Growth Cycles and Total Factor Productivity in Turkish Economy: 1980-2018[#]

Ozan Bakış[*], Uğurcan Acar[**] and Gökhan Dilek[**]

Executive Summary

It has been stated that, in order to avoid middle-income trap and to converge to developed countries income levels, Turkish economy must grow above 5% annually on average. Although fixed capital investments and increase in employment are factors that contribute to economic growth, they are not sufficient for strong and sustainable economic expansion. Strong and solid GDP growth cannot be achieved without increases in knowledge, technological advances, and more efficient reallocation of existing resources. To put it simply, for a sustainable economic performance Total Factor Productivity (TFP) is a must.

Compared to Turkey, China, South Korea, and India have higher and steady growth rates. The main difference between Turkey and these countries is that they have higher TFP growth rates.

The average TFP growth is 1% for Turkish economy in the 1980-2018 period. The fastest TFP growth is achieved in the 1980-1989 period with 2.2% annual average growth rate. For the 2003-2013 period the annual average TFP growth is 1.2% while it is 0.4% for the years between 1990 and 2002. The TFP growth is lowest in the 2014-2018 period where it remains constant over this period.

Introduction

This research brief presents Betam's TFP calculations and analyzes productivity dynamics for Turkish economy by dividing the years between 1980 and 2018 into four periods. The starting year, 1980, is not chosen arbitrarily. The economic decrees issued in 24 January 1980 are

[*] Ozan Bakış, Betam, Senior Researcher, ozan.bakis@eas.bau.edu.tr
[**] Uğurcan Acar, Betam, Research Assistant, ugurcan.acars@eas.bau.edu.tr
[**] Gökhan Dilek, Betam, Research Assistant, gokhan.dilek@eas.bau.edu.tr

generally accepted as marking the start of a paradigm shift in the growth regime of Turkey from import-substitution to open market economy.

Our plan is to present the productivity in two research briefs. This research brief is the first one that discusses the productivity for the Turkish economy at the aggregate level while the second one will elaborate on the productivity dynamics of four main sectors (agriculture, industry, construction and services) of Turkish economy. The second research brief will be published in the coming days. We would like to indicate that these two research briefs are derived from the forthcoming Betam TFP working paper which has a broader content and focuses more on technical discussions (Bakış and Acar, 2020). Betam TFP working paper periodize the years between 1980 and 2018; and discusses the TFP calculation results along with other macroeconomic indicators. The periods are 1980-1989, 1990-2002, 2003-2013 and 2014-2018. This periodization is based on years marking important changes shaping Turkish economy[1]. Both research briefs use the same periodization following Betam working paper while discussing and explaining macroeconomic indicators of Turkish economy.

The Course of Employment in Turkey

The total employment in Turkey reaches to 28,7 million in 2018 from 14,9 million in 1980 corresponding to a total of 93.1% growth rate[2]. The total population of Turkey goes up to 82 million from 44.7 million at the same time period with the total growth rate of 83.3%. It is to be expected that Turkey has a higher employment growth than population; since, Turkey has a young demographic structure. However, these two growth rates are still close to each other because the labor force participation rate, especially for women, are low over the years.

In Figure 1, it can be seen that some years witnessed falls in total employment. These years are 1988, 1993, 2000, 2002 and 2003. Despite the serious global financial crisis, 2009 recorded a slight increase in employment.[3] The years that recorded falls in employment are the years of economic crisis. In 1988 and 1989, there were a serious economic slowdown which is the main cause of the decreases in employment figures (GDP growth in 1988 is 2.1%, and in 1989 0.3%).

---

[1] For the detailed discussion on the determination of periods, please see: forthcoming Betam TFP working paper (Bakış and Acar, 2020).
[2] For the detailed information on the calculation of employment series for the years before 2004, please see: forthcoming Betam TFP working paper (Bakış and Acar, 2020).
[3] This seemingly paradoxical situation is the result of "additional employee effect" mostly observed in women, and the incentive policies for female employment. In 2009, male employment indeed fell.

Figure 1: Total Employment Level over the Years, Million Persons
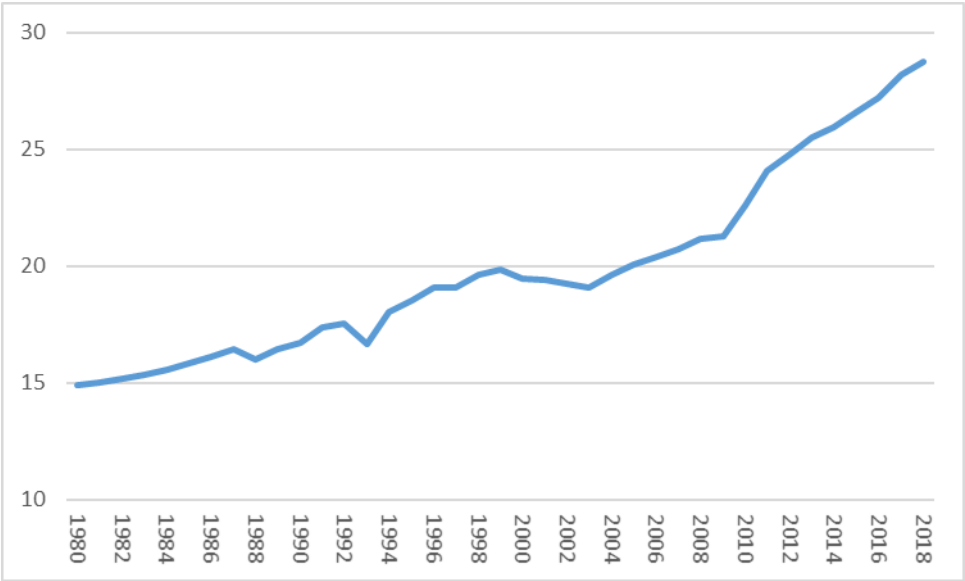
The most rapid growth in employment happens in the 2003-2013 period with 2.6% annual average. The 2014-2018 period also records solid job gains (2.4%). The employment growth is sluggish in the period of 1990-2002 with 1.3% annual average while the 1981-1989 period has the worst performance in terms of employment growth (1.1%). Employment increases after 2003 has not been enough to reduce unemployment rate because of the increasing labor force participation. After 2010, labor market witnesses a surge in women's labor force participation rate.

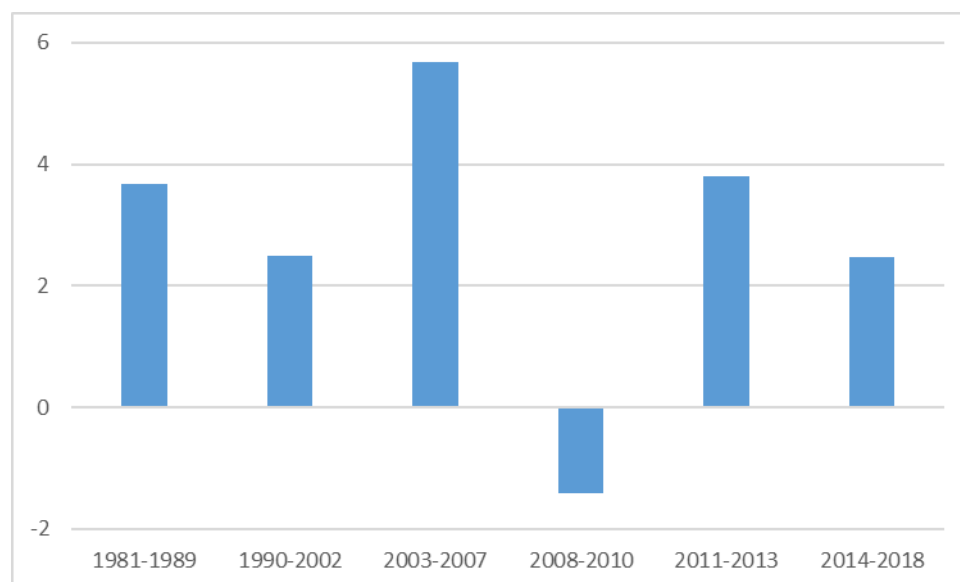## Labor Productivity in Turkish Economy

Labor productivity (value added / employment) is calculated by dividing real GDP (in 2009 prices) to total employment. Labor productivity is equated to 100 in the starting year (1980) and the other years are normalized accordingly. Labor productivity almost triples from 1980 to 2018.

Labor productivity series is affected by business cycles. For example, in 1994, 2001 and 2009 labor productivity fell considerably. The reason for the fall in labor productivity is that the economic output decreases more than the employment losses. The employment contracts may prevent job losses, some professions are more resistant to economic downturns (such as administrative jobs), and public employment is immune to economic crisis. Hence, it is expected that labor productivity falls during economic contractions.

Figure 2 presents the annual average growth rate in labor productivity for each period. Labor productivity grows at the most rapid pace in the 1981-1989 period with 3.7% annual average

rate while in 2003-2013 the figure is also solid (3.2%). The 1990-2002 and 2014-2018 periods have the same annual average growth rate for labor productivity with 2.5%.

Figure 2: Labor Productivity Annual Average Growth Rate in Turkey

Source: TurkStat, Betam.

The Course of Total Factor Productivity in Turkish Economy

The part of the economic output that cannot be explained by increases in employment and fixed capital stock is defined as Total Factor Productivity (TFP). This unexplained part (sometimes referred as residual, or Solow residual as well) accounts for advances in technology, knowledge level or a more efficient reallocation of existing factors of production. In order to calculate the TFP series, an aggregate production function must be specified, and employment, fixed capital stock, and real GDP data are gathered[4]. The part that is unexplained by employment and fixed capital stock is considered as TFP. The Figure 3 presents TFP series for Turkish economy. TFP is equated to 100 at the starting year and the other years are normalized accordingly. TFP grows 38% cumulatively from 1980 to 2018, and over these years annual average growth rate is 1%. This performance is considerably lower than those of high growing countries.

TFP series is affected by business cycles. TFP decreases when there is an economic downturn and increases when economy flourishes. During the economic slowdowns/crisis, capacity utilization rates fall, the idle capital stock increases due to the closing firms, and employment level do not perfectly respond to economic output levels. Hence, TFP series positively correlated to business cycles. Because of the cyclicality of the TFP series, it is hard to interpret

---

[4] The TFP series is calculated by Betam. For the calculation details, please see: forthcoming Betam TFP working paper (Bakış and Acar, 2020).

the TFP movements as technological advances in the short-run. Thus, it makes more sense to approach TFP series using averages over multiple years.

TFP has the most rapid annual average growth rate in the period of 1980-1989 with 2.2%. In the period of 2003-2013 TFP grows above average with annual growth rate of 1.2%. TFP growth is sluggish in the 1990-2002 period, and at that time the figure is only 0.4%. The period of 2014-2018 is the worst period in terms of TFP growth (0%).

As Figure 3 shows, TFP increases rapidly after 2002, and contracts considerably in 2008 and 2009. After 2010, TFP rebounds; however, cannot reach its 2006 peak.

Figure 3: The Course of TFP over the Years (1980=100)
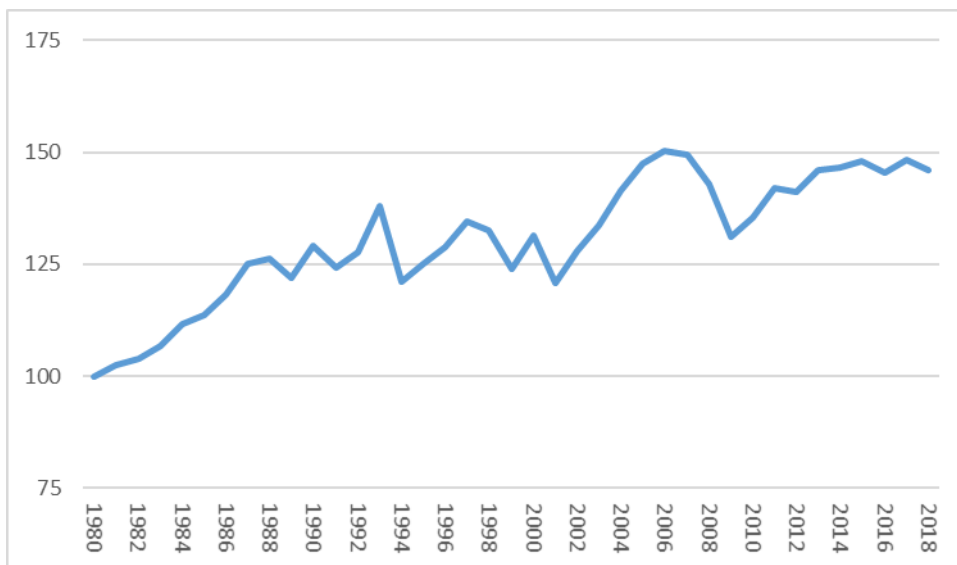
Source: Betam.

Economic Growth Outlook of Turkish Economy

Analysis on Turkish economy generally states that economic growth of the country should exceed 5% for long periods of time in order to catch up developed countries income levels. The New Economy Program of the government set the target growth rate for 2020-2022 years as 5%. Hence, this growth target is a reference point for both academics and policy makers. There is also another opinion stating that 5% growth target is a legitimate aim for 2020's while Turkey must have been growing over 6% until the first half of the 2000's to be considered as successful[5]. There are at least two reasons supporting the latter thought. First one is about the level of the capital stock, and the second one is about efficiency gains resulting from structural transformation. Since the capital stock was lower before 2000, the same amount of investment is expected to stimulate more growth at that period compared to recent years. Likewise, the domestic migration continues from rural to urban areas which creates a more efficient allocation of labor force, thus productivity improvements. The reason behind these

---

[5] We thank to Prof. Dr. Seyfettin Gürsel for this reminder.

productivity gains is the "hidden unemployment" in rural areas. Migration from rural to urban areas does not cause a decrease in agricultural output while creating a previously non-existing value added in paid jobs. For these two reasons, if we evaluate 5% as a successful growth rate for the recent years, we should seek higher rates for former years.

The average annual GDP growth rate for Turkish economy is 4.6% for the years between 1980 to 2018 (At the same time period, per capita GDP grows at 2.3% annual average rate). Although Turkey's growth performance is close to the 5% target, this target is not achieved. In the light of discussion in the previous paragraph, it is better to evaluate the growth performance of Turkish economy according to specified subperiods earlier. We will come back to this discussion when discussing Table 1 below. The frequency of economic crisis in Turkish economy are the main reason that weighs down the average growth rate and disappoints the expectation of sustainable growth. Turkish GDP contracted five times during the 1980-2018 period. These years are 1980, 1994, 1999, 2001 and 2009. In 1980, the exhaustion of the closed economic system, internal disorder and military coup d'état; in 1994, poor monetary, interest rate and debt policies of the government; in 1999, Asian economic crisis and earthquake happened in the Marmara region; in 2001, high public debt level, a misguided stabilization program, and the liquidity problems of commercial banks plus a political crisis are the main causes of the economic crisis. In 2009, the Global Financial Crisis caused a sharp decline in economic activity.

Table 1: Average Annual GDP Growth of Turkish Economy in the Time Periods

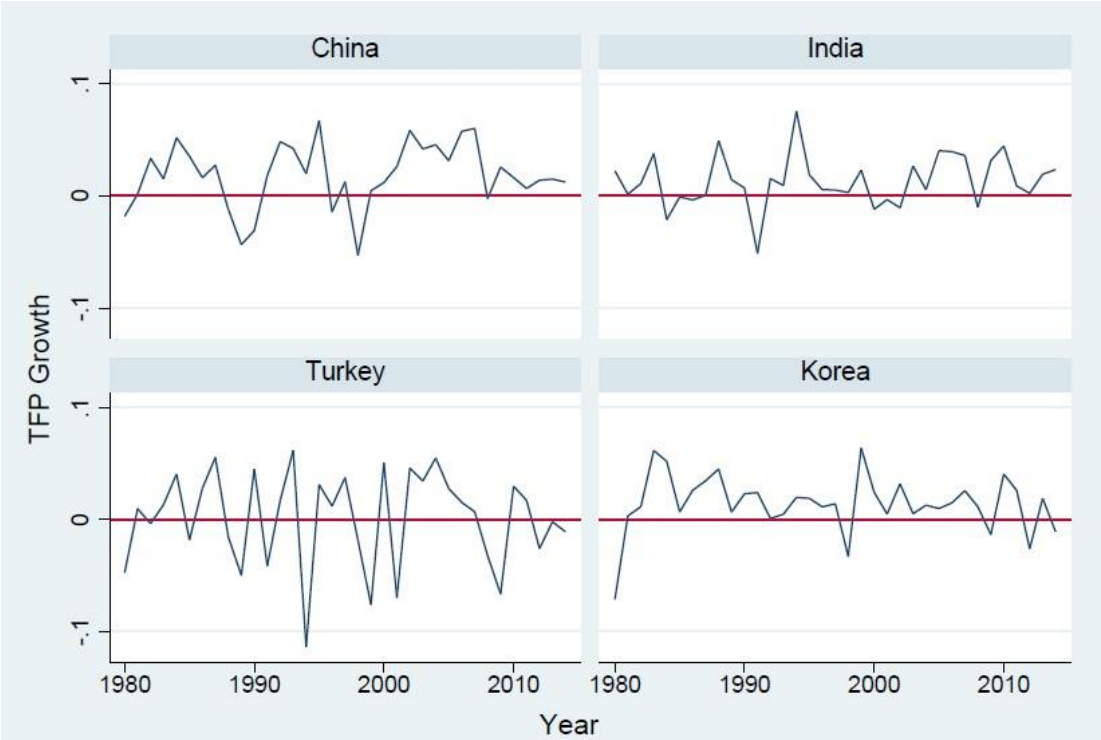| Period	GDP Growth Rate (%)	
1981-1989	4.7	
1990-2002	3.4	
2003-2013	5.7	
2003-2007		*7.0*
2008-2010		*1.4*
2011-2013		*7.8*
2014-2018	4.8	

Source: TurkStat, Betam.

Following the periodization used in the forthcoming Betam TFP working paper, the best years in terms of growth performance is the 2003-2013 period with an annual average GDP growth rate of 5.7%. The 2014-2018 period records a smaller figure of 4.8%. 2016 coup attempt and economic slowdown in 2018 are the main reasons for a slower growth performance. GDP growth during the years between 1981 to 1989 are somewhat modest with annual average growth rate of 4.7% while in the 1990-2002 period Turkish economy expanded only 3.4% yearly, because of the successive economic and political crisis, and natural disasters such as the Marmara earthquake (Table 1).

Figure 4: Per Capita GDP Growth Rate of Turkey, China, India, and South Korea, 1980-2014
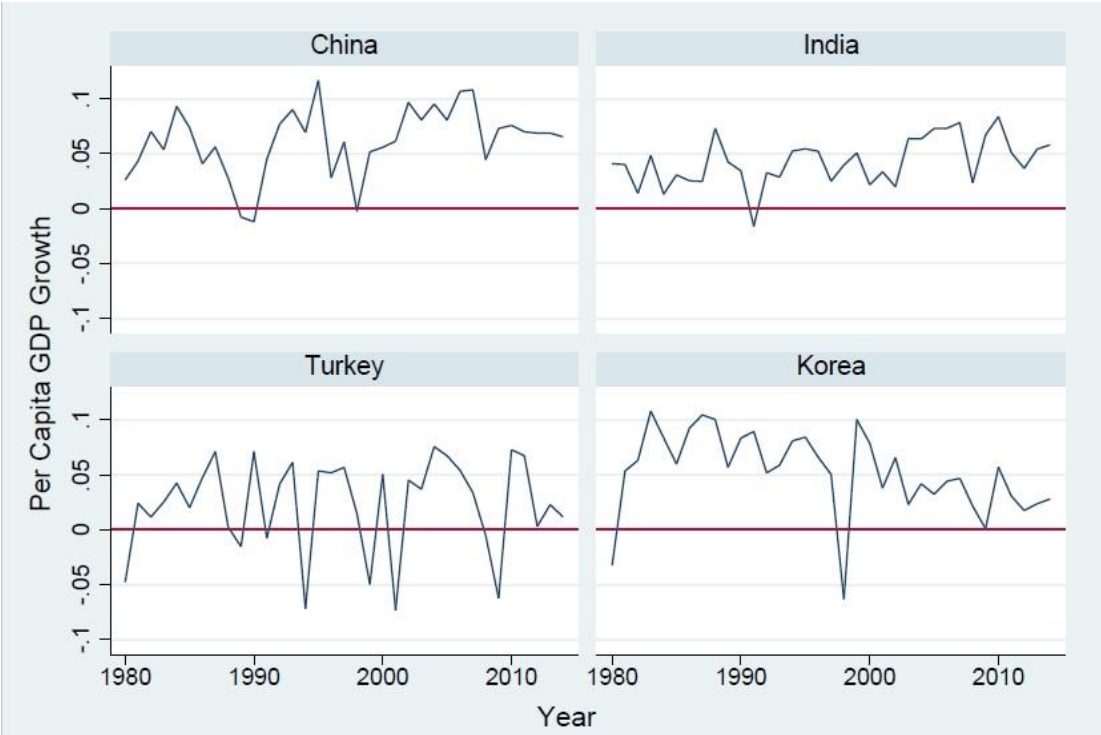
Source: PWT, Betam.

Figure 5: TFP Growth Rate of Turkey, China, India, and South Korea, 1980-2014

Source: PWT, Betam.

Annual GDP growth rate is near its long-term average in 1981-1989 and 2014-2018 periods while it is below average in the 1990-2002 period and above average in the 2003-2013 period. Even if 5% is accepted as a target growth rate for every period, only the 2003-2013 period achieves the target. An above 5% growth rate (for example 6%) should be the target for 1980s 1990s as we discussed earlier. In this respect, the growth figures of 1980s and 1990s are more disappointing.

The data sets used in this research brief are mainly obtained from TurkStat. However, for international comparisons "Penn World Table" (PWT for short) dataset is utilized. Some rapidly and sustainably growing Asian economies' GDP growth rates are compared to Turkey's in Figure 4. These countries are China, India, and South Korea. All these three countries' per capita GDP is below per capita GDP of Turkey in 1980 (both purchasing power parity adjusted and unadjusted figures). By 2018, China and South Korea surpassed Turkey's per capita income level (PPP unadjusted). GDP growth is more volatile in Turkey compared to these three countries. Over the period of 1980-2014, annual average per capita income growth is 6.2% in China, 4.3% in India, 5.3% in Korea and 2.3% in Turkey.

What makes the difference between Turkey and these three countries? No doubt, one of the most important factors is TFP (Figure 5). China, India, and South Korea all have higher and steady TFP growth figures compared to Turkey. Slower and volatile TFP growth is the main factor that makes Turkey fall behind of these three countries. A reminder is necessary here. In Figure 4 and Figure 5, all the data comes from PWT (Feenstra et al., 2015). Although Betam's TFP calculations for Turkish economy has a pattern similar to PWT TFP series, there are significant numeric differences between them. The reasons behind these numeric differences are discussed in detail in Bakış and Acar (2020).

Contribution of TFP to GDP Growth: 1980-2018

We have stated that TFP contributes, on average, 1 percentage point to GDP growth between 1980 and 2018. Contribution of TFP to growth shows considerable volatility over the years. In parallel to the cyclicality of TFP series, the contribution of TFP to growth is affected by the business cycles.

Figure 6 presents TFP contribution to growth along with the contribution of labor and capital in each subperiod. TFP contributed 2.2 percentage points of 4.7% annual average GDP growth rate in the 1981-1989 period; in other words, 47% of growth is due to TFP increases in 1981-1989. One of the reasons behind the moderate growth in this period is that the increases in capital stock contributed only 1.9 percentage point. This result is not surprising because investments remain low throughout this period, because of underutilization of high capacity rates inherited from 1970s.

In the period of 1990-2002 where average annual growth rate is 3.4%, the contribution of TFP to growth is only 0.4% percentage points (11% of growth is due to the TFP increases). The main

contribution to growth comes from fixed capital growth in this period with 4.9 percentage points; in other words, 71.7% of the growth is due to advances in fixed capital stock.

2003-2007 and 2011-2013 are two exceptional subperiods that record above 7% growth rates. TFP contributions to growth are 3.1 and 2.5 percentage points, respectively, in these two subperiods. These figures are by far the best TFP growth rates for the entire 1980-2018 period. The contributions of TFP to growth rates are 3.1 and 2.5 percentage points in these subperiods, respectively, which accounts for 45% of the GDP growth. In both subperiods, increases in fixed capital stock contributed as much as TFP to the growth rates (3.1 and 3.3 percentage points respectively) (Figure 6).

Because of the influence of the Global Financial Crisis, TFP contribution to GDP growth is negative in the years between 2008 and 2010, as expected. The striking point is that although increases in fixed capital stock and employment are close to 2003-2007 and 2011-2013 averages (6.4% and 2.9% respectively), GDP growth is limited to 1.4% (Figure 6).

TFP does not contribute to growth in the final period covering 2014-2018 because TFP does not grow in that period either. GDP growth rate is also relatively moderate in the period of 2014-2018 with an annual average growth rate of 4.8%. Large increases in capital stock (7.2%) is are the main driver of growth in this period with a contribution of 3.7 percentage points. Among all the periods analyzed, capital stock contributed the most in the 2014-2018 period. The moderate growth rate of the 2014-2018 period shows that even high levels of investment may not guarantee desired rates of growth if they do not lead to TFP increases.

Looking at gross fixed capital formation at current prices published by TurkStat, we see that the share of construction investments is 51.3% between 2009 to 2012 while the share of machinery and equipment investment is 39.3% in the same years. Starting from 2013 these shares are altered in favor of construction. Between 2013 and 2018 the share of construction investments reaches 56.5% while machinery and equipment's share decreases to 35.7%. Hence, there is an approximately 5 percentage point shift from machinery and equipment investment to construction investment. Given that construction investments are less productive than machinery and equipment investments we claim that one of the key determinants of the low TFP growth in the 2014-2018 period is these unproductive construction investments.

Figure 6: Capital, Employment and TFP Contributions to GDP Growth
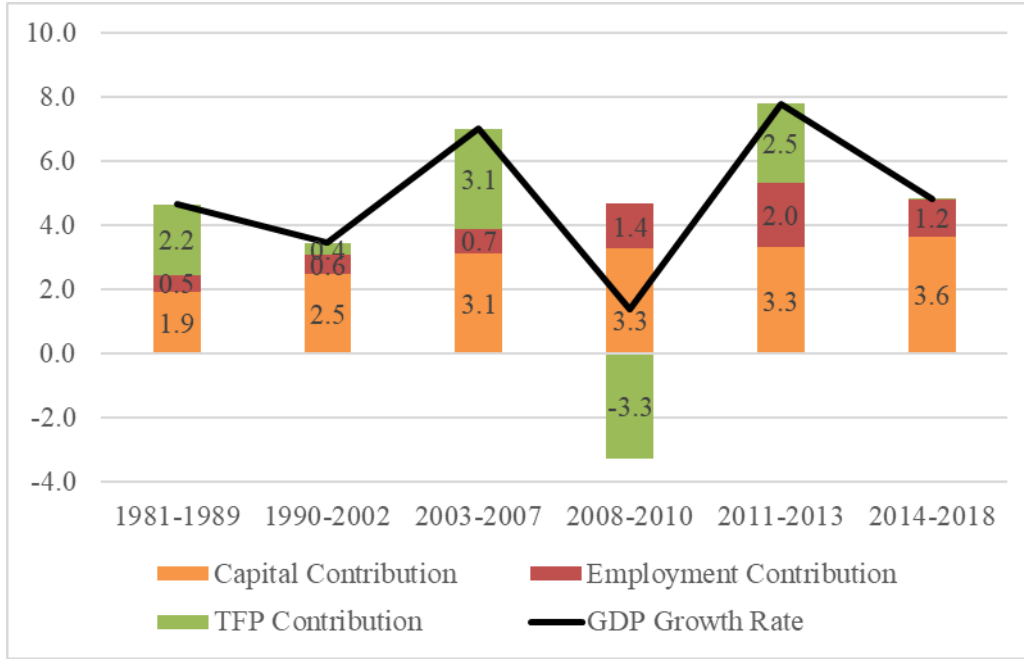
Source: Betam

References:

- Bakış, O. ve Acar, U. (2020): Türkiye Ekonomisinde Toplam Faktör Verimliliğinin Seyri: Sektörel Bakış, Betam Çalışma Tebliği No. 19 *(forthcoming)*
- Feenstra, R.C., R. Inklaar ve M.P. Timmer (2015), "The Next Generation of the Penn World Table" American Economic Review, 105, 3150-3182. Updated PWT data can be found: www.ggdc.net/pwt (Date accessed: 2 April 2020).