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ASSESSMENT OF THE POSSIBILITY OF A MIDDLE-INCOME TRAP IN TURKEY

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ABSTRACT

Turkey has been under the middle-income country category according to the income category classification of the World Bank. Turkey promoted to high-middle-income group in 2005 after spending more than 50 years in lower-middle-income group. The purpose of this study is to identify the presence of middle-income trap in Turkey. The study brings together the most recent theoretical studies from different perspectives with respect to the presence of MIT in Turkey along with Robertson and Ye approach in the empirical phase. Within the context of this study, structural break unit root test using current data obtained through the Atlas method is applied in order to evaluate Turkey's middle-income trap status. The GNI per capita Atlas Method (current US $) data of the World Bank for the years 1967-2016 are used in the study. The empirical analysis briefly showed that Turkey is not in the MIT.

Key Words: *Middle-income Trap, Turkey's Middle-income Trap disposition, Robertson and Ye Approach*

Jel Codes: *D31, C40, E01, O500, O470, C22*

1. INTRODUCTION

The middle-income trap is the insufficiency of per capita income levels or the continuity of weak or stagnant growth performance from the perspective of per capita income levels of developing countries compared to developed economies. In other words, although the efficiency-based growth model cannot be realized in the economic structure during long periods of stagnation, there is no agreed definition.

In the literature on middle-income trap, as a result of many errors in the sustainable economic growth process, we come across all the reasons why the country cannot switch from the middle-income group to the high-income country group. This concept was first introduced in the study titled 'An East Asian Renaissance: Ideas for Economic Growth' published by the World Bank experts Gill and Kaharas (2007).

There are many studies that present different perspectives on the causes of the middle-income trap. However, studies on empirical detection of the middle-income trap are limited. Along with the descriptive studies, there are different period sections designed using different econometric techniques and analyzes carried out on a national and regional basis.

2. MIDDLE-INCOME TRAP THEORETICAL FRAMEWORK

In the literature, studies on the causes of the middle-income trap are progressing through two approaches. The first one is the approach that directly links economic growth to structural change in middle-income countries. In this approach, economic development depends on the increasing technological capacity of production, yield, high demand flexibilities, industrial development, diversity and specialization in production, and level of sophistication especially in export structures [income flexibility of export demand is higher for high-tech products than low-tech products] both within and between sectors.

According to this approach, due to the failure to realize structural change for the creation of high value-added economic activities in international competition, middle-income trap takes place. By establishing a direct relationship between structural change and economic growth, it is advocated that the increase in productivity caused by structural change is essential in ensuring sustainable growth and increasing living standards (Paus, 2014). “Insufficient structural transformation is one of the prominent reasons of the middle-income trap, because labor intensive production cannot compete in internationally standardized markets [due to relatively high wages] and high value-added production activities [due to low productivity]” (Lin and Treichel 2012; Ohno 2009; Paus 2012).

The inferences of Kharas and Kohli (2011) are important in the context of the same structural transformation. Especially in their studies for Latin America and East Asian countries, they made structural analyzes about falling into the middle-income trap and getting out of the trap. These analyzes include the transition from cheap labor and capital-based growth targets to factor efficiency growth strategies, diversification of production, specialization in production, and decentralized economic management approach. Flechtner and Panther (2013)’s productivity-based growth approach stands out especially in education and emphasis on human capital in the causation of the middle-income trap. They argue that a high-quality education system is required so that technological advances improve the innovation-based structure and Kanchoochat and Intarakumnerd (2014) the relationship between education and national development has a direct impact on the economic growth strategy.

Hausman, Hwang, and Rodrik (2007) emphasize the strong links of economic growth and distinctive performance characteristics of the middle-income countries (not the countries in other income groups) with the economic growth of their export structures. In addition, Zeng and Fang (2014) state that the low-income economies the manufacturing industries of which

are based on low wages cannot compete against innovative advanced economies based on high skills.Cimoli, Porcile and Rovira (2010), emphasizing that the income flexibility of export demand is higher for high-tech products than low-tech products, are prominent approaches of the middle-income trap in the context of structural transformation.

In other words, it seems that the economic growth approach, which is based on productivity in the long term, has created structuralist solutions for the middle-income trap.

The second type of approach that the studies related to middle-income trap focus on in the literature is the stagnation and slowdown in economic growth and lack of convergence to developed countries. Here, a country's per capita income could not rise above this income level for many years after reaching a certain level and there are various definitions in the literature by Jankowska, Nagengast and Perea (2012) or by Eğilmez (2012) who talks about being trapped in the 20% of the US per capita GDP. These approaches mainly consist of studies on empirical determination of whether countries are in the middle-income trap.

Felipe, Abdon and Kumar (2012) determine the threshold values of whether or not countries are in the middle-income trap. They developed these thresholds based on the historical data of the countries, their growth rates, their income transitions and times. Felipe et al.(2012) grouped countries based on their GDP according to the relevant calculation in this study.

Eichengreen, Park and Shin (2012) base their approach to slowdown in growth on the combination of three conditions. This tripartite structure is aimed at determining the middle-income trap. The approach, which is based on the emergence of the slowdown in growth, tries to determine the threshold values. These values were first determined as at least 3.5% and above of the average growth rate in the seven-year period before the slowdown in growth took place. In the second stage, these values are determined as the average growth rate in the seven-year period after the slowdown in growth has started to show a decrease of at least 2% and in addition, the annual income is greater than $ 10,000 according to the purchasing power parity per capita. Eichengreen et al.(2013), on the other hand, advocates two band level ranges of the middle-income trap, which may occur between $ 10,000-11,000 and $ 15,000-16,000. Apart from the relevant calculation values, increasing the shares of high-tech products in exports, human capital and democratization are other important topics that Eichengreen emphasizes in order to overcome the middle-income trap.

Apart from approaches to determining threshold values for the middle-income trap, there is a methodological study developed by Robertson and Ye (2013) providing econometric testing for the determination of the middle-income trap of the countries. This study was created based on the lack of convergence of developed countries.

Another method is an approach based on the growth slowdown that Woo (2012) has created based on the catch-up index (CUI). This index is derived from the ratio of income levels of countries to the income level of the USA. Countries with an index value above 50% are grouped as high-income, countries between 55% and 20% are grouped as middle-income, and countries with less than 20% are classified as low-income countries.

With the second approach, the stagnation and slowdown in economic growth and the lack of convergence to developed countries, in other words, the sustainability of economic growth is very important in determining the middle-income trap.

Along with these two approaches, Ohno (2009)'s descriptive study, which was designed based on the gradual industrialization approach, is important in the conceptualization of the middle-income trap. The glass ceiling approach in this study is one of the important studies in which the functionality of foreign direct investments and middle-income trap are used together. It is an approach in which simple production activities carried out with the help of foreign

investments evolve towards less dependency on foreign investment and production of technology and management know-how based on their own internal values.

Another important factor that stand out in middle-income trap causality together with related approaches is income distribution inequality. There are approaches such as Egawa (2013) and Islam (2015), that accept that income distribution inequality decreases growth rates or leads to inequality trap, especially in developing countries, and that this is one of the important reasons for middle-income trap.

3. MIDDLE-INCOME TRAP AND TURKEY

Numerous studies have been carried out in recent years in relation to Turkey's middle-income trap positioning. The aspects that stand out in these studies have been tried to be brought together. Arslanhan and Kurtsal (2010) emphasize that the sectoral structure and export products content of the country need to be changed in order for Turkey not to be caught in the middle-income trap. Transition from cheap labor force and labor-intensive sectors in exports to technological structures to reach higher levels in global markets and to strengthen competition will enable this. The authors emphasized the necessity of increasing the technological structure from low level to medium and high level.

Yeldan, Taşçı, Voyvoda and Özsan (2012) define three different versions of Turkey. In the first version, Turkey is defined as a developed and industrialized country with no middle-income trap risk. In the second version, Turkey is defined as a country with a middle-income trap risk. The third version of Turkey does not only face the middle-income trap risk but also poverty risk. Therefore, it is inevitable to develop different policy designs for regions with different income and development levels. The authors emphasize that the focus should be on technology-intensive areas and that supply-based policy incentives should be preferred in regions facing the risk of middle-income trap. It is also important to emphasize that in regions where there is the risk of middle-income trap, emphasis should be put on developing transportation infrastructure and supporting production based on medium low and above medium technology. For other regions, it is necessary to take measures to find solutions to the problem of scale in agriculture, to ensure transition from subsistence economy to industrial production and to provide a demand-oriented incentive design for the goods produced in these regions.

Öz (2012) state that per capita income based on purchasing power was trapped at 21% of the US income between 1960 and 2000, and that although this rate increased over 25% after 2010, sustaining this level also meant fulfilling certain conditions. It is not only necessary to aim to adapt to new products and processes through innovation and specialization but increasing the education levels of educators who could produce them is also important. The transformation that will create these conditions is possible through education, institutionalization and organizational compatibility.

Toprak (2012) state that Turkey is not only in the middle-income trap, but also in medium technology trap due to lack of high performance in the intellectual property rights index and the inadequate number of patent applications as well as in the medium human development level trap risk due to the inadequate quality of its education system when compared against other areas and the infailure of this system to become the driving force of economy. The author argues that this structure leads to staying permanently in the developing country status. The author also argues that although Turkey has got an advantageous structure in terms of market volume in comparison to other emerging countries that it is part of, due to dependency on foreign investments as Turkish companies are experiencing serious difficulties in having access to financial resources and due to insufficient domestic savings, factors such as high tax rates,

bureaucratic structure, relatively high level short-term portfolio investments and high current account deficits result in a vulnerable Turkish economy.

Indicating that Turkey is in the middle-income trap, Sak (2012) argues that this is particularly due to lack of industrialization in Turkey. Sak also states that the share of employment created by the industry is in decline in total employment, that productivity per worker has decreased and spontaneous productivity increases are not possible without industrialization. According to Sak, the main issue in industrialization is qualitative and that this results in decline in Turkey's industrial share in the world market. Sak (2012) also states that failure to achieve qualitative transformation in industry and gain a sufficient position in the high-tech product market leads to failure in achieving transformation in the quality of production which he thinks is determinant in overcoming the middle-income trap. Sak also indicates that various variables such as tax, justice, labor market, education and macro framework have come to the fore in the decline of the industrialization rate especially in recent years.

Yaşar and Gezer (2014) base their study on the middle-income trap definitions introduced by Eichengreen et al.(2012) and they assess accordingly whether or not Turkey is in the middle-income trap. This assessment is based on two conditions. According to the first condition, they state that when the per capita income of the rapidly growing country reaches $ 17,000 according to the fixed prices of the year 2005, the economic growth will slow down by 2% and when this income reaches 57% of the US income, economic growth will face stagnation. Between the years 1980-2012, Turkey's per capita income was between 15 to 20% of per capita income of the US and as this percentage couldn't reach 57%, this does not fulfill the first condition of the middle-income definition for Turkey.

Another condition to remain in the middle-income trap is that when the share of countries' employment in the manufacturing industry reaches 23%, the growth performance slows down and stays at this level. Between 2006 and 2013, this rate was 18,82% on average, and 23% as specified by Eichengreen was not achieved. Therefore, it is stated that the second condition of being in the middle-income trap has not been met. Yaşar and Gezer (2014) also state that Turkey has reached the upper limit of growth achieved through low to medium technology and that the existing growth targets could not be achieved with this technological structure in the future.

Koçak and Bulut (2014) test Turkey's middle-income through the Robertson and Ye (2013) approach. They used the multiple structural break unit root tests of Lee and Strazicich (2003) and Carrion-i Silvestre et al. (2009) for testing. According to the relevant test results, it is emphasized that Turkey is not in the middle-income trap. In other words, Turkey has a tendency to close the gap with the US economy, but this process is dependent on Turkey's sustainable growth performance. It is also underlined that certain conditions should be in place in order that Turkey does not face any risks. It becomes important that human resources policies are supported by R&D investments, deepening in institutionalization and updating the legal system should be achieved so as to secure a more democratic and freedom-based system which also protects intellectual property rights. It is also important that this structure is accompanied by macroeconomic balance through the variables of inflation, savings and growth.

Bozkurt, Bedir, Özdemir and Çakmak (2014) test Turkey's convergence to high-income countries based on the data for the period 1971-2012. In this study, (Lee and Strazicich, 2003)'s multiple structural break unit root tests were applied and Turkey's convergence to high-income countries was accepted based on the stationarity obtained according to the test results. After determining the relevant convergence, they questioned the effects of the enrollment rate in higher education, the domestic savings rate and the share of the manufacturing industry in GDP,

which are accepted as important indicators of the middle-income trap, over the same date range applying the ARDL limit test. With the related test results, it is determined that the enrollment rate in higher education, the domestic savings rate and the share of the manufacturing industry in GDP have a significant effect on per capita income in the short term. With the Granger causality test applied to clarify the effect of the relevant determination, it was determined that all variables were the Granger cause of per capita income in the short term.

Mert (2014) examines the demand aspect of the problem along with the supply-based studies developed to overcome the middle-income trap. According to Mert, the common feature of countries that have come out of the middle-income trap and grow relatively rapidly is the contribution of their domestic demand to growth being higher than that of net foreign demand. In the study, examples that do not comply with the relevant determination are also highlighted. This study also focuses especially on the decisiveness of consumption expenditures in countries where growth is driven by domestic demand. When the impact of external and internal demand is compared in terms of contribution to growth in Turkey, it is stated that the impact of external demand is in serious decline. Unlike other countries, not only the household consumption expenditures but also the final consumption expenditures of the government are high. The study emphasizes the importance of increasing not only the consumption but also the investment expenditures of households parallel to the final consumption expenditures of the government.

Unlike the studies that study the middle-income trap based on the current exchange rate, the middle-income trap studies by Nişancı, Gerni, Türkmen and Emsen (2015) are based on the purchasing power parity. The approach in all other studies stating that Turkey was included in the lower-middle-income group in 1955 and stayed in this group for 50 years and then moved up to the upper-middle-income group is criticized in this study. The study argues that Turkey moved up to the upper middle-income group earlier than 2005. The per capita income was recalculated for the period 1980-2013 during which current deficit was minimum and even saw a surplus and according to these calculations, it was concluded that Turkey was included in the upper-middle income group in 1997 or even earlier. When the findings of Nişancı et al.(2015) with respect to middle-income trap are based on the years in which Turkey's current deficit was minimum and the base year is closer to date, then the length of Turkey's stay in the upper middle-income group is longer. The assessment, in a sense, marks the years of financial economy/monetary abundance. The growth figures obtained when the purchasing power parity is disconnected from the exchange rate are considered to be indicative of the levels of artificial welfare. In the light of all these discussions and based on the assumption that the length of stay in the middle-income group is 14 years, it is pointed out that Turkey has been in this group for a much longer period and is in the middle-income trap.

Kaya, Tokucu, Aykırı and Durmuş (2015) state that structural causes led to the middle-income trap in Turkey and that for this reason, the indicator of overcoming the trap should be structural measures. However, this structural process is not simply through the labor-capital combination, which can be explained in a simple way, but also includes many variables such as technology, education, the status of the goods-service-labor markets, infrastructure, innovation capacity and an increase in these capacities, therefore, this will determine growth speed and per capita income level. However, this study emphasizes that Turkey has to achieve sustainable economic growth to overcome middle-income trap. In addition to this, it is also emphasized that by following the outward development model after 1980, the need to increase foreign exports and decrease foreign dependency in intermediate goods, thereby making the net contribution of foreign trade to growth positive is emphasized. Arrangement of the exchange rate policy to increase export revenues, increasing the share of R&D expenditures in national income by providing public and government incentives for scientific research and technology,

and being able to produce products with higher added value to be exported are the things that should be done to overcome middle-income trap.

Stating that the most important determinant to overcome the middle-income trap is the sectoral choice, Çaşkurlu and Arslan (2014) state that this choice is an indicator of becoming part of global value chains. Focusing on railway transportation in the study, the authors state that the technological leap will be the main subject in the export of technology and in reducing foreign dependency.

Ener and Karanfil (2015) examine the effects of total domestic savings on per capita income between 1980-2013 using time series, cointegration and causality methods. While they could not find any causality from per capita income to savings, they found one-way causality from total domestic savings and deposit interest rates to per capita income and from investments to money supply. The obtained result showed that continuous deficit in the corresponding period in the range of savings-investment balance in Turkey created serious problems in the per capita income level, and accordingly in the increase of national income and sustainable economic growth. The study argues that high deficits in savings in terms of per capita income in Turkey have led to failure to overcome the middle-income trap for long years and become one of the high-income countries. It is also mentioned that insufficient domestic savings increase the current account deficits by requiring external savings in financing the investment.

Based on the economic data for the period 2001-2013, Bahçekapılı (2015) states that due to the slowdown in growth and the large decline in total factor productivity, Turkey is in the middle-income trap. According to Bahçekapılı, the economic growth between 2002-2008 is due to capital-intensive technology imports, shifting the workforce to more productive sectors and relatively high total factor productivity. However, foreign capital dependent growth and the current deficit due to capital goods imports destabilized the economy and that low domestic savings, low productivity and unrealistic exchange rate policies have pushed Turkey into the middle-income trap.

In their study, Alçın and Güner (2015) state that the middle-income trap should lead to discussions based not only on the per capita income figures but also on productivity, the quality of the workforce, the production structure, macroeconomic stability and the success of techno-economic policies. The only point of focus should not be whether or not Turkey falls in the middle-income trap, but that it should also include policies to escape from this trap. The study also emphasizes the need for the nationalization of investments through the localization of capital and know-how, developing new market and product opportunities in foreign trade, fast and steady economic growth through integrated techno-economic policies, as well as achieving not only quantitative but also qualitative transformation at the sectoral level.

Ada and Acaroğlu (2016) state that Turkey is in the middle-income trap and also note that Turkey is a strict follower of the developed countries. They created the Granger causality tests based on the economic data for the period 1983-2013. The study emphasizes that Turkey can overcome the middle-income trap by investing in education and focusing on high-tech export products. It is emphasized that the production of technological export products and services in a healthy way can be achieved by qualified workforce with an effective and efficient training system.

Gürsel, Bakış and Köksal (2016) state that the middle-income trap will continue to stay on Turkey's agenda as productivity increases do not have sufficient impact on economic growth. With respect to Turkish economy achieving high growth numbers before the global crisis (2002-2008), the study emphasizes that labor productivity had a significant impact on per capita income levels. However, although employment growth has still been achieved in low rates in recent years, the weak increase in labor productivity has slowed down the income

growth per capita. Reiterating that increasing productivity is very important in achieving higher growth figures and closing the gap with high-income countries by increasing the per capita income in Turkey, the authors stressed the importance of effective structural changes that include infrastructure, energy-labor force-product markets and tax system.

Yalçınkaya and Aydın(2017) examine whether or not Turkey is in the middle-income trap by applying the Robertson and Ye approach. Stationary and structural break unit root tests were applied to GDP data, which were created according to real and purchasing power parity. According to the relevant test results, it is emphasized that Turkey is in the middle-income trap. In order for Turkey to become a high-income country, it should have a growth rate higher than its potential and that it should be made sustainable. At this point, it is also emphasized that achieving stability in macroeconomic indicators and political structure in the short term and the need to implement structural reforms in the long term are important in overcoming the middle-income trap.

According to the common opinion in this study, Turkey is either in the middle-income trap or is not in the middle-income trap but is faced with this risk. Both approaches demonstrate that there is need for transformation against Turkey's middle-income trap disposition. One of the points frequently emphasized even in different causalities in different studies is not to lose any time in performing technological structural analyzes seriously. Both replacing growth process provided by labor-intensive sectors in the production process by technological production processes based on R&D and innovation, and the elaboration of the product range for competition in the foreign market with technology will enable the transition to the frequently mentioned value-added product group.

Relevant studies describe the serious risks that could be encountered during technological structure transformation of Turkey due to dependence on foreign capital in the context of middle-income trap. In particular, the failure to nationalize/localize production, which is dependent on intermediate goods imports, is one of the most emphasized points.

The relationship between foreign capital and middle-income trap is another problem encountered in Turkey as insufficient domestic savings are replaced by high amounts of foreign savings in order to ensure the savings-investment balance. The increase in the use of foreign savings causes the savings investment balance to constantly deficit and increase the current account deficits. As a result of this process, serious problems emerge in national income and sustainable economic growth.Education, especially the emphasis on human capital development, labor productivity, institutionalization, democracy, updating the legal system in which freedoms and intellectual property rights are protected and increasing patent applications are observed as important variables in the context of middle-income trap in relevant studies.

4. EVALUATION OF MIDDLE-INCOME TRAP IN TURKEY BY ROBERTSON AND YE APPROACH

Scope:

In many studies on determining the middle-income trap, the time series structure is not taken into consideration regarding the per capita income level. In other words, the middle-income trap positioning of countries should be analyzed econometrically (Robertson & Ye, 2013). First of all, in this approach, another country, which is considered to have a balanced growth path, is determined as the reference country, in addition to the country tested to find out whether or not the country in question is in the middle-income trap. The USA is accepted as the reference country in this study and other studies. A new series is derived from the natural logarithm of the GDP per capita of the tested country, over the years, by obtaining the differences of the logarithm of the reference country's GDP per capita.

$x_t = In\ GDP_{A,t} - In\ GDP_{USA,t}$ (Koçak and Bulut,2014)

Stability analyzes are applied to this new series (difference series) within the time series applications. As a result of stationarity analysis, the difference series being stagnant for the given level leads us to the conclusion that the country under test is in the middle-income trap. This result shows that the difference in GDP per capita between the tested country and the USA will not decrease over time or that the tested country does not tend to catch developed countries with respect to national income from an econometric point of view. (Koçak and Bulut, 2014).

The fact that the related difference tends not to decrease also indicates that the country under test is in the middle-income trap. In this approach, the necessary condition that indicates that the mathematically tested country is in the middle-income trap is the expected value or long-term estimate of per capita income, i.e.

$lim_{k\to\infty} E(x_{i,t+k} | l_t) = \bar{x}_i$ does not change over time (1)

$\underline{y}r,t - yr,t \leq \bar{x}_i \leq \bar{y}r,t - yr,t$ should also be included in the middle-income group band (2)

(Robertson and Ye, 2013)

According to the assumptions above, the $x_{i,t}$ series should be stationary with a nonzero average for the middle-income trap. In particular, the presence of a stochastic trend in the $x_{i,t}$ series violates the time-dependent invariance of the mean in this trend. In addition, the $\bar{x}_i$ average is in the middle-income band. This result is important because if the $x_{i,t}$ series is stationary, the long-term $\bar{x}_i$ average of this series differs significantly from the current $x_{i,t}$ value or can be calculated on simple average finite intervals due to short-term dynamics (Robertson & Ye, 2013).

The approach by Robertson & Ye (2013) is not only econometrically determining whether the tested country is in the middle-income trap, but this approach also examines the GDP per capita values within the time series applications (structural breaks, stochastic trend, slowdown in growth, etc.) and it also enables the need to revise these series frequently at certain intervals to a certain extent (Yalçınkaya and Aydın, 2017).

In their study, Robertson and Ye (2013) test whether 46 countries are in the middle-income trap using the traditional ADF and structural break Zivot –Andrews (ZA) and Lumsdaine-Papell (LP) unit root tests for the period of 1950-2010. It has been determined that 23 of these 46 countries under test are in the middle-income trap according to at least one unit root test. While Turkey is one of these countries in the middle-income trap according to the ADF test, Turkey is stated not to be in the middle-income trap according to ZA and LP tests (Robertson and Yee, 2013).

5. OBTAINING RESEARCH DATA

Robertson and Ye(2013) (and many other researchers) have worked with Penn World Table (Version 7.1) 2005 prices and datasets derived from the purchasing power parity to determine the middle-income trap. However, the point to be emphasized here is the need to revise the datasets in terms of both GDP and GNP due to changes in both national-international inflation and exchange rates. Therefore, especially in the studies developed in recent years, researchers provide data sets based on the real GNP values per capita calculated by the World Bank's Atlas Method. The peculiarity of these data sets is that the per capita GNP values can be calculated by adjusting to the exchange rate average of the last three years and inflation differences between countries. In this way, it was tried to reduce the short-term effects that may occur in exchange rates and the effects of domestic-foreign inflation rates on GNP per capita (Yalçınkaya and Aydın, 2017).

In this study, the data sets created by the World Bank with the Atlas Method are used. In this framework, the GDP data set for the 1967-2016 period is used.

SER01: In[GNI per capita Atlas Method(current US$)-Turkey] –In[GNI per capita Atlas Method (current US$)-USA] [Absolute Logarithm Difference][Between 1967-2016] [https://databank.worldbank.org/indicator/NY.GNP.PCAP.CD/1ff4a498/Popular-Indicators] (Accessed:10.11.2018).

6. METHODOLOGY AND FINDINGS

With its very well-known definition, the concept of stationarity is put forward as the mean and variance values of the economic series not changing depending on time (or independent of time), that is, they remain constant. However, it is accepted that the covariance between the two periods of these series is not dependent on the period when it is calculated, but only on the distance between the two periods (covariance due to the level of delay) (Gujarati, 1999).

This definition of stationarity leads us to the definition that "time series does not have a trend or accumulation, in other words, there is no need to take the differences of the series." In order to be able to generalize not only the estimation period dealt with regarding the related time series behavior, but also the other periods, the related time series should be stationary or made stationary.

Determination of the stationarity of the time series is carried out through unit root tests with different assumptions, the test statistics of which could be and which take (doesn't take) into consideration the structural break effects. In this context, the state of stationarity is investigated through traditional Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Dickey -Fuller GLS (DF-GLS) of different nature and Zivot-Andrews (ZA), Lee and Strazicich (LS) and Carrion-i Silvestre (CS) unit root tests with structural breaks. According to the ADF, PP and DF-GLS classical unit root tests which were created primarily through different techniques,

$\mathbf{H_0}$: "There is a unit root / data are not stationary."

$\mathbf{H_a}$: "There is no unit root / data are stationary" null unit root hypotheses will be tested.

The results of the traditional ADF, PP and DF-GLS unit root tests performed in relation to the stability of GDP data sets per capita in this study are tabulated below.

Table 1. ADF, PP and DF-GLS Unit Root Test Results

	ADF Test Statistics		**PP Test Statistics**		**DF-GLS Test Statistics**	
Variables	**Constant**	**Constant +Trend**	**Constant**	**Constant +Trend**	**Constant**	**Constant+Trend**
SER01	-1,77	-2,44	-1,1506	-1,7999	-1,7762	-2,4148
Critical Values						
1%	-3,57	-4,16	-3,57	-4,16	-2,614	-3,77
5%	-2,92	-3,5	-2,92	-3,5	-19,478	-3,19

According to the related table values, it is concluded that the GDP per capita series are not stationary at the level [I (0)] in both constant and constant-trend forms. For the 1% and 5% significance levels of the absolute values of the calculated test statistics for the related series, there is a "unit root" because it is smaller than the Mac-Kinnon critical values in ADF and PP unit root tests and Elliott-Rothenberg – Stock critical values in the DF-GLS traditional

unit root test. For this reason, the hypothesis of "there is a unit root," "that is, the data are not stationary" cannot be rejected. Depending on the stationarity of the data sets, relevant test results show that the Turkish economy is not in the middle-income trap.

It is noteworthy that the unit root tests can produce deviated results if the relevant values undergo a structural change in relation to the data set provided. Because, considering the structural changes in the related time series, the establishment of ADF, PP and DF-GLS traditional unit root tests may produce erroneous results (Perron, P., 1989). Similarly, ignoring and/or incomplete handling of the structural breaks in the economic time series during the research period examined results in erroneous results (Yalçınkaya and Aydın, 2017). Therefore, in order to achieve more reliable results and eliminate existing hesitations, the series discussed are also examined separately with unit root tests that allow for one (Zivot-Andrews-ZA), two (Lee and Strazicicih-LS) and five (Carrion-i Silvestre-CS) structural breaks, respectively.

Perron (1989), based on the view that time series may undergo structural changes, developed a unit root analysis that takes into account structural breaks and based this analysis on the assumption that the date of structural breaks is known. However, the assumption that this study is based on has been criticized by Zivot-Andrews in the following years, and a single break structural unit root test, in which the date of break can be determined internally, has been developed by him. The break date to be obtained is formed according to the point where the t-statistics obtained from the ADF test are minimum (Zivot and Andrews, 1992:pp 254). In this test, three different regression models, where the break is in the constant (Model A), the trend (Model B) and both the constant and the trend (Model C), were created and parameter estimates were made for each break point and t-statistics were calculated.

$$y_t = \mu + \beta_t + \alpha y_{t-1} + \theta_1 DU(\emptyset) + \sum_{j=1}^{k} c_i \, \Delta y_{t-i} + \varepsilon_t \; (Model\ A) \qquad (1)$$

$$y_t = \mu + \beta_t + \alpha y_{t-1} + \theta_2 DT(\emptyset) + \sum_{j=1}^{k} c_i \, \Delta y_{t-i} + \varepsilon_t \; (Model\ B) \qquad (2)$$

$$y_t = \mu + \beta_t + \alpha y_{t-1} + \theta_1 DU(\emptyset) + \theta_2 DT(\emptyset) + \sum_{j=1}^{k} c_i \, \Delta y_{t-i} + \varepsilon_t \; \text{(Model C)} \qquad (3)$$

The term (t = 1,2,3, ... T) in the equations to show the time, ε_t represents the non-autocorrelated and normally distributed error term. $\mathrm{DU_t}(\lambda) = \begin{cases} 1, & \mathrm{t} > \mathrm{TB} \\ 0, & \text{otherwise} \end{cases}$ and $\mathrm{DT_t}(\lambda) = \begin{cases} \mathrm{t} - \mathrm{TB}, & \mathrm{t} > \mathrm{TB} \\ 0, & \text{otherwise} \end{cases}$

However, TB is about to break time corresponds to the breakpoints.DU shows the structural change in the constant term and DT are shadow variables that show structural changes in trend. The hypotheses created in the ZA test are based on the significance of the α coefficient (Esenyel, 2017).

The hypothesis is developed as follows:

$\mathbf{H_0}$: "The series has got a unit root without a structural break."

$\mathbf{H_a}$: "The series is stationary with one break."

If the t-statistic is greater than the critical table value, the null hypothesis (Ho) is rejected. Thus, it is concluded that α is meaningless and the series is stationary. The Zivot – Andrews results table created to determine stationarity related to this study is as follows.

Table 2. Results of the Zivot -Andrews Unit Root Test with One Structural Break

	Model A		**Model B**		**Model C**	
Variables	**ZA Test Statistics**		**ZA Test Statistics**		**ZA Test Statistics**	
SER01	-4,2122	1982	-3,81	1995	-4,1455	1982
Critical Values						
1%	-5,34		-4,8		-5,57	
5%	-4,93		-4,42		-5,08	

Regarding the test results in the table above, it is seen that the related series are not stationary at the levels in Model A, B and C [I (0)]. This is because the absolute values of the calculated test statistics are smaller than the critical table values at 1% and 5% significance levels. These results show that the series in the examined period are subject to structural change and are not stationary at the level with a structural break. In other words, a single structural break does not have a significant effect on the stationary state of the series. In order to avoid erroneous results due to the incomplete determination of the number of structural breaks, the stationary states of the respective series will be investigated with the Lee and Strazicich (2003) unit root test which allows for two structural breaks. The method used in LS unit root test is as follows:

$$y_t = \delta' Z_t + \varepsilon_t , \quad \varepsilon_t = \beta \varepsilon_{t-1} + u_0 \quad (*)$$

$Z_t, (Z_t = [1, t, D_{1t}, D_{2t}, DT_{1t}, DT_{2t}]')$ in the relevant equation is the vector of exogenous variables and $\varepsilon_t \approx iid\ N\ (0, \sigma^2)$ is the pure error term. D_{it} and DT_{it}, i=(1,2) is considered a shadow variable and they can be defined as follows

$$Z = [1, t, D_{it}, D_{it}]' \ , \ i = 1,2 \qquad D_{it} = \begin{cases} 1 , & t \geq TB_i + 1 \\ 0 , & \text{otherwise} \end{cases}$$

$$Z = [1, t, D_{it}, D_{it}, DT_{it}, DT_{it}]' \text{ , i=1,2} \quad D_{it} = \begin{cases} t - TB_i , t \\ 0, \text{otherwise} \end{cases}$$

TB in the related equations gives the breaking dates.By substituting the expression $Z = [1, t, D_{it}, D_{it}]'$ for Z_t in the (*) equation, Model A is reached, which can allow two breaks in the constant term for the LS unit root test. If the expression $Z = [1, t, D_{it}, D_{it}, DT_{it}, DT_{it}]'$ is added instead of Z_t in the equation (*), Model C is obtained, which allows two breaks in the constant term and trend.

Lee-Strazicich derives the LM unit root test from the $\Delta y_t = \delta' \Delta Z_t + \emptyset S_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta S_{t-i} + u_t$ equation. And it uses the equation $\lambda_i = TB_i / T$, $i = 1,2$ to locate the two breaks. Here T is the total number of observations, and the break dates are determined where the test statistics are the smallest. Procedure followed is $LM_\tau = inf_\lambda^{\tau(\lambda)}$and $\tau = t$ is statistic.After the break dates are determined (LM) test statistics are calculated. These statistics are compared with the critical table values in the Lee and Strazicich study, and the stationarity hypotheses are tested (Yalçınkaya and Aydın,2017).

The most important point that distinguishes the Lee-Strazicich (LS) test from other tests with one or two structural breaks is that the null hypothesis is worded as "there is a unit root with a structural break." If the calculated test statistics are larger than the relevant critical table values, the null hypothesis is rejected.

Table 3. Results of the Lee-Strazicich Unit Root Test with Two Structural Breaks

	Model A			Model C		
Variables	**LM Test Statistics**	**L**	**KT**	**LM Test Statistics**	**L**	**KT**
SER01	-3,153485	1	1999-2004	-6,109044	7	1982-2004
LS Critical Values						
1%	-4,073			-6,691		
5%	-3,563			-6,152		

According to the table values above, the related series is not stationary at the relevant level in Model A and Model C. This result is understood from the fact that the calculated test statistics are not greater than the absolute value of the relevant table critical values. The unit root test with two structural breaks shows that there was a tendency of significant reduction in the relative income level difference between the Turkish and US economy in the relevant period and that Turkey was not in the middle-income trap. As it allows for bilateral structural break (failure to reject null hypothesis) and due to the erroneous result possibility resulting from determining these number of breaks as pioneers, the Carrion-i Silvestre et.(2009) test that allows for up to five structural breaks will be applied to the series. As noted above, the Carrion-i Silvestre Test can allow up to five structural breaks. Another important advantage of this test is that it enables effective results to be obtained in small samples.

$y_t = d_t + u_t$

$U_t = au_{t-1} + v_t \qquad t=0,\ldots T$

equations constitute the stochastic data generation process for the test. Five different statistics were developed to test the stationarity in the series obtained in this process.

$P_T(\lambda^0) = \{ S(\bar{\alpha}, \lambda^0) - \bar{\alpha} S(1, \lambda^0)\} / s^2(\lambda^0)$

$MP_T(\lambda^0) = [C^{-2}T^{-2}\sum_{t=1}^{T} \tilde{y}_{t-1}^{\,2} + (1 - \tilde{C})T^{-1}\tilde{y}_T^{\,2}] / S(\lambda^0)^2$

$MZ_\alpha(\lambda^0) = (T^{-1}\tilde{y}_T^2 - S(\lambda^0)^2)(2T^{-2}\sum_{t=1}^{T}\tilde{y}_{t-1}^2)^{-1}$

$MSB(\lambda^0) = (S(\lambda^0)^{-2}T^{-2}\sum_{t=1}^{T}\tilde{y}_{t-1}^2)^{-1/2}$

$MZ_t(\lambda^0)=(T^{-1}\tilde{y}_T^2 - S(\lambda^0)^2)(4S(\lambda^0)^2T^{-2}\sum_{t=1}^{T}\tilde{y}_{t-1}^2)^{-1/2}$ (Göçer and Peker,2014).

The hypotheses developed for this test are as follows:

H_0: "There is unit root under structural breaks."

H_a: "There is no unit root under structural breaks."

Critical values to be used for testing the relevant hypothesis are generated by the bootstrap method. If the test statistics calculated with this test are smaller than the absolute values, Ho is rejected. In other words, it is accepted that there is no unit root under structural breaks in the series, that is, the series is stationary (Göçer and Peker, 2014). Values related to the results of the test are given in the table below:

Table 4. Carrione-i Silvestre (2009) Results of the Unit Root Tests with Multiple Structural Breaks

		I (0)			I (1)		
Variables		**Test Statistics**	**Critical Values**	**Break Dates**	**Test Statistics**	**Critical Values**	**Break Dates**
Ser01	**P_T**	33,902	[9,238]	1966	21,199	[5,543]	-
	MP_T	28,171	[9,238]	1975	21,885	[5,543]	
	MZ_a	-15,978	[-47,64]	1986	-3,866	[-17,325]	
	MSB	0,176	[0,101]	1996	0,325	[0,168]	
	MZ_t	-2,826	[-4,878]	2009	-1,258	[-2,896]	

Note: Values in parentheses are critical values generated by 1000 iterations using bootstrap. Structural break dates are the dates determined by the test method and only the results in the test with level values are reported in order to express the breaks in the original state of the series.

When the table values are examined, it is determined that the test statistics are higher than the critical values in both the level value and the first difference value of the relevant variables. In this case, H_0 cannot be rejected. In other words, the fact that the variables are not unit-rooted shows that they are not stationary. When the relevant series of break points are analyzed, 1966 is the last year before the end of the 1st Five Years Development Plan and the government went for elections in this year. 1975 corresponds to the following year of the beginning of the economic crisis, which began in 1974 in Turkey. 1986 is the first year of the period that saw an inflation rate higher than 50 percent (1986-1990 period) and the government held interim elections in this year. 1996 was the year of radical political changes and government change in Turkey. 2009 corresponds to the economic crisis periods caused by internal and external impacts.

Econometrically, the null hypothesis that "there is a unit root under structural breaks" cannot be rejected. Therefore, the statistical result of the series tested "are not stationary and the difference between the two series tends to close" could be reached. The fact that the series are not stationary also indicate that the Turkish economy is not in the middle-income trap and this result is in line with the results of the studies Robertson and Ye (2013) and Koçak and Bulut (2014) that examine the Turkish economy from an econometric point of view.

7. CONCLUSION

Studies on assessing Turkey's middle-income trap focus on the fact that even though Turkey is not in the middle-income trap, the country is still faced with the risk or is in the middle-income trap. The studies carried out agree that technological structural analyzes should be performed particularly. Transition to the product group with high added value takes is through transition from labor-intensive sectors to innovation-based technological production processes and the production of a technological product range to compete in international markets. However, dependency on foreign capital and failure to nationalize production done especially dependent on imports of intermediate goods are among the most emphasized points in the context of the middle-income trap.

In addition, the increase in the use of foreign savings causes the savings investment balance to consistently deficit and increase the current account deficits. As a result of this process, it is emphasized that serious problems arise in national income and sustainable economic growth. In studies carried out on the middle-income trap, the major variables that stand out are education, with special emphasis on human capital development, labor

productivity, institutionalization, updating the legal system where democracy, freedoms and intellectual property rights are protected, and increasing patent applications.

Turkey's medium-income trap disposition was tested using the Robertson and Ye (2013) econometric approach. With this approach, the difference of logarithm value of the US GDP from the Turkish GDP values logarithm was taken and stationarity analyses were applied to the series created. In this context, the status of stationarity was tested by applying traditional Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Dickey –Fuller GLS (DF-GLS) tests of different nature and Zivot-Andrews (ZA), Lee and Strazicich (LS) and Carrion-i Silvestre (CS) unit root tests with structural break.

Turkey does not appear to be in the middle-income trap according to the econometric methodology applied in the study. This result is in line with the results of the studies by Robertson and Yee (2013) and Koçak and Bulut (2014) that examine Turkish economy from an econometric point of view.

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