent variable  $L$  represents bank-level loans. The dummy variable  $A$  equals 1 for observations in January and February, and 0 for November and December, while the dummy variable  $P$  is equal to 1 for observations between November 2015 and February 2016, and 0 for those between November 2014 and February 2015. The  $Z$  variable denotes the ratio of minimum-wage-income customers and ranges between 0 and 1. As this

variable is calculated for every bank by taking averages of the 2011–2015 period, it is independent from time and is not affected by the minimum wage adjustment.  $f_b$ ,  $f_m$  and  $f_w$  represent the fixed effects for bank, month and week, while  $\epsilon$  shows the error term.  $\alpha_1$  is the main coefficient in the equation and indicates the percentage point change in consumer loans resulting from a percentage point increase in the rate of low-income loan-utilizing customers after the minimum wage rise. As month and bank are included in the model as fixed effects,  $A$  and  $Z$  variables are not needed in the equation.

The effect variable coefficient, which is 0.9 as shown in the second column of Table 1, suggests a significant rise in consumer loans in the banks extending credits to the low-income group compared to those extending relatively less credits to the low-income group as of January 2016. Across sub-items of consumer loans (personal, automobile and mortgage), the effect stems from personal and automobile loans. Another notable result is that mortgage loans exhibit no effect whatsoever.

**Table.1.** Estimation Results  
Dependent Variable: Consumer Loans in Natural Logarithm

Independent Variables	Total	Personal	Automobile	Mortgage
Effect ( $A_m \times P \times Z_b$ )	0.90** (0.27)	0.82*** (0.17)	1.25** (0.40)	0.05 (0.50)
$A_m \times P$	-0.13* (0.06)	-0.51*** (0.04)	-0.27 (0.15)	0.09 (0.12)
$A_m \times Z_b$	-1.33** (0.35)	-0.49** (0.11)	-0.82 (0.40)	0.17 (0.07)
$P \times Z_b$	-0.55* (0.24)	-0.12 (0.28)	-1.53*** (0.24)	-1.30* (0.50)
$P$	0.002 (0.08)	0.64*** (0.10)	0.45** (0.11)	0.08 (0.10)
Average $Z_b$	0.129	0.148	0.169	0.149
Month fixed effects	Applicable	Applicable	Applicable	Applicable
Week fixed effects	Applicable	Applicable	Applicable	Applicable
Bank fixed effects	Applicable	Applicable	Applicable	Applicable
Number of observations	913	795	556	631
$R^2$	0.97	0.94	0.92	0.91

\*\*\*, \*\* and \* denote statistical significance at 1, 5 and 10 percent, respectively. Standard errors are in parenthesis and clustered at a weekly level.

To calculate the rate of increase in consumer loans driven by the minimum wage adjustment, estimated coefficients and raw data were used to make a rough back-of-the-envelope calculation. Accordingly, the minimum wage rise in January 2016 raised monthly flow data on consumer loans extended after that date by 10 to 15 percent. Considering that this rise is observed through the monthly flow data (and the possibility of this rise to fade at a certain point), it appears that its effect on the stock will be rather limited.

In sum, the minimum wage rise had an increasing effect on the consumer loan utilization particularly through personal and automobile loans. However, this rise appears to lack the influence to change recent trends in the consumer loan market. The limitation of this effect is attributed to the macro-prudential measures.

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Box  
4.3

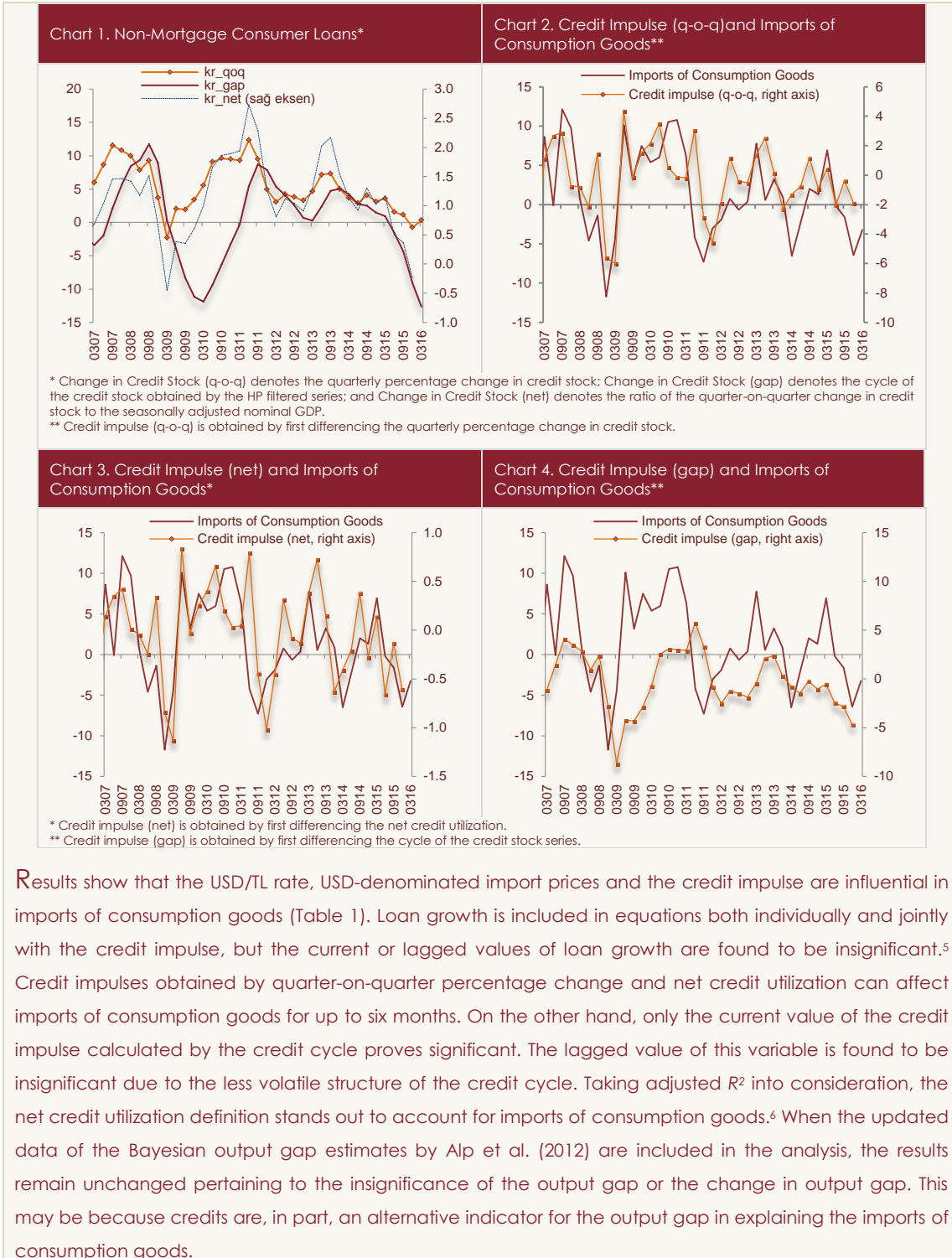
## Relation Between Non-Housing Consumer Loans and Imports of Consumption Goods

After the global financial crisis, the CBRT started to observe financial stability besides maintaining the price stability objective. Accordingly, with a view to containing not only inflation but also macrofinancial imbalances, a new framework was adopted, which also targets credit developments. Under this framework, credits are closely monitored for they capture the effect of the monetary policy stance. The aim of this box is to give an analysis of the relationship between non-mortgage loans and the imports of consumption goods. Any significant relation to be found between these variables may indicate that current macroprudential and monetary policies can also contribute to robust and balanced growth.

The literature contains studies investigating the effects of loan types on various macroeconomic variables. Mian et al. (2015) indicate that the rise in consumer loans pushes up the share of consumption within the national income and the share of consumption goods within imports, and deteriorates the current account deficit. This study also indicates that the rise in consumer loans weakens the economic growth. Beck et al. (2012) discuss that credits are positively related to economic growth and income distribution in the case of commercial loans; however, this does not apply to consumer loans. Alioğulları et al. (2015) show that consumer loan growth in Turkey deteriorates the current account deficit, while commercial loan growth does not have a significant effect on the current account deficit. Thus, findings in the literature suggest that growth, growth composition and the external trade balance can be supported by observing credit growth and credit composition.

Consumer loans excluding mortgage used in the analysis consist of automobile and personal loans. This aggregate data does not include seasonality. Similar to Öğünç and Sarkaya (2015), the analysis uses three different definitions for credits: (i) quarterly percentage change in the non-housing consumer loan stock, (ii) the ratio of quarterly difference in non-housing consumer credit stock to the seasonally adjusted nominal GDP of the relevant quarter; in other words, net credit utilization and (iii) cycle component of non-mortgage consumer credit stock calculated by HP filter with  $\lambda=1600$ . As exhibited in Chart 1, credit definitions (i) and (ii) are similar, while (iii) is less volatile than the other two given the way of measurement. By taking the first differences of these series, credit impulse series were constructed. Imports of consumption goods in quarterly growth terms are highly correlated to credit impulses calculated by definitions (i) and (ii).<sup>4</sup> Charts 2-3 indicate that this correlation stems from a similar movement in the series in the respective period.

<sup>4</sup> In the 2006Q1-2015Q4 period, the simultaneous correlation between quarterly growth of the imports of consumption goods and the credit impulse calculated by the definitions (i) and (ii) are 0.67 and 0.61, while the correlation between imports of consumption goods and the credit impulse calculated by definition (iii) is 0.19. This lower correlation is also supported by Chart 4, which displays a less similar pattern between the two series.



<sup>5</sup> These results are consistent with the findings by Kara and Tiryaki (2013), which assert growth in aggregate demand may be more correlated with credit impulse than credit growth after periods of notable change in credit dynamics.

<sup>6</sup> Results in Table 1 are obtained through Ordinary Least Squares (OLS). However, for the endogeneity problem that may arise between consumer loans and imports of consumption goods, models are also estimated by Two-Stage Least Squares (TSLS). Lags of the output gap and the change in the output gap are used as instruments for credit impulse. Results point that all coefficients in these models prove significant when TSLS is also used, that their magnitudes do not indicate a notable change compared to OLS and the choice of instruments is appropriate.

In sum, the credit impulse in non-mortgage consumer loans proved influential in the imports of consumption goods. In particular, the credit impulse derived from the net credit utilization has a higher power in explaining the imports of consumption goods. Findings indicate that limiting the rise in consumer loans may support a more controlled growth in private consumption expenditures and improvement in the current account deficit.

Table 1. Regression Results (2007Q1-2015Q4)

	Credit Impulse (q-o-q)	Credit Impulse (net)	Credit Impulse (gap)
Constant	4.22***	4.29***	4.07***
$\Delta USD_t$	-0.37***	-0.45***	-0.47***
$\Delta USD_{t-1}$	-0.45***	-0.49***	-0.43***
$\Delta Import Prices_{t-1}$	-0.57***	-0.66***	-0.68***
Credit Impulse <sub>t</sub>	0.97***	4.1***	0.78**
Credit Impulse <sub>t-2</sub>	0.84***	5.92***	
Dummy Variable (2007Q2)	-5.93***	-6.69***	-8.97***
Dummy Variable (2012Q4)	-5.88***	-7.03***	-4.1***
R <sup>2</sup>	0.71	0.77	0.60
Adjusted R <sup>2</sup>	0.64	0.72	0.51

$\Delta$  denotes the quarterly percentage change in the respective variable. Standard errors are heteroskedasticity and autocorrelation consistent. \*\*\*, \*\* and \* denote 1, 5 and 10 percent statistical significance, respectively. The Table reports estimations, which are statistically significant and theoretically meaningful.

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