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MARMARA ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
İKTİSAT ANA BİLİM DALI
.EKONOMİ&FİNANS(İNG) BİLİM DALI

THE EFFECT OF PUBLIC HIGHER EDUCATION EXPENDITURES ON ECONOMIC GROWTH-A CASE OF TURKEY

M.A THESIS

AHMET METİN ŞİMŞEK

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Danışman: Doç. Dr. ECE HANDAN GÜLERYÜZ

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ÖZET

YÜKSEKÖĞRETİMDEKİ KAMU HARCAMALARININ EEKONOMİK BÜYÜMEYE ETKİSİ-TÜRKİYE ÖRNEĞİ

Bu çalışmada yükseköğretim kamu harcamalarının Türkiye'nin ekonomik büyümesine olan etkisi ARDL sınır testi yöntemiyle analiz edilmiştir. Çalışma yıllık bazda olup zaman aralığı olarak 1981 ve 2020 yılları aralığını kapsamaktadır. Ampirik analizde kişi başına düşen gayrisafi yurtiçi hasıla bağımlı değişken, yükseköğretim kamu harcamaları bağımsız değişken, doğrudan yabancı yatırımlar ve toplam mal ve hizmet ithalatının toplam mal ve hizmet ihracatına oranı kontrol değişkeni olarak seçilmiştir. Çalışmada yer alan değişkenlerin durağanlıkları ADF birim kök testi ve yapısal kırılmalı DF birim kök testleri ile sınanmıştır. Birim kök testleri sonucunda (IMP/EXP) değişkeni düzeyde durağan iken(I(0)), diğer değişkenler ise 1. devresel farklarında durağan(I(1)) oldukları tespit edilmiştir. Çalışmada uygulanan ARDL methodunda varyans ve otokorelasyon sorunlarının olup olmadığı Breush-Pagan-Godfrey ve LM test istatistikleri üzerinden denetlenmiştir. Bulgular ışığında, modelde istatiksel olarak önemli bir varyans ve otokorelasyon sorununun olmadığı tespit edilmiştir. Modelin, uzun dönem istatistik değerleri incelendiğinde F istatistik değerinin tablo kritik değerinden büyük olduğu gözlemlenmiştir. Modeldeki değişkenlerin eş bütünleşik değerler olduğu böylelikle tespit edilmiştir. Analiz sonucunda kamu yükseköğretim harcamalarındaki artış, kişi başına düşen gayrisafi yurtiçi hasılasında artış ile karşılık bulmaktadır. Ayrıca tahmin edilen uzun dönem katsayılarının isitkrar koşullarının incelenmesi amacıyla Cusum ve Cusum Kare testleri yapılmıştır. Tahmin edilen uzun dönem bulgularının, hem Cusum testine hem de Cusum Kare testi sonuçlarına göre %5 anlamlılık düzeyinde istikrar koşullarını sağladığı saptanmıştır. Aralarında eş bütünleşme tespit edilen değişkenler için hata düzeltme mekanizmasının işlevselliğinin tespiti için kısıtsız hata düzeltme modeli bulguları incelenmiştir. Hata düzeltme teriminin(-0,577), istatiksel olarak anlamlı ve mutlak değerce 1'den küçük olduğu sonucu ışığında denge sapmalarının yaklaşık 2 dönem (2yıl) içerisinde geri dengeye geleceği de tespit edilmiştir.

Anahtar Kelimeler: ARDL methodu, ADF Birim Kök Testi, DF Birim Kök Testi, Türkiye Yükseköğretimi, Ekonomik Büyüme

ABSTRACT

THE EFFECT OF PUBLIC HIGHER EDUCATION EXPENDITURES ON ECONOMIC GROWTH-A CASE OF TURKEY

In this study, the effect of public higher education expenditures on Turkey's economic growth was analyzed by ARDL bound test method. The study is on an annual basis and time period covers the period between 1981 and 2020. In the empirical analysis, gross domestic product per capita was choosen as the dependent variable. The independent variable of the study is the public higher education expenditures and the control variables of the study are the ratio of total imports of goods and services to total exports of goods ans services. The stationarity of the variables in the study were tested with the ADF unit root test and DF unit root with structural break test. As a result of unit root tests, it was determined that (IMP/EXP) variable was stationary at its level(I(0)) while other variables were stationary their first cyclic difference(I(1)). The existence of variance and autocorrelation problems in the ARDL method applied in the study was checked by using Breush-Pagan-Godfrey and LM test statistics. In the light of the findings, it was determined that there was no statistically significant variance and autocorrelation problem in the model. When the long-term statistical values of the model are examined, it has been observed that the F statistical value is greater than the table critical value. Thus, it was determined that the variables in the model were cointegrated values. As a result of the analysis, the increase in the public higher education expenditures allows to increase in GDP per capita.

In addition of this, Cusum and Cusum-Square tests were performed to examine the stability conditions of the estimated long-term coefficients. It was determined that the estimated long-term findings met the stability conditions at the 5% significance level according to both Cusum test and Cusum-Square test results. In order to determine the functionality of the error correction mechanism for the cointegrated variables, the findings the unconstrained error correction model were examined. In the light of the result, the error correction term which is -0,577 is statistically significant and its absolute value is less than 1, it has also been determined that the equilibrium deviations will return to equilibrium within approximately 2 periods(2 years).

Keywords: ARDL approach, ADF Unit Root Test, DF Unit Root Test, Turkish Higher Education, Economic Growth

ÖNSÖZ

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ABBREVIATION LIST

ABET: Accreditation Board for Engineering and Technologhy/USA

ACQUIN: The Accreditation, Certification and Quality Insurance

ADF: Augmented Dickey-Fuller

AIC: Akaike Information Criteria

AKKR: The Danish Accreditation Institution

AQ: Agency for Quality Assurance and Accreditation

ARDL: Autoregressive Distributed Lag

CBT: Central Bank of Turkey

CHEA: The Council for Higher Education Accreditation

DF: Dickey-Fuller

EHEA: European Higher Education Area

ENQA: European Association for Quality Assurance in Higher Education

EQAR: The European Quality Assurance Register for Higher Education

EU: European Union

EUA: European University Association

FEDEK: The Association for Evaluation and Accreditaion of University Programs in Mathematical, Natural and Social Sciences

FWCI: Field-Weighted Citation Impact

GDP: Gross Domestic Product

GNP: Gross National Product

HCERES: High Council for the Evaulation of Research and Higher Education

HDI: Human Development Index

HDR: Human Development Report

HEPDAK: Association for Evaluation and Accreditation of Nursing Education Programs

IUA: Irish Universities Association

METU: Middle East Technical University

MIAK: Association for Acrreditation of Architectural Education

MÜDEK: Association for Evaluation and Accreditation of Engineering Programs

QAA: Quality Assurance Agency

R&D: Research and Developement

TEPDAD: Association for Evaluation and Accreditation of Medical Education Programs

U.K.: The United Kingdom

U.S.A.: The Unites States of America

UN: United Nations

UNDF: United Nations Development Program

VEDEK: Association for Evaluation and Accreditation of Educational Institutions and Programs of Veterinary Medicine

WHO: World Health Organization

YÖDEK: Turkish Higher Education Quality Council-1

YÖK: Council of Higher Education

YÖKAK: Turkish Higher Education Quality Council-2

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INTRODUCTION

Sustainable economic growth and development can be reached out by several factors that play a key role in countries' economies. One of the most significant factors is education because qualified human capital allows governments to be in a better environment in terms of socially and economically. In order to create a welfare country, there is a need for an educated society that will produce new knowledge that will increase productivity and efficiency, will transform this knowledge into value-added products, and will solve the society's problems. When we look at the developed countries, each of them has strong education structures. For this reason, developing countries should enhance their education structure or policies more to compete with developed countries.

Since the importance of education was truly understood, there has been much discussion in published studies on the connection between education and economic growth, and many econometrical studies have been made to represent the relationship between education and economic growth. In some of these studies, the education variable has been considered as the number of students in different education levels or the number of academicians or graduated studendts from higher education. In some of these studies, the education variable has been considered the total expenditures on education. When it looked at the literature, it was realized that the studies with education variable as education expenditures on education in Turkey did not specifically focus on expenditures on higher education only. From this respect, this study aims to present the relationship between public expenditures on higher education and economic growth in Turkey.

A.The Subject and Purpose of The Study

In the model of the study, Turkey's GDP per capita has been used as the dependent variable. GDP per capita can be thought of as the dependent variable representing the economic growth in the analysis. The study's independent variable is the public expenditures in higher education represented as "EDU". The control variables of the study are the ratio of total imports of goods and services to the total exports of goods and services, which is represented as "IMP/EXP", and the foreign direct investments, which is represented as "DYY". All observations/data in this study cover the period between 1981 and 2020, and all observations in the study have been used yearly basis. As mentioned above, this study aims to present the estimation of the effect of higher education public expenditures on economic growth with the econometrical model, which is represented in the below equation. Education expenditures are in Turkish Lira(TL), other values in the model are in U.S. dollar.

B. Methodology of The Study

The effect of public expenditures in higher education on economic growth has been estimated according to the ARDL bound test, and the econometrical model used in this study is as follows.

$$\mathrm{Log}(\mathrm{GDP}_t) = \alpha + \beta_1 \mathrm{Log}(\mathrm{EDU}_t) + \beta_2 \mathrm{Log}(\mathrm{DYY}_t) + \beta_3 \mathrm{Log}\left({}^{\dot{\mathrm{I}}\mathrm{MP}_t}\!/_{\mathrm{EXP}_t}\right) + \varepsilon_t \tag{1}$$

While the subscript sign “t” in the equation represents the time dimension as annually, "α" represents the constant term of the equation. “ε”represents equation error terms assumed to be in the pure random walk process. Beta values (i=1, 2, 3) indicates the effect of explanatory variables on economic growth, and they are the coefficients to be estimated within the econometric model. ADF unit root test has been applied to the variables to determine their stationarity levels. ARDL bound test has been used in this study since ARDL bound test method is the most appropriate estimation method for variables in different stationary levels(I(0) and I(1)). In addition, ARDL bound test method is known to give better results for small sample compared to other cointegration methods. For this reason, ARDL bound test method has been preferred for this study.

The data collected from the data sources within the scope of the research were transferred to the E-views 10 program, and all necessary econometric analyses were carried out with the mentioned package program. The required data for econometrical analysis has been collected from CBT’s Electronic Data Delivery System and the Turkish Ministry of Education budget reports. The higher education public expenditure data from 1981 to 2007 have been provided from 2007 budget report of the ministry of education. The higher education public expenditure data from 2007 to 2020 have been provided from 2021 budget report of the ministry of education.

SECTION 1

THE CONCEPTUAL FRAMEWORK OF HUMAN CAPITAL AND HUMAN DEVELOPMENT INDEX

1.1 The Concept of Human Capital

In the middle ages, population growth was taken into account as product increase with the belief that every human being would create an economic value. Overpopulation has seemed beneficial, while underpopulation has seemed as dangerous in terms of production.(Özgüven 1984: 31-32)

With the transformation process into an information society that started after the second world war, the most affected element was human capital as an inevitable development. Qualified people have symbolized the information society. Knowledge began to be considered as a new factor of production alongside traditional means of production (Doğan, Şanlı 2003: 174). The most important feature in the transformation of labor with knowledge is that it begins to be perceived with the“ abstract qualities of labor”. In other words, the perception of labor as muscle power has left its place to the perception of intangible qualities such as knowledge, skill and experience that create high added value. (Yetik 2018: 41)

The concept of human capital has entered to the economics literature with the studies of Adam Smith, J. Stuart Mill, and Alfred Marshall. Denison (1962), Schultz(1968) and Becker(1964) have enhanced the concept of human capital, which we use today(Eser, Gökmen 2009: 43).

Human capital means qualified human power that can use human labor, capacity, skill, and experience for the country’s benefit and transform it into production directly or indirectly. Human power can be productive thanks to the knowledge, skills, qualifications, and abilities gained through education. The increase in productivity makes it possible to provide a higher income level. All these qualities directly concern human beings. For this reason, human labor that uses knowledge and can transform it into production is the main factor that defines human capital(Yetik 2018: 39).

There are several definitions of human capital. Schultz(1968) defines human capital as society's all capability which is useful in the production process(Schultz 1968: 277).According to Throw(1970), human capital is a person's ability, skill, and knowledge, and the amount of human capital is determined according to the value of the number of goods and services produced. When the value of goods and services increases, the value of human capital increases. If the value of goods and services decreases, the value of human capital will fall in the economic system(Thurow 1970:2).

The model of endogenous economic growth emphasizes the significance of human capital. The notion of human capital, which is the primary source of economic growth, is used to reflect all concepts, including a person's knowledge, education, skills, health state and social standing. In the models of Lucas (1988) and Rebelo(1991), human capital is taken into account as one of the production factors, the same as physical capital. Economics needs human capital investments as much as needs physical capital investments(Taş, Yenilmez 2008: 160).

Schultz(1961) has indicated that 1) countries which has not enough human capital can not manage physical capital efficiently, 2) human capital and physical capital should develop together for the economic growth of a country, 3) Because private investors are only concerned with physical capital, human capital is the limiting element in economic progress. The three conclusions of Schultz(1961) can be seen as components of a complete human capital theory of economic growth(Breton 2014: 1).

1.2 The Properties of Human Capital

According to Stroombergen(2002), the properties of human capital are the followings;

- Human capital consists of the capability and experience of a person.
- The value of human capital depends on individuals, and human capital stock in a country is created by all people who live in there.
- Development expenditures made in the past for the individual determine the value of human capital. These investments consist of expenditures made by the person, family, employer and the public.
- The value of human capital is estimated and measured by considering benefits that will derive from a person's knowledge and education in future(Hobikoğlu 2011: 91).

Schultz(1968) states the characteristics of human capital as follows;

- It is the result of investments in people.
- It is personal and it is inseperable from the person themself.

- It is innate or acquired abilities.
- It can not be visualized but its impacts can be measured.
  - *Inner impacts*: Individual and family well-being and economic independence, as well as career training and further education, are all part of this impact.
  - *External impacts*: The studies on human capital indicates that it positively impacts the economic growth (Aykırı, Tokucu 2017: 267).

1.3 The Indicators of Human Capital

There are several impactful elements in the building of human capital. These elements can be divided into 3 groups as education indicators, health indicators, and population indicators(Bozdağlıoğlu, Sezgin 2017: 51).

1.3.1 Education Indicators

Education is one of the most momentous factors that have a key role in the building of development of individuals' qualities. Most studies on human capital generally focus on education because of its important role in the creating of human capital. In an economy, the main elements that determine the level of education are education records, literacy rate, physical and financial indicators. The educational records in a country show the distribution of education levels(*elementery school, middle school, and tertiary education*) of a population of that country. Physical indicators are the education infrastructures in a country, such as the number of schools, the number of classrooms, the number of laboratories, and the number of computers in the schools, and financial indicators are the total expenditures on education. The literacy rate is the simplest element used to measure the education level of a country and its status of human capital (Aykırı, Tokucu 2017: 267).

It is vital to be equipped with the information that will increase the performance of individuals to activate the potential in economics and create sustainable economic development. For achieving this, education is significant factor. For this reason, the education can be considered as the most important factor in the formation of human capital (Bozdağlıoğlu, Sezgin 2017: 52).

Micro effects of human capital investments are seen on individuals, families, and firms. These micro effects are concentrated in certain areas, and affect a country's macroeconomic areas. An increase in personal income caused by education expenditures has positive impacts on families and firms, and the spreading of this effect impacts technological development, productivity, and the industrial sector of a country (Bilen, Yumuşak 2000: 82).

According to Bowen(1964), education is crucial element for forming human capital. To sustain economic development, education should be expanded. In addition to this, the quality of education should be high standard, and it should be compatible with today's technology. Education contributes to develop the awareness of democratic society and gives people the oppurtunity to understand the complex issues to solve them. For this reason, investment in education is necessary to ensure socio-economic and socio-political developments (Çankaya, Karataş 2010: 41).

1.3.2 Health Indicators

Another important factor contributing to human capital accumulation is an individual's health. The share of allocated health expenditures from a country's budget, health expenditures per capita, the number of beds in hospitals, the number of beds per capita, the number of doctors per capita, etc are the elements of health indicators. The improvements in health indicators have a positive impact on human capital accumulation because knowledgeable, experienced, and talented individuals can create value if only individuals are healthy (Çankaya, Karataş 2010: 41).

According to the World Health Organization(WHO), health should be at the optimal point physically and mentally. In other words, being healthy is not just related to not having any diseases but also to being healthy mentally. The definition of health may vary according to the individual's cultural, religious, or social status. Perceptions of illness and discomfort are different for individuals with higher education, while individuals with low income perceive the illness and discomfort rather than other individuals in different statuses differently. For this reason, health is considered both subjectively and objectively. When it comes to the factors that show the level of the health system of a country, they are the followings:

- *Infant and child mortality rates*: deaths within 1 year are considered infant deaths, and deaths between 1 and 5 years old are considered child deaths. These 2 rates are accepted as significant indicators to determine the health level of the communities.
- *Life Expectancy:* The average life expectancy is mainly related to the quality of health services and opportunity to reach health services. This indicator is also crucial to understand a country's health system level.
- *The amount of doctors*, *the number of doctors per capita*, *and the fund* allocated to the health system reflect the situation of health system of that country.
- *Causes of death and the types of diseases* also reflect the situation of health system of a country (Yıldırım, Yumuşak 2009: 58-59).
-

1.3.3 Population Indicators

Population and migration show the accumulation of a country's human capital. The population growth, the population ratios of men and women, and rural and urban populations should be considered to better understand a country's human capital accumulation. A population can contribute to a country's economic development; however, an excessive population may negatively affect economic growth. Countries that cannot employ their population are called the exporter of human capital. If countries' employment opportunity is higher than their population, then these countries are called the importer of human capital (Çankaya, Karataş 2010: 42).

1.4 The Comparision of Physical Capital and Human Capital

The capital, which has an important position among the factors of production, has always characterized physical capital until recent years. However, with the effects of social and personal properties on the production process, positive values such as knowledge, skill, experience and dynamism have also been taken into account as capital. These developments have caused the reconstitution of the concept of capital definition, and the comparison of classical capital with the new ones emerged. At this point, capital is described as any materials and intangible things that positively affect production. Therefore, human capital contributes to economic growth in proportion to its existence as in physical capital. Human capital is dynamic, while physical capital is not. In this sense, continued changes in a society's quality and quantity play a key role in a country. Human capital can not be stored because of its dynamic property. For this reason; not using human capital means the loss of human capital (Karagül 2003: 82).

1.5 The Concept of Human Development Index (HDI)

Before the 1970s, development was generally thought of as an increase in national incomes. The high growth in the national income does not make that country a developed country. After seeing that social problems could not be solved in economically developed countries, it has emerged that the interaction between economic growth and human development should be reconsidered (Demir 2006:1).

According to the definition of the Human Development Report 1990 (HDR), human development is a process that enlarges individuals' options. At all stages of growth, people should be able to have a healthy and long life, learn new skills amd have Access to the resources they need to live comfortably. Many more opportunities are unavailable if these basic options are not available.

The Human Development Index (HDI) was originally released by the United Nations Development Program (UNDP) in 1990 as part of the Human Development Report(HDR). The UNDP research group's major goal was to develop an indicator that may replace the GDP or GNP. The UNDP agreed that both the GNP and the GDP were insufficient indicators of a country's well-being. According to the UNDP's research group, the new indicator should had the following characteristics.

- It should be a multidimensional index
- It should be simple to calculate
- It should be simple to use and understand.
- It should be practicable with the data given
- It should be capable of expressing capabilities.

UNDP utilized past UN studies to shape the HDI's concept during the construction process (HDI). Three basic variables were used to calculate HDI and they were life expectancy, literacy, and GDP per capita. These three essential variables were chosen to symbolize the most fundamental abilities that are required for people to develop into full human beings (Bagolin, Comim 2008: 15-16).

1.6 The Elements of Human Capital Index(HDI)

The elements of HDI are shown at Table.1

Table 1. Human Development Index's min. and max. indicator values

Dimensions	Indicators	Minimum	Maximum
Health	Life Expectancy(years)	20	85
Education	Expected years of schooling(years)	0	18
	Mean years of schooling(years)	0	15
Standard of living	Gross national income per capita($)	100	75.000

Source: HDR's technical notes 2016: 2.

1.7 The Calculation of Human Development Index(HDI)

Dimension indices are calculated as below:

- $$Dimension\ index\ = \frac{actual\ value - minimum\ value}{maximum\ value - minimum\ value} \quad (2)$$

As it is mentioned in Table 1, education has two indicators which are expected year of schooling and mean years of schooling. Equation (2) is applied to these two indicators, and the arithmetic mean of the results of indices is taken to calculate the dimension index for education.

The geometric mean of the three-dimension indices represents the HDI, and it is calculated as:

- $$HDI = (I_{Health} * I_{Education} * I_{Income})^{1/3} \quad (3)$$

According to the results of equation (3), which represent their HDI values, countries are being classified as below in terms of human development:

Table 2. Classification of Nations

Classification of Nations	Cutoff Points
Very high level development	0.800 and above
High level development	0.700-0.799
Medium level development	0.550-0.699
Low level development	below 0.550

Source: HDR's technical notes 2016: 3.

SECTION 2

THE ECONOMIC GROWTH MODELS AND GENERAL PERCPECTIVE TO THE TURKISH HIGHER EDUCATION

2.1. Conceptual Framework of Economic Growth and Economic Development

Although there is no commonly recognized definition of economic development, most thinkers see it as a process that generates economic and social, quantitative and particularly qualitative improvements that cause the national economy's real output to expand cumulatively and sustainably. In opposition to economic development, economic growth is a narrower concept rather than economic development, and it is defined as an increase in national income per capita and it comprises the increase in GDP, GNP and NI. Economic growth is also defined as the process of increasing the size of macroeconomic indicators of a country, while development demonstrates how growth affects society by raising the level of living. Economic growth is constrained by factors such as a high increase in population, limited resources, insufficient infrastructure, poor resource utilization, high public expenditures, etc. According to Balcerowicz(2001), there are four dimensions for economic development;

- The initial level of development
- Human capital or education degree of individuals
- The internal economic situation of a country
- The external economic conditions (Haller 2012: 66-67).

2.1.1. Adam Smith's Economic Growth Model

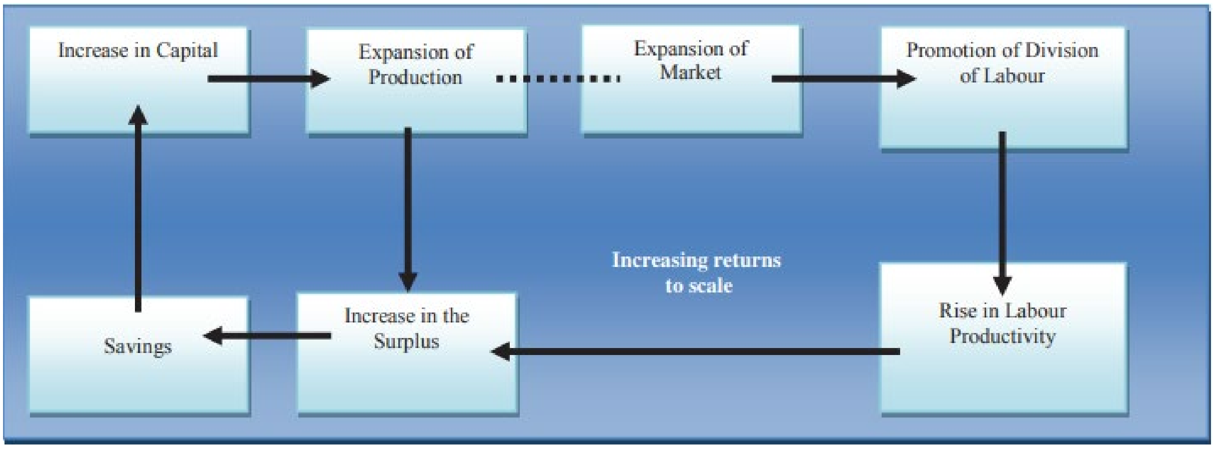
The first economist who studied the phenomenon of economic growth was Adam Smith. He has published the article "*In Quiry Into The Nature And Causes of The Wealth of Nations,"* which includes his growth model, in 1776. The growth model developed by Adam Smith is built on elements such as the rate of industrialization growth, the significant increase in innovations, and the division of labor. From this aspect, his growth model, which was developed at the very beginning of the industrial revolution, is actually a product of the industrial revolution. It can be said that the background of his growth model is the industrial revolution (Ünsal 2016: 39).

In his economic growth model, since each worker concentrates on a single job, both her/his ability and the amount of product that can be produced will increase. Workers do not waste any time moving from one job to the other, thanks to the division of labor. This means they will save time, and they will use that time in production. When workers direct all their attention to a single goal which is their specific job, it can be expected that they will find easier and shorter methods while performing their tasks. Thus, workers can develop useful machines and tools that will increase their productivity. The increase in the productivity of labor due to the increase in the division of labor increases national income. The increase in national income means that the society will consume more compared to before. As a result of this situation, that country's welfare increases. The increase in national income also allows for higher capital accumulation due to the production of all consumer goods. Thus, the cycle that promotes economic growth is constantly repeated (Taban 2008:26).

Adam Smith attributes economic growth to two main sources. One of them is the accumulation of capital. Another is the classification of labor as efficient and inefficient. It was not known that economic growth is an increase in real national income in the period of classics. Although the national income accounting was not developed enough, the increase in wealth and welfare of a nation meant the economic growth, according to Adam Smith in those times (Bocutoğlu 2016: 63).

For a long time, one widespread interpretation of Adam Smith's economics was that he advocated "*laissez-faire*", or the view that letting market forces do their thing was the best policy. This perspective also seems to indicate that the government should be as little as feasible in terms of its economic function. When one analyzes his work more thoroughly and differentiates between his polemics and theoretical ideas on the relationship between markets and governments, as well as the obligations of the private and public sectors, a more fiar evaluation arises. According to Smith's theory, one of the most crucial functions of a goverment is to provide the legal structure that is necessary for the functioning of competitive markets. It is necessary to have a legal system that provides a solid foundation for private transactions in order for the market economy to operate in an effective manner. To put this another way, the purpose of a state is to protect individuals inside a society from threats of violence and invasion from other societies, as well as from the pressure exerted by other individuals within the society, in their roles as market players. When it come to the construction of an economic system, governemts have a crucial role to play in ensuring that it would prevent the establishment of private monpolies and cartels to the greatest extent feasible (Sandmo 2014: 10).

Figure 1. Smithian Growth Process



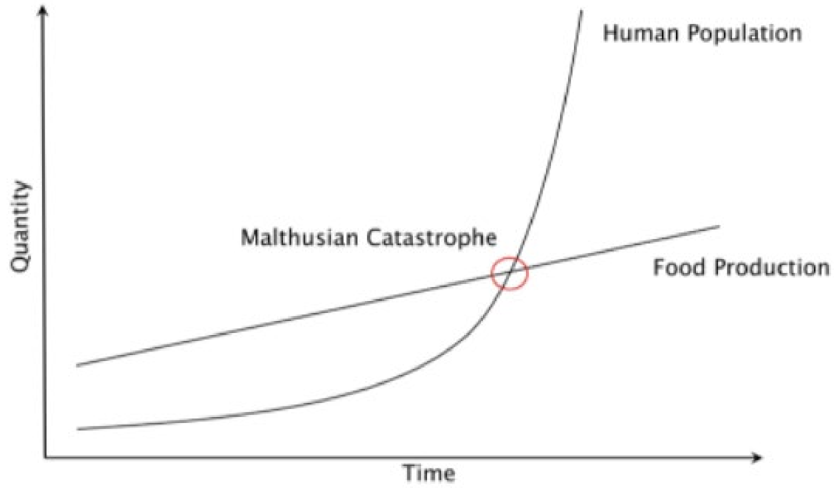
Source: (Uçak 2015: 668)

The economic growth theory of Adam Smith consists of a rise in labor productivity via division of labor and an increase in productive labor through capital accumulation. The process of capital accumulation is depicted by the sequence of increase in capital, expansion of output, rise in surplus, and savings. Increasing returns to scale through improving labor productivity as a result of the division of labor is a key aspect of the Smithian growth model. The processes entail market expansion leading to the development of labor division which in turn leads to an increase in labor productivity and surplus (Uçak 2015: 669).

2.1.2. Thomas Maltus's Economic Growth Model

Thomas Malthus was an important thinker of classical economic thought."*An Essay on The Principle of The Population*" was published by him in 1798. During his period, the main discussions were about the increase of poverty and how to resolve the poverty. The negative effects of the industrial revolution and increasing urbanization, unemployment, and poverty have emerged. According to Malthus, the increasing rate of population is faster than the increasing rate of food production. While the food production increases linearly(1, 2, 3, 4 ,5, 6…), population growth increases geometrically(1, 2, 4, 8,16, 32…). This situation disrupts the balance between the population and foodstuffs. According to Malthus, it is inevitable that humanity will face food shortages. In this respect, Maltus was called a pessimist economist, and it is not possible to be optimistic about the future of the economy because of his population theory (Bocutoğlu 2016: 77-84).

Graph 1. Malthus's Basic Model



Source: (Özçakır 2020)

The thought that an increase in foodstuff could not keep up with the population growth was based on the law of diminishing returns. According to this law, the fertility of the land, the capital goods used, and new production methods can be increased up to a certain level. After reaching the marginal level, the new use of capital goods will not increase productivity anymore. Malthus has also stated that there was a relationship between the wage and the population. Population growth increases the labor supply, and this will result in lower wages. As the wage level falls below the " *minimum subsistence level*", misery and disease will increase, so the supply of labor will decrease, and wages will rise again (Güneş 2009: 134).

According to Malthus model, the production function is as follow;

$$Y_t = A_t D^a L_t^{1\text{-a}} \tag{4}$$

Y_t represents the quantity of output produced at time *t, D* represents the quantity of available land for the subject country, and there is no time subscript for D because it is constant and it does not change over time). It can be thought that it is a fixed parameter in the production equation. L_t represents the available amount of labor force at time *t.* A_t represents the level of productivity at time *t* and *a* is parameter that can take a value between 0 and 1. As it can be seen from production function, Malthus's economic growth model was based on the agricultural economy. In this type of economy, the land is a crucial factor for the production. The only input for production that can be increased in the above model is the labor force. For this reason, labor force has a key effect on production(Steinsson 2021: 8-9).

Malthus could not fully assess the impact of technology on the food supply. From Malthus's period to the present, the population has significantly increased due to technological innovations, economic, social and cultural factors. Famine and hunger came to the fore, mostly due to political turmoil. All these diminished the impact of Malthus's theory (Güneş 2009: 134).

2.1.3. David Ricardo's Model

Ricardo's study "*The Principles of Political Economy and Taxation*" was published in 1817. Ricardo stated that specialization with the law of comparative advantages and having a comparative advantage in a certain group of goods are needed for economic growth. His theory basically argues that countries specializing in a certain group of goods will benefit from international trade, and this benefit will lead to an increase in welfare. Ricardo's model suggests that countries should produce and export goods belonging to sectors in which they are relatively more productive (Gözgör 2016:15).

According to Ricardo, economic growth, which means the transformation of goods into more goods, emerges as a result of the capital accumulation process. The process of capital accumulation begins with the existence of profit and its conversion into circulating and fixed capital through investments. Capital accumulation and economic growth will continue as long as the share of wages for the reproduction of labor and the share of rent allocated to landlords do not increase. In the progress of capital accumulation, increasing capital and an increasing population cause the share of rent received by the landowners from the total production to increase both in value and quantity. In such a case, the profit share allocated to the capital owners from the total production begins to decrease. Decreasing profit share and profit rate reduce the willingness of capital owners to invest. Investments are not made when the rate of profit falls to a certain level that does not allow capital owners to invest. The cessation of investments means the end of the process of capital accumulation and economic development. As a result, the economy reaches a stagnant state (Tanyeri 2000: 8-9).

The fundamental economic problem for Ricardo was the problem of the distribution of total production in a country. The distribution problem is a fundamental problem that needs to be addressed and analyzed first in order to analyze capital accumulation and economic growth. In this respect, it can be said that the basis of Ricardo's economic analysis is the analysis of distribution and economic growth (Tanyeri 2000:13).

2.1.4. Marx's Theory

In Marx's theory, there are three elements. The first one is the productive forces. The second one is the ideological superstructure which includes government, law, politics, religion, the science of art, literature, and philosophy, and the third one is the manner of the production. This can be named an economic system. The most important matter underlined by Marx in the economic system is power relationship among classes.

According to the Marx's economic growth model, there are three important ratios that determine the growth rate, and the related ratios are as follows;

- Surplus Value Ratio = $a= (s / v) . 100$ (5)
- Profit Rate = $k= [s / (c+v)]. 100$ (6)
- Organic composition of Capital= $b= [c / (c+v)].100$ (7)

s represents the unpaid wages to the worker, *v* represents the wages paid to the worker, *c* represents the fixed capital, a represents the surplus value ratio and k represents the profit rate. Growth is determined by the rate of profit and there are two factors that determine the rate of profit. These are the rate of surplus and the organic composition of capital (Aksu 2014:361).

Marx called the part of the capitalist's capital invested in machinery and raw materials as fixed capital(c). The value of the fixed capital is directly reflected in the value of produced goods, and the fixed capital can not add more than its own value to the value of the produced goods. He called the part of capitalist's capital devoted to the wages of workers as variable capital(v). Variable capital adds to the value of the produced goods more than its own value. The surplus that the worker adds to the production that exceeds her/his own value is called surplus value(s). The capitalist takes this surplus value from the worker without any payment for it. According to Marx, profit rate(k) will tend to decrease in the long run due to the increase in productivity caused by mechanization and new-labor saving inventions. Profit rate(k) increases when the rate of surplus value(a) increases; however, when organic composition of capital increases, profit rate decreases (Bocutoğlu 2016: 137-138).

Marx was more concerned with how the exploitation of labor was increased rather than concerned with how technological innovations affected economic growth. Work or Labour is the most important determinant of economic growth, and also, the realization of the growth target can only be achieved with the transfer of all means of production to the public, according to the Marxist economy (Aksu 2014:362).

Marx argued that capital accumulation would reduce profit rates, trigger economic crises and lead to unemployment, and as a result of this process, class conflicts would arise. Marx's assumption of a two-class society dividing society between the proletariat and capitalists was incompatible with real- life because the societies have been transformed into the three- classes with the middle class society, and even workers took place in the middle-class. This has considerably prevented class conflicts. The state intervened in economic life as a social state in order to improve the economic conditions of the working class. Thus, the class conflict did not arise in capitalist countries (Bocutoğlu 2016: 142).

2.1.5. Keynesian Model

The Keynesian economy, which emerged with the great economic depression in the World in 1930s, was in the economic policy of many states until the 1960s. In the work of John M. Keynes's "*The General Theory of Employment, Interest and Money*", the intervention of the state in the economy is inevitable. According to Keynes, the main reason for this intervention is demand insufficiency. Keynes's thoughts, especially with the participation of his economic growth model and other analysis tools became the basis of the states' economic philosophy (Aksu 2014: 362).

In his "*General Theory*" study, he did not accept the basic principles of mainstream economic thought, which consisted of classics, marginalists, and neo-classics. Against these principles rejected by Keynes, Keynes's principles can be summarized as follows;

- The long-run analyses of classical economics that were centered on economic growth were not acceptable to Keynes. Instead of this, he recommended doing a short-term examination with an emphasis on conjectural variations.
  According to Keynes, all attention should be focused on short-term problems such as the unemployment issue and long-run analyzes is not meaningful because we will all be dead in the long run.

- Keynes did not accept Say's law which is summarized as every supply creates its own demand; instead, he argued that every demand creates its own supply.
- Keynes argued that the factors determining the interest rate are money supply and money demand. He rejected the classical interest theory.
- According to the classics, prices and wages are fully flexible. Keynes rejected this classical principle which automatically allows full employment to be achieved in the economy. According to the Keynesian economy, although prices and wages are flexible to increase, they are inelastic to decrease. Prices and wages can rise easily; however, they can not fall easily.
- In the Keynesian economy, there is no system that will bring the economy to full employment on its own. To get the economy back full employment, the government needs to step in. Keynes suggested that fiscal policy is the best way to make sure that everyone has a job, and he viewed monetary policy with suspicion (Bocutoğlu 2016: 252-253).

He adopted the view that consumption would stimulate production, and the state would increase consumption through public expenditures, allowing for increased purchasing power. To put it more clearly, Keynes tried to establish a new system of economic thought, unlike classical and neo-classical economics. The economic growth in the Keynesian economy was in the form of a short-term growth process, and he made a growth analysis in this way. Because the aim was not examine the long-term growth; however, the aim was to examine how to reach full employment level from underemployment with short-term inputs for a short-run period. Keynes established his theory as demand-based, not supply-based. Neither technological investments and innovations nor qualified human capital were included in Keynes's economic growth model. He focused on how an economy would get rid of recession and to what extent the sources that triggered growth would accelerate growth. The fact that he did not address the problems faced by an economy in the growth process and the factors affecting the growth process shows that his model is incomplete. Keynes just took into account developed countries, and he did not consider developing countries in his theory. From this respect, it can be said that this is a major shortcoming (Aksu 2014: 363-364).

2.1.6. Harrod-Domar's Model

The Harrod-Domar model emerged in the continuation of the Keynesian growth theory, and the Harrod-Domar model, which systematically examined the growth process for the first time ,has been described as the first wave of modern growth theory. They independently investigated whether the economy can grow in a stable and balanced way in the long run (Alper 2019: 206).

While Harrod was investigating the conditions of growth that will reach full employment equilibrium from the unemployment equilibrium, Domar, on the other hand, investigated the conditions that would ensure the continuation of growth starting from the full-employment equilibrium. According to Harrod-Domar model, savings, capital-output ratio, and investments are the main source of growth. Domar took into account the national income growth rate required to achieve full employment over a period of time, and he has worked on how investment increases will increase national income and production capacity (Aksu 2014:366-367).

According to Harrod-Domar model, invetsments have two crucial impacts on the economy. The first one is the income-enhancing effect of investments, and another is the capacity-enhancing effect on the economy which means that investments always increase production capacity. According to Harrod-Domar growth model where, the labor supply increases exogenously at a constant rate of *n*, savings are a fixed function of income. In the below equation, "*S*" represents the total savings, "*Y*" represents the total income, and "*s*" represents the saving rate.

$$S= s.Y \tag{8}$$

Total production produced in the economy is a function of the capital stock.

Economic growth depends on the change in capital stock and the incremental capital/output ratio.

$$\Delta Y = (1/v) \Delta K \tag{9}$$

ΔY represents the change in total output, ΔK represents the change in capital stock, and v represent the incremental capital/output. As the saving rate increases and the capital-output ratio decreases, economic growth accelerates (Alper 2019: 206-207).

External savings are not mentioned in the Harrod-Domar model. In this model, capital is the only factor that increases production. Qualified labor and technological developments have been ignored(Aksu 2014: 369).

2.1.7. Solow's Model

"*A Contribution to the Theory of Economic Growth*" was published by Solow in 1956. Increases in capital stock contribute to better per capita productivity, according to a mathematical model based on differential equations presented in the article. Solow starts with the assumption that people save a fixed percentage of their income. The growth rate of population and supply of labor is constant and it is possible to manage capital intensity. The prices of production factors determine capital intensity. Increasing capital intensity creates ever smaller contributions to production because of diminishing returns. Under the circumstance of the absence of technological development, a stationary state is obtained in the long run, according to this model, when the growth rate of capital, output and labor is constant. As a result, output per worker and capital per worker remains constant. A rise in the percentage of saved incomes can not increase the growth rate permanently (Daniele 2017:2).

Since Solow's model takes into account the law of diminishing returns, the main factors determining economic growth rate are changes in the technological development and population growth in this model, however; these two factors are determined from outside the model.

Solow's growth model can be represented as follows;

In the below equation, *Y* symbolises the output, *K* symbolises capital, *L* symbolises labor, and *A* symbolises labor-augmenting technology or knowledge at the time (*t*).

$$Y(t) = F\,[K(t), A(t), L(t)] \qquad (10)$$

The Slow model reveals how savings, population growth, and technological development will affect output over time. This model has two consequences. The first one is that there will be no economic growth without technological development and the second one is that an increase in the saving rate will have as much effect on growth as the shock situation (Aksu 2014:372-374).

2.1.8. Endogenous Economic Growth

The term "*endogenous growth*" emphasizes a wide range of theoretical and empirical studies that originated in the 1980s, and the works based on the endogenous growth model separate themselves from the idea of neoclassical growth by highlighting that economic growth is a result of endogenous effects of an economic system, not the result of influences that are coming from outside(Romer 1994: 3).

What should be understood from endogenous growth is that economic growth is a result of factors arising from the economic structure itself. These main factors can be summarized as education, health technology policy, the social-cultural and other characteristics of that country. The coincidences brought by the unique characteristics of a country cause research and development. This model considers two fundamental and fresh perspectives on economic growth. The first is knowledge and second is human capital (Aksu 2014: 375).

2.1.8.1. Lucas's Model

In the endogenous growth model developed by Lucas(1988), he drew attention to the cruciality of human capital for economic growth. Drawing attention to the importance of human capital is based on the belief that there is no single type of capital. In Lucas's model, human capital is also considered an important type of capital besides physical capital. According to Lucas, human capital is the primary source of growth along with technological development. The concept of human capital in the Lucas'model refers to the improvements in the skills or abilities of employees, and there is a linear relationship between the improvements in the skills of employees and the increase in production according to Lucas's model. In this respect, the improvements in the skills of employees have a significant effect on economic growth (Çinko 2006:143).

In its role as a driving factor for economic growth, he takes account into human capital as an alternative and complement to technological advancement. From Lucas's perspective, human capital can be defined as a whole of physical, intellectual, and technical capabilities of human beings(Monteils 2002: 94-95).

Lucas's(1988) production function Y = F (K ,uhN) sheds an important light on internalization through education. According to this function, the increase in the capital stock(K) and the number of workers(N) allow for an increase in production. In addition to this, the production increases as the average general skill level(h) and average working time(u) of the employees increase. The accumulation of human capital depends on the increase of remaining time ($1-u$) from work. In other words, human capital accumulation depends on the reduction of the working time(u). If u(t) equals to 1, this means that the all time goes to work and there is no time to develop employees' skills, and human capital accumulation becomes 0. If u(t) equals to 0, this means that all time goes to developing the skills of employees, and there will be no time to work, which means production will be zero. It is argued that there will be no diminishing returns at any skill level between these two extremes (Demir, Duran, Üzümcü 2006: 29).

2.1.8.2. Barro's Model

Barro(1996) determined the basic factors of economic growth in his " *Determinants of Economic Growth: A Cross-Country Emprical Study*" as follows;

- Initial level of GDP
- Initial level of human capital
- Fertility rate
- Government consumption
- The rule of law index
- Terms of trade
- Regional variables
- Investment ratio(Barro 1996: 14-23).

Barro's growth function is as follows;

$$DY = f\,(Y, Y^*) \tag{11}$$

DY represents the growth rate of output per capita, *Y* represents the current state of output per capita and *Y** represents the level of output per capita in stable long-run equilibrium. According to Barro, a good legal order, less corruption, low inflation-based government policies, longer life expectancy, low fertility rates, an increase in primary and secondary education, the improvement in foreign trade contributes to rise in real GDP per capita(Aksu 2014: 381).

According to Barro, not only the intervention of state's tax policies, but also the guarantee of infrastructure investments and property rights affect growth positively (Çinko 2006: 144).

2.1.8.3. Romer's Model

According to Romer**,** the primary source of economic growth is "knowledge". The contribution of knowledge to production is R&D activities that produce new designs and new technologies. In Romer's model, technological innovations are internalized as the engine of long-term growth. The source of these innovations is knowledge which is based on the basis of human capital. Technological development is a critical factor in the productivity of the labor force, and it allows the productive output per labor force to increase. Depending on the market incentives provided by the government and the competitive conditions of the companies in the market, a policy based on technological products and technological changes will be formed automatically. This situation will allow the quality products to enter the market, and the demand will revive somehow. The market and growth will enter an upward trend(Aksu 2014: 377-378).

Romer focuses on the role of human capital as well as technological innovations in terms of their effects on economic growth. According to Romer, technical information which can be expressed as a byproduct is produced while carrying out production and investment activities. This technical information is used as a free input when reproduction is done. The fact that the technical information produced by a company reaches other companies and increases the amount of production is expressed with the concept of the overflow effect. The overflow of technical knowledge causes a general increase in productivity by increasing the total knowledge stock of the economy as well as the increase in production (Çinko 2006: 144).

2.2. General Perspective To Higher Education And The Place of Turkish Higher Education In The World

2.2.1. The Evolve of Higher Education in The World

The different policy and social conjecture emerged at the end of the 2nd. World War period caused a serious increase in the demand for higher education in the U.S.A. since the 1950s and in Europe since the 1960s. In the post-war period, the countries' need for a qualified workforce for development more than ever and the understanding of the importance of scientific research during the Second World war were seen as the main reasons for the increase in the demand for higher education. For this reason, countries had to produce a series of policies to meet the increasing demand for higher education. The massification trend in higher education, which took place in almost every country in the World, brought along primarily quantitative developments in the higher education systems of the countries. In this context, the Turkish higher education system has been affected by this massification trend, and the Turkish higher education system has become one of the largest higher education systems in the World after countries such as China, U.S.A., Russia and India (Boyacı et al. 2019:991).

When we come to the questions of " *What is the role of education in social life*", " *What does education offer us*", *In which direction is education evolving?*, "*What are the key factors for qualitative&quantitative developments in education?*, it is crucial to discuss the answers of above questions to understand the story and importance of higher education.

Education has an important place in achieving goals such as raising awareness of citizenship, ensuring the welfare of citizens, realizing social integration, and accelerating economic growth. Especially in the conception of the social state, education has been public service and sector financed by public resources under the responsibility of the state as a right of citizenship. Higher education is continuing to be a public service regulated by national authorities, mostly as an education level where public officials, professionals, and academicians are trained. The scale, meaning and function of higher education are needed to change because of today's socio-economic condition. Higher education is expanding and diversifying in terms of higher education institutions and higher education programs. Higher education is evolving towards a multi-plane and multi-dimensional structure in which different processes take place in the global, regional, and national fields. In this process, a new university model which is called multiversity is developing, and universities undertake new missions such as creating innovation and giving opportunities to entrepreneurs (Yılmaz 2016: 1192).

Today, higher education institutions or universities are expressed as dynamic campuses that can contribute to science, transform the scientific and technological information produced into social and economic values, set strategic goals to increase the number of literature individuals and also provide socio-economic development in the world. In order to increase the welfare of a country, higher institutions have great duties. It is stated as one of the basic principles expected from universities to produce scientific research and publications that can find solutions to the problems of society and meet the expectation of higher education in addition to the existing education and training (Ertepınar et al. 2019: 18).

2.2.2. The Concept of Quality in Higher Education

Determining the definition of the "quality" term presents several fundamental issues. First, quality is a nebulous concept with several meanings based on the perspectives of various stakeholders. When determining quality, four kinds of stake holders should be taken into account. These stakeholders are providers(*financial institutions*), users of products(*students*), users of outputs(*employers*), and employees of the sector(*academics and administrators).* Another difficulty is that quality is a multifaceted term. For this reason, narrowing the quality notion to a one-sentence description is problematic. Such definitions might be one-dimensional or too broad to be operationalized in some circumstances(Crawford et al. 2015:4). It can be said that there is no agreed definition of quality because the important names contribute to the development of the concept of quality approach "quality" from different perspectives. Although there is no agreed definition of quality, in general definition, quality means the conformity of goods or services produced to the expectations of consumers or those who benefit from the service or goods (Güler, Soyer 2021: 49-50).

In the last quarter-century, the concept of quality in higher education has been tried to be expressed and explained with many different names. "*Quality control*", "*quality management"*, "*quality assurance system*", and "*quality culture*" can be given as examples of these names. Quality in higher education is a comprehensive concept consisting of all laws, processes, activities, and mechanisms that will ensure, maintain and improve quality in higher education. Although it is not easy to define the quality of higher education, it can be said that it is a result of the interaction between teachers, students, and the institutional learning environment. Higher education institutions are involved in the quality assurance process for the following reasons;

- To continuously improve the management, education, and research development activities of the institution
- To meet the workforce expected by the market
- To clarify the organizational management scheme required for academic programs
- To establish measurable benchmarks in terms of transparency, traceability, and accountability.
- To be able to make decisions that will benefit all stakeholders who are students, academicians, and administrators (Bilgiç, Elmas, Hamutoğlu:2020:113).

2.2.3. International Quality Practices in Higher Education

Studies for the improvement of quality in universities started especially in the 1980s. The restructuring process of higher education coincided with the 1980s. Countries with different levels of economic, political, social, and cultural development all over the world have needed to gather around a common point with the effect of globalization and the change in information technologies. The policies developed by European Union(EU) have started the Bologna Process, which aims to gather higher education institutions under a common roof, harmonize the education systems with each other and, eliminate the differences among them (Güler, Soyer 2021: 47).

There are four contemporary approaches to creating an effective quality assurance system in universities. These are "*traditional peer review evaluations"," the assesment and outcomes movement"," total quality management*", and "*accountability and performance indicator reporting*"(Bogue 1998: 10-129). Within this context, standardization, certification, or accreditation, which are currently quality assurance practices, are applicable systems for providing quality assurance in higher education (Beykoz, Işık 2018: 10).

At the beginning of 1980s, in order to maintain a certain standard of excellence in their higher education system, every developed country in the World has created a national quality assurance organization. Almost all of these national agencies are funded by their states; however, they operate as independent institutions. These agencies have been established directly by the state in some countries such as Denmark, Switzerland, Norway, Australia, and Japan. Agencies in the Netherlands and Portugal are agencies that the universities and states have established together. Agencies in France and England were established independently of state and universities. Federal states such as the U.S.A., Germany, and Mexico do not have a single national agency;however, each province has its own agency for quality. The main aims of these agencies can be summarized as follows;

- To create awareness of higher education quality assurance
- To analyze and evaluate the self-assessment of higher education institutions.
- To identify the strengths and weaknesses of higher education institutions and to offer recommendations for overcoming problems and monitoring developments.
- To keep up the public and foreign institutions informed and to provide transparency (YÖK 2007: 22-23).

Among the quality agencies operating internationally in the world are European Association for Quality Assurance in Higher Education(ENQA), The European Quality Assurance Register for Higher Education(EQAR), The European University Association(EUA), The Quality Assurance for Higher Education(QAA), The Council for Higher Education Accreditation(CHEA), Agency for Quality Assurance and Accreditation(AQ), The Danish Accreditation Institution Secures and Develops Quality and Relevance in Higher Education Degrees and Institutions(AKKR), Irish Universities Association(IUA), Accreditation, Certification, and Quality Assurance Institute(ACQUIN), High Council for the Evaulation of Research and Higher Education(HCERES) (Beykoz, Işık 2018: 14).

For the purpose of developing a system that is based on the general comprehension of quality control procedures in higher education, the efforts of European and its surrounding countries to create a European Higher Education Area (EHEA) started with the decision of the European Union Council on January 24, 1998 before the Bologna declaration. This decision gained momentum supported by the establishment of the European Association for Quality Assurance in Higher Education(ENQA) and Lisbon and Bologna processes. ENQA as the institution responsible for the mutual recognition of the quality assurance systems of the member countries in Bologna Process and the coordination of these studies, has played a key role in these studies (YÖK 2007: 23).

Higher education institutions can create quality assurance by integrating with specified standards. Setting standards on a country basis provides the opportunity to make comparisons between institutions, and it also offers the opportunity to compare with similar standards in different countries. Standardization provides mobility which leads to student mobility in the competitive higher education field. The quality assurance system is shaped by an approach based on improvement and transparency, so it is related to all processes of higher education institutions. The relationship of these processes(research, projects, teaching activities, etc.) with national and international standards is determined by internal and external audit activities. When it comes to accreditation, the concept of accreditation is basically a system of trust. In this context, it is a system for demonstrating the conformity of any program implemented by an institution or institution itself to a certain performance standard at the domestic or international level. These performance standards are i) quality, ii) efficiency, and iii) activity. The accreditation system enables a higher education institution to establish trust in front of the public. At the same time, it positively affects the perception of people who want higher education. It can be said that there are two significant benefits of being accredited for higher institutions. These are accountability and transparency (Beykoz, Işık 2018: 11-12).

It is extremely significant to monitor and evaluate the quality of higher education and to create a quality assurance system. Each country manages its quality process in accordance with its current conditions and higher education structure. Quality practices in some of the leading countries in higher education are as follows;

- In U.S.A., the higher education system, which has a decentralized structure operates on the basis of institutional diversity and flexible structure and there is no central authority that directly supervises or evaluates higher education institutions. Accreditation institutions in the U.S.A. operate as private and non-profit institutions and quality assurance standards in universities are provided by these private accreditation institutions.
- In U.K. where universities are autonomous, the external evaluation function is the responsibility of the QAA, of which all universities are official members.

- In Japan, quality principles regarding higher education are determined by the agencies authorized by the relevant ministry. National higher education quality assurance composes of three structures. These are " minimum standards for establishing a university", " set-up&confirmation system," and " accreditation system".
- In Greece, the quality assurance authority, which is authorized by the Greek parliament, carries out and reports the external audit process of higher education institutions. This authorized agency presents the results of quality evaluation and the general evaluation report of the current higher education system to the parliament every year(Bursalıoğlu, Tezsürücü 2013: 104-105).
- In Netherlands's higher education system, there is no supervisory and regulatory structure such as YÖK ;however, there is an institution called higher education inspectorship. The subject inspectorship appoints an officer with the title of the inspector to each university to ensure the quality assurance and to help solving potential problems in the accreditation process (Beykoz, Işık 2018: 14).

2.2.4. Institutional Structure of The Quality Assurance System in Turkish Higher Education

In the process representing the transition from the industrial society to the information society, the increase in the demand for universities took on an entrepreneurial university structure over time brought along the need for central palnning, coordination and supervision. In order to meet this need, central intermediary institutions have been established by western countries. As a result of these developments in the World and Bologna process, quality assurance studies in Turkey have started to be carried out rapidly with an institutionalized structure (Güler, Soyer 2021:65).

Higher education in Turkey depends on the institution called the Council of Higher Education(YÖK) in accordance with the higher education law numbered 2547 dated 1981. Since 1981, YÖK has been in charge of higher education planning, regulation and, superintending. The basic character of YÖK's control mechanism is a centralized and rigid management(Beykoz, Işık 2018: 15). Between 1981 and 2005, when the institutions did not have a defined quality assurance system, the supervisory board inspected the relevant units, instructors, and activities of higher education institutions on behalf of YÖK in accordance with the law numbered 2547. The information and data requested by the supervisory board from the universities during the audits were presented in the forms defined by YÖK. Thus, universities were subject to internal audit in a transparent manner, but the evaluations were not shared with the public.

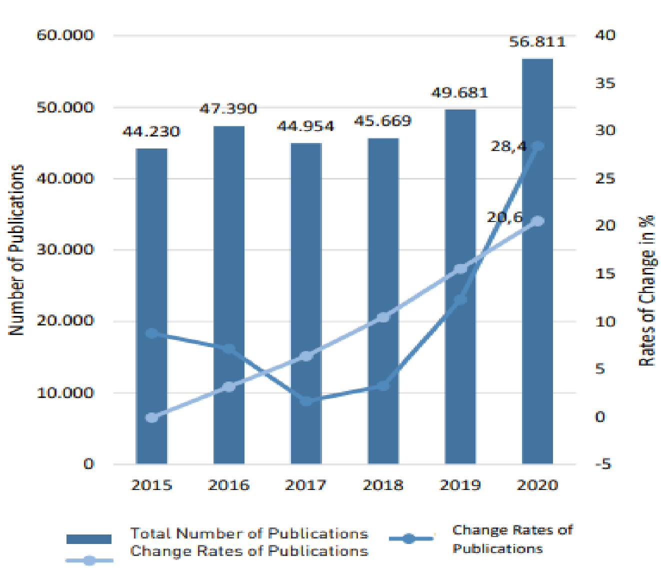
The first quality studies in Turkey started in 1994 with the accreditation of two engineering department programs at Middle East Technical University(METU) by the Accreditation Board for Engineering and Technology/USA(ABET). The milestone of the quality and accreditation process was realized when Turkey was included in the Bologna Process in the Prague declaration in 2001. From being a member of the Bologna Process, Turkey has started to take action on issues such as quality assurance in higher education, the framework of qualifications, and recognition of qualifications with the priority targets brought by the global world. Thus, quality studies in higher education started to be carried out in a more systematic structure. In 2002, the Association for Evaluation and Accreditation of Engineering Programs (MÜDEK) was established by YÖK to carry out accreditation studies in the field of engineering. Before the establishment of MÜDEK, 42 engineering programs of 4 Turkish universities were accredited by ABET. In 2005, YÖK established Turkish Higher Education Council-1(YÖDEK) in order to evaluate the education, activities related to research, and administrative services of universities'departments and to work on the recognition and development of quality levels within the scope of the independent external evaluation process. Among the main duties of YÖDEK were to examine the evaluation reports prepared regularly every year by higher education institutions, to determine the procedures and principles in order to issue the quality evalution registration certificate to independent institutions and organizations that can carry out academic evaluation and quality improvement studies and to submit it to YÖK for approval (Güler, Soyer 2021: 66-68).

The regulation of YÖDEK has lost its validity based on the Higher Education Quality Assurance regulation that was put into effect in 2015. The newly introduced regulation is a reform that obliges all higher education institutions to meet with a quality assurance system. With the Higher Education Quality Assurance regulation, The Higher Education Quality Council-2(YÖKAK), which regulates the quality assessment and assurance activities of universities within the body of YÖK, and the execution of accreditation procedures was established. With this regulation, universities are obliged to prepare an internal evaluation report on quality assurance studies every year. The external evaluation process, which will be carried out by independent evaluation institutions authorized by the quality board at least once every five years, has been put into practice. It is very significant for the universities to see their own strengths and weaknesses that all foundation and state universities which were previously indifferent to quality inspections, prepare internal evaluation reports in accordance with this new regulation and share those reports with the YÖKAK. Quality assurance assessments gain functionality through standardization and accreditation processes. As a result of the transformation brought about by higher education laws and institutions in Turkey, the efforts of universities to become accredited have increased. In order to be stronger in the external evaluation process and to accredit some of the programs of the universities, there are independent agencies for quality assesments in Turkey. These are Association for Evaluation and Accreditation of Engineering Programs (MÜDEK), Association for Evaluation and Accreditation of Medical Education Programs(TEPDAD), The Association for Evaluation and Accreditaion of University Programs in Mathematical, Natural and Social Sciences (FEDEK), Association for Accreditation of Architectural Education (MIAK), Association for Acrreditation of Architectural Education (VEDEK) and Association for Evaluation and Accreditation of Nursing Education Programs (HEPDAK) (Beykoz, Işık 2018: 15-16).

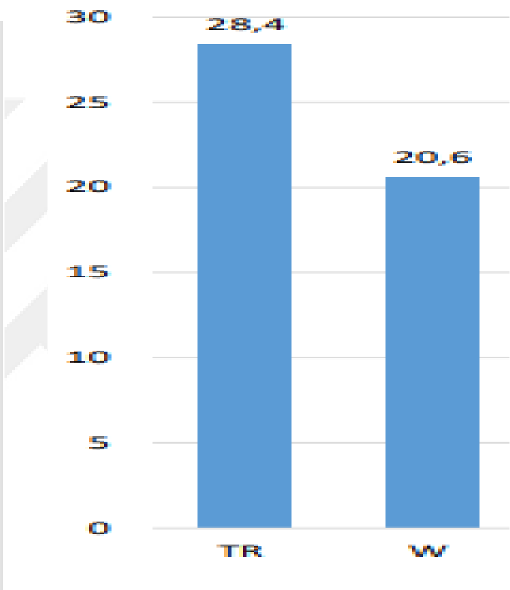
2.2.5. Important Performance Indicators in Turkish Higher Education

Turkey’s yearly total number of publications (TNP) went from 44.230 in 2015 to 56.811 in 2020, representing a 28,4% rise between 2015 and 2020. During this period, 23 percent of publications were carried out with international collaboration, 33 percent with national collaboration, 32 percent with institutional collaboration, and 12 percent were published as single-author research.

Graph 2. The Number of Publications in Turkey Between 2015-2020



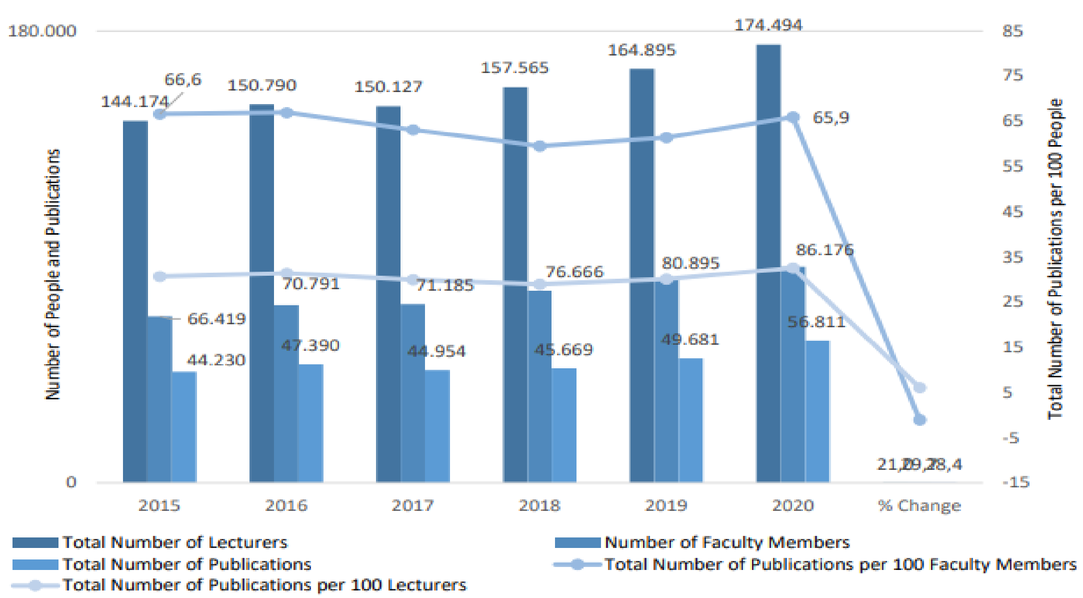
Graph 3. Rates of Change in % Between 2015-2020



Source:General Evaluation of Publication Performance Report, 2021

During the period between 2015 and 2020, the total number of publications climbed by 28% in Turkey and 21% across the World. While the global average yearly growth in publications is roughly 3.5 percent, Turkey’s annual average increase has been around 4.5 percent. The rise in the number of professors and teaching assistants has also been shared in the below graphs.

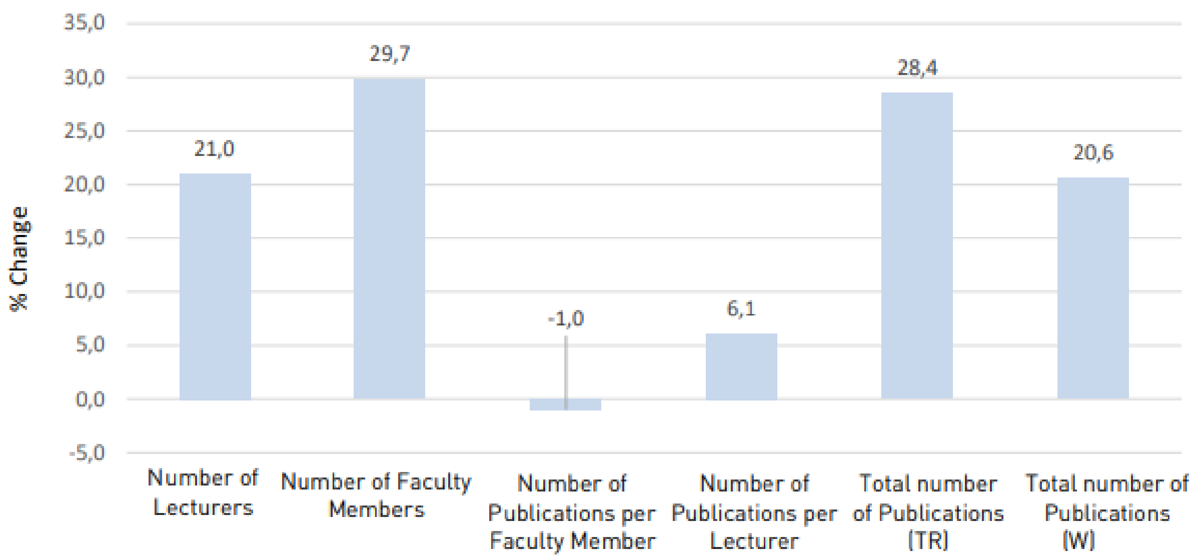
Graph 4. The Total Number of Publication and Personel Performance



Source:General Evaluation of Publication Performance Report,2021

According to the below graph, the number of lecturers increased by 21%, and the number of faculty members increased by 29,7%. When it comes to the change in the number of publications per lecturer, it increased by 6.1%. The interesting and disappointing point is that the number of publications per faculty member decreased by 1% during period 2015-2020.

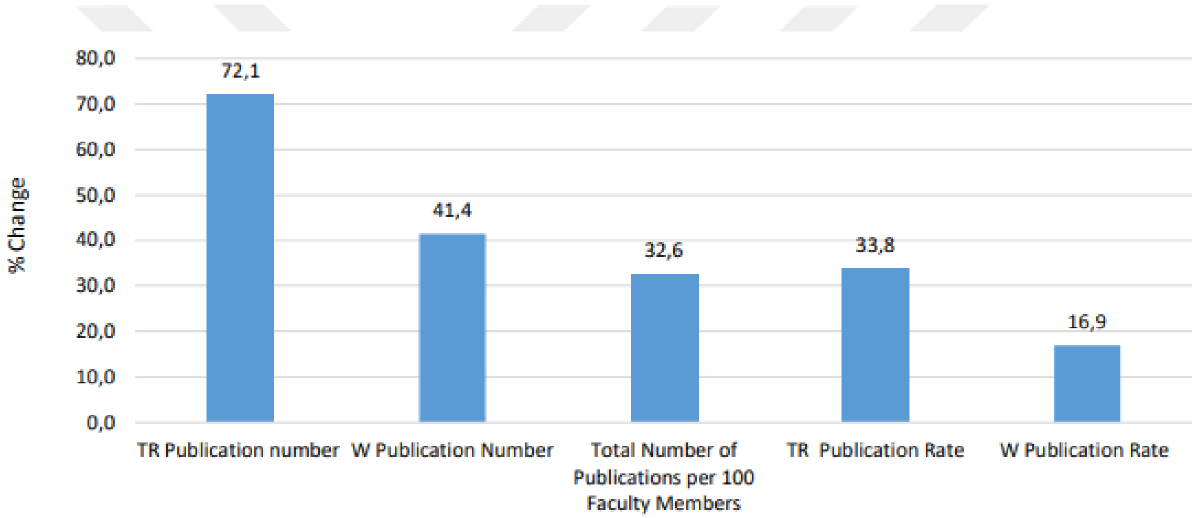
Graph 5. The Change Ratios for Indicators between 2015-2020



Source: General Evaluation of Publication Performance Report,2021

Between 2015 and 2020, publications arising from international cooperation accounted for an average of 23% of all publications. The rate of publications made with international cooperation increased from 20,1% to 26,9%. At the same time, the number of publications created with international cooperation has increased by 72 percent in Turkey and 41 percent globally during the mentioned time period. The publishing rate has increased by 34 percent in Turkey and roughly 17 percent globally. Despite stability in total publications per faculty member, the number of publications arising from international cooperation climbed from 0,134 in 2015 to 0,177 in 2020. This means that there is 32.6 percent increase rate for the number of publications resulting from international collaboration per faculty member. The graph showing Turkey's and the World's percentile change of publications resulting from international cooperation is as follows;

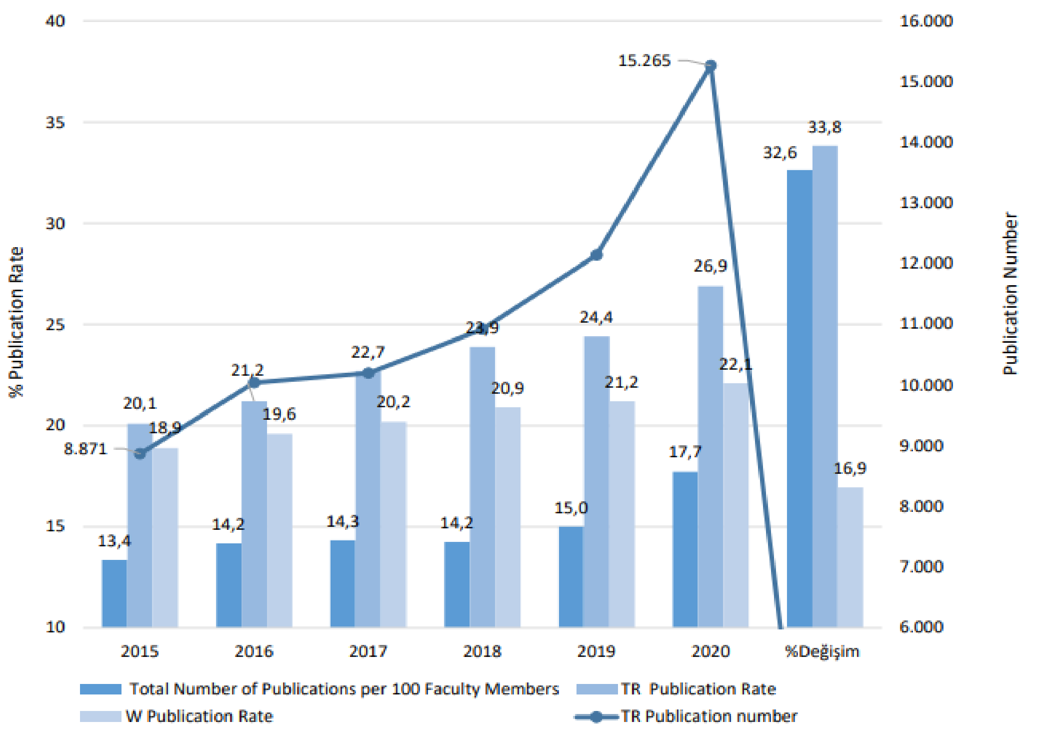
Graph 6. Percentile Change of Publications Resulting from International Cooperation Between 2015-2020



Source:General Evaluation of Publication Performance Report,2021

The breakdown of the total number of publications per 100 faculty members, TR publication rate, W publication rate, and TR publication number on the basis of years between 2015 and 2020 are as follows;

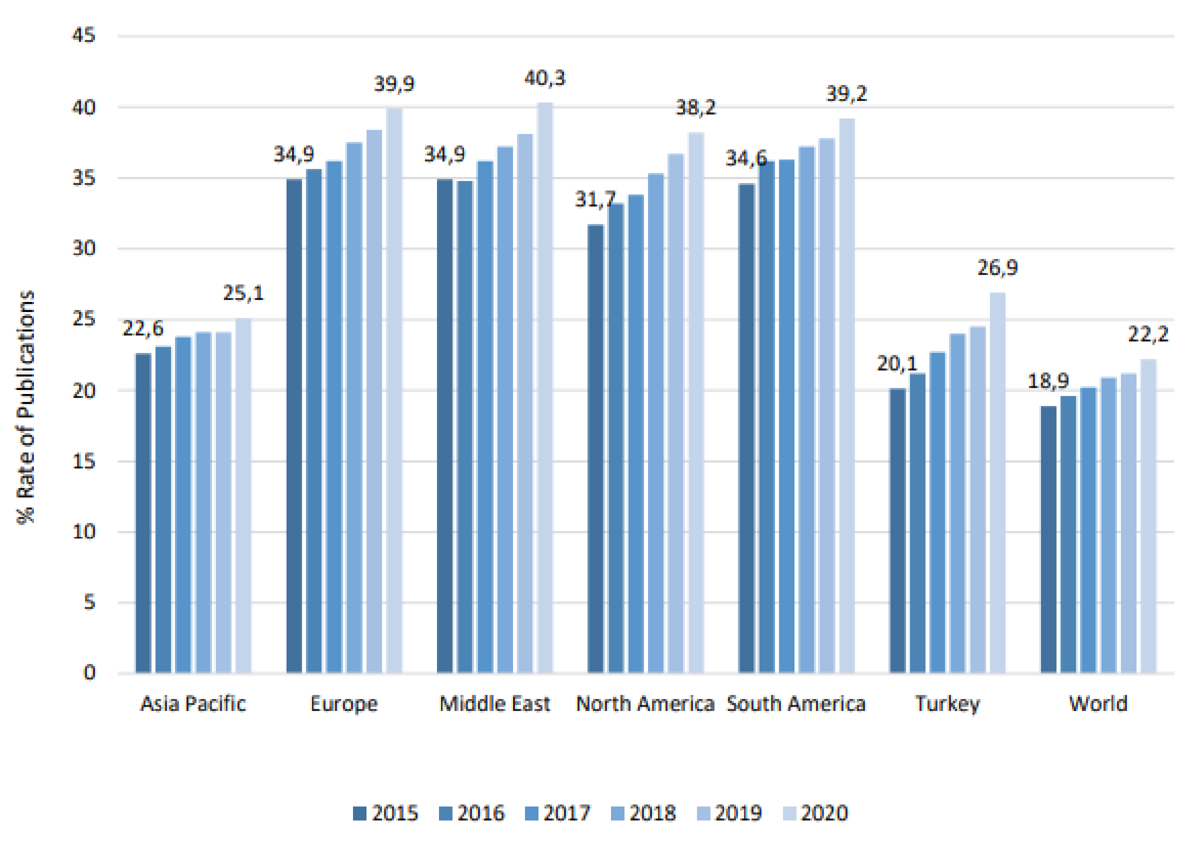
Graph 7. Publications Resulting from International Cooperation



Source: General Evaluation of Publication Performance Report,2021

Despite the fact that the number and rates of publications arising from international cooperation in Turkey are so lower than the European and North America, the fact that there has been a considerable increase in the number and the rates of publications during 2015-2020 has been stated as a crucial development.

Graph 8. The Rate of Publications Resulting From International Cooperation



Source: General Evaluation of Publication Performance Report,2021

2.2.6. The Concept of FWCI

The number of citations obtained by a document divided by the anticipated number of citations for similar publications yields the Field-weighted Citation Impact (FWCI), which is a Scopus/SciVal metric. FWCI is a significant parameter showing the quality of the publications. Publication types, percentile, number of publications, number of citations, citation per publication and FWCI values have been shown in the below table for the time period 2015-2020.

Table 3. Publication Types, Rates and Impact Values of Publications Made Between 2015-2020

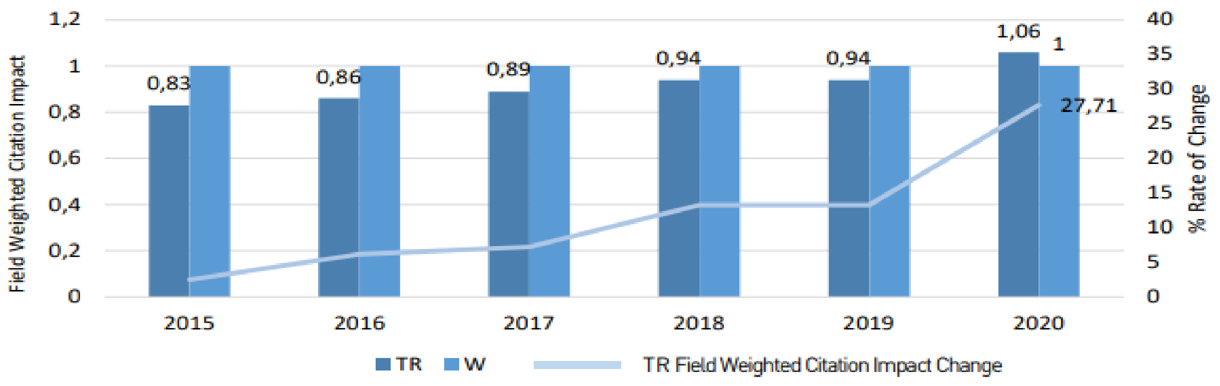
Publication Type	Percentile	Number of Publications	Number of Citations	Citation per Publication	FWCI
International Collaboration	23,4	67.437	897.469	13,3	1,85
Only National Collaboration	32,5	93.796	436.751	4,7	0,66
Only Institutional Collaboration	32,2	92.882	400.051	4,3	0,64
Single Author	12	34.619	118.202	3,4	0,61
University-Industry Collaboration	1,4	4.057	128.844	31,8	4,03
Inter-university Collaboration	98,6	284.677	1.723.630	6,1	0,88

Source:General Evaluation of Publication Performance Report,2021

FWCI value of publications created with international cooperation(1,85) is greater than the average FWCI (0,64) value of publications produced by domestic academics, according to the above table. If FWCI value equals to 1, this means that the relevant author has the same impact as other authors at the average. This value can be considered the threshold value. If the FWCI value is lower than 1, this means that relevant authors' publications are cited less than the global average. If the FWCI value is greater than 1, this means that relevant authors' publications are cited more than the global average. For example, if the FWCI value is equal to 2, this means that the publication has been cited 100% times more than the global average. If the FWCI value is equal to 0,5, this means that the publication has been cited 50% times less than the global average.

Turkish publications' FWCI value, which was 0,71 in 2000 and 0,73 in 2005, rose to 0,83 in 2015 and continued to rise in 2020, reaching 1.06 and surpassing the value of 1, which is considered as the world average. FWCI trend during the time period 2015-2020 is shown in the below graph.

Graph 9. Field Weighted Citation Impact



Source:General Evaluation of Publication Performance Report,2021

SECTION 3

LITERATURE REVIEW

In this part of the study, there are previous studies that indicate to us whether the connection between education and economic growth exists or not. Alam, S., Sultana, A. & Butt, M.S. (2010) have analyzed the long-run relation between social expenditures and economic growth in developing Asian countries, including Bangladesh, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, and Thailand for the period from 1970 to 1995 . They have used the data of Health Expenditures, Education Expenditures, Expenditures on social security and welfare as expenditure variables, and also Gross Domestic Product(GDP) symbolizes the economic growth for their study. According to the Panel Cointegration test results, they have found that there is a strong relationship between expenditures on education and economic growth.

Riasat S., R. M. Atif & K. Zaman (2011) have analyzed the impact of education expenditures on the economic growth of Pakistan for the period from 1973 to 2018 by using the ARDL technique. The percentage share of GDP for education stands for education expenditures and per capita Gross Domestic Product(GDP) symbolizes the economic growth in their study. The result of their analysis shows that spending on education contributes to GDP per capita.

Idrees, A.S. and Siddiqi, M.W. (2013) have examined the long run relationship between education expenditures and economic growth for 14 countries by applying Fully Modified Ordinary Least Squares(FMOLS). 7 of the studied countries are developed countries which are UK, US,Canada, Germany, France,Italy and Japan and remaining ones are developing countries including Pakistan, India, China, Turkey, Poland, Russia and South Africa. Their study covers the period from 1990 to 2006 for all studied 14 countries. After the analysis, they have found that expenditures in education contributes to economic prosperity. According to the result of the analysis, in developing countries, expenditure on public education has a higher impact on economic growth than in the developed countries.

Solaki, M.(2013) has examined the effect of the human capital & public education expenditures on economic growth for Greece, the covering period from 1961 to 2006. In her study, the percentage share of education spending on total public expenditures symbolizes the spending on education parameter and economic growth parameter is real GDP per capita.Solaki's empirical analysis indicates that public educational expenditure positively impacts real GDP per capita in the long-run period.

Devarajan, S., Swaroop, W. and Zou, H. (1996) have pointed out the contribution of the components of public expenditures to economic growth. Education expenditures are a component of public expenditures in the study. They have found that public education expenditures have a negative impact on economic growth, and it is statistically insignificant.

Additionally, there are also studies analysing the relationship between education and economic growth in the basis of Turkey. Afsar, M. (2009) has studied to detect whether the relation between expenditures in education and economic growth exists or not for Turkey by using the Granger causality test. Afsar's study covers the time period from 1963 to 2005. Gross National Product(GNP) is used as the economic growth parameter in the study. The result demonstrates that expenditures on education impact economic growth positively.

Özsoy, C. (2008) has studied the contribution of Turkish higher education to economic growth performance by using the VAR model. Her study covers the time period from 1970 to 2006. The number of students in higher education takes place as an educational variable, and Gross National Product(GNP) stands for economic growth in the study. According to the findings, higher education positively impacts economic growth. Özsoy has also found that an increase in economic growth impacts higher education positively. Shortly, the bicauselity relationship between higher education and economic growth exists.

Pamuk, M. and Bektaş, H. (2014) have researched the relationship between expenditure on education and economic growth for Turkey by using the Granger causality test. GDP is the economic growth parameter, and expenses in education are the educational variable in their study. The analysis demonstrates that expenditures on education do not have a effect on economic growth.

Şimşek, T. (2017) has demonstrated the relationship between education expenditure and economic growth by using the ARDL bound testing approach for Turkey. The study covers the period from 1991 to 2016. Gross Domestic Product(GDP) is the economic growth variable in the study. According to the findings, education expenditure positively impacts economic growth.

Eriçok, R. E. and Yılancı, V. (2013) have studied education expenditure and economic growth relationship in the example of Turkey by using the ARDL approach. The study covers the period from 1968-2005. The findings demonstrate that education spending impacts economic growth positively in the short run.

Over the period 1995-2012, Şen, H., Kaya, A., Alpaslan, B. (2018) have investigated the causality between education spending, health spending, and economic growth for eight developing countries which are Argentina, Brazil, Chile, India, Indonesia, Mexico, South Africa, and Turkey by using Granger Causality test. Annual GDP growth stands for economic growth, and education spending and health spending variables are used as the share of GDP in the study. One of the findings of the analysis is that there is no relationship between education expenditures and economic growth in the case of Turkey.

Over the period from 2006Q1 to 2015Q4, Uçan, O. and Yeşilyurt, H. (2016) have studied on the effect of education spending on economic growth in Turkey. GDP stands for economic growth in the study. The finding of the Granger causality test shows that there is a relationship between expenditure on education. Education spending positively affects economic growth in the long-run.

Doyar, V. (2019) has studied the relationship between higher education and reel income variables for the Mediterranean region provinces of Turkey. The study covers the period from 2008 to 2017. Education variables are the number of students in higher education and the number of academicians in higher education. GDP stands for the economic growth parameter in the study. According to the results, there is no causal connection from the number of students and academicians to economic growth.

Over the period 1923-2016, Yıldız, E. (2017) researched on the relationship between higher education and economic growth in Turkey. The education variable for this study is the number of graduated students from higher education, and GDP stands for economic growth. According to the Johansen Cointegration analysis, a cointegration exists between gross domestic product and the number of graduated students from higher education. An increase in grad students positively impact economic growth, which is represented as GDP, and increase in GDP also has a positive impact on grad students.

Erdem, E. and Tuğcu, C.T. (2015) have investigated the relationship between higher education and economic growth in Turkey. The study covers the period from 1970-2008. There are two education variables or indicators in the study. One of them is the sum of the students in all higher education institutions, and another one is the graduated students from one of the higher education institutions. GDP represents the economic growth in their study. According to the result of the analysis, an increasing of the number of students in any of higher education institutions and an increase of graduated students from any higher education institutions positively affect economic growth in the case of Turkey.

Akgül, I. and Koç, S.Ö.'s study (2011) aimed to find out whether the relationship between education and economic growth exists or not for Turkey. The time series of the study covers the year 1924 to 2009. It is based on the threshold autoregressive (TAR) model. Indicator of human capital is the number of graduated students from higher education, and the indicator of economic growth is the GNP in their study. According to the findings, the threshold value for the rate of change in the number of graduated students from higher education is 8,08 %, and the threshold value for the economic growth is 3,2%. If the rate of change in the number of graduated students from higher education is greater than 8,08%, it positively impacts the economic growth for each period. Additionally, if the economic growth is greater than 3.2,%, it positively impacts the number of graduated students from higher education.

SECTION 4

EMPIRICAL ANALYSIS

In this part of the study, it is aimed to do an empirical analysis to detect the effect of higher education public expenditures on economic growth.

4.1. Data Set

All data in this study cover the time period from 1981 to 2020. The data of GDP per capita, Direct Foreign Investments, Import/Export have been provided from CBT's electronic data delivery system. The data of the higher education public expenditures have been provided from the budget reports of the ministry of education. The public higher education expenditure data from 1981 to 2007 have been provided from 2007 budget report of the ministry of education. The higher education public expenditure data from 2007 to 2020 have been provided from 2021 budget report of the ministry of education.

4.2. Research Model

Within the scope of the research, it is aimed to estimate the effect of higher education public expenditures on economic growth with the econometrical model, which is represented in the below equation.

$$\mathrm{Log}(\mathrm{GDP}_t) = \alpha + \beta_1 \mathrm{Log}(\mathrm{EDU}_t) + \beta_2 \mathrm{Log}(\mathrm{DYY}_t) + \beta_3 \mathrm{Log}\left({}^{\dot{\mathrm{I}}\mathrm{MP}_t}/_{\mathrm{EXP}_t}\right) + \varepsilon_t \tag{12}$$

While subscript sign t in the equation represents the time dimension as annually, α represents the constant term of the equation. ε represents equation error terms assumed to be in the pure random walk process. Beta (i=1, 2, 3) indicates the effect of explanatory variables on economic growth, and they are the coefficients to be estimated within the econometric model.

4.3. Variables

The definitions of the variables used in the research model are as in Table 4.

Table 4. The Definitions of Variables

Dependent Variable	
Variable	**Symbol**
Gross Domestic Product(GDP)	Log(GDP)
Independent Variables	
Variable of Interest	**Symbol**
Higher Education Public Expenditures	Log(EDU)
Control Variables	**Symbol**
Foreign Direct Investments	Log(DYY)

The Ratio of Total Imports of Goods and Services to Total Exports of Goods and Services	Log(IMP/EXP)

Observations which cover time period from 1981 to 2020 for all of these variables were used anually and T is equal to 40. In addition of this, due to the different sizes of variables, a double log(log-log) model was estimated by taking the natural logarithms of all of them.

According to Woolridge(2013), the coefficients to be estimated within the double logarithmic model can be interpreted through the percentage changes of the variables and this allows us to eliminates the problem of numerical size that is difficult to interpret such as the estimation of excessively large or extremely small coefficents.

4.4. Data Analysis

The data collected from tha data sources within the scope of the research were transferred to the E-views 10 program and all necessary econometric analyses were carried out with the mentioned package program.

In the first part of the findings section, time course graphs were drawn and analyzed in order to visually examine the trend, structural break and similar temporal properties of time series along with descripitive statistics of the variables.

It is essential for the time series regression models that the variables being used be stationary. The spurious regression model will be constructed whenever it is determined that two or more non-stationary variables are being regressed against one another. When it comes to spurious regression, the models that need to be estimated often provide satisfactory outcomes. However, despite having a high R2 and having parameters that are statistically significant, the estimated parameters are often unimportant. The fact that the non-stationary variables move in the same direction due to random chance is the primary explanation for this phenomenon. The fact that the variables are connected to one another is not the cause. It is possible for there to be spurious regression between two non-stationary variables that are not even remotely connected to one another, as well as in interconnected financial and macroeconomic series (Çınar, Sevütekin 2017: 559).

The ADF unit root test is a kind of unit root test that evaluates a series to identify whether or not it is stationary. The technique in question is an improved implementation of the Dickey-Fuller (DF) unit test. In contrast to the DF unit root test, the ADF unit root test takes into consideration the autocorrelation issue. The answer to whether or not a Y t series is stationary in its level is determined by the solution to three equations, which are provided by the ADF unit test.

For $Y_t \sim I(0)$;

I. None (No intercept & No trend):

$$\Delta Y_t = \beta_1 Y_{t-1} + \sum_{i=1}^{p} \sigma_i \Delta Y_{t-i}$$

(13)

II. Intercept

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \sum_{i=1}^{p} \sigma_i \Delta Y_{t-i}$$

(14)

III. Intercept&Trend:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Trend + \sum_{i=1}^{p} \sigma_i \Delta Y_{t-i}$$

(15)

The ADF test requires the estimation of the regression specifications in the equations of (8),(9) and (10) with least squares method. Two conditions must be satisfied for the series to be stationary. First one is that the coefficient of beta-1 value should have a negative sign and second one is that the coefficient should be statistically significant. The lags of the dependent variable in the equation are intended to eliminate the possible autocorrelation problem in the error terms and it is recommended to compare the Schwarz Information Criterias(SICs) to determine the optimal lags (Kutlar 2000).

The null hypothesis and alternative hypothesis for the ADF test are folows;

H_0: Unit root exists in the series (The series is not stationary.)

$H_{1:}$ Unit root does not exist in the series.(The series is stationary.)

If the level values of the series are not stationary, it is decided at which difference level the series is stationary by applying the similar ADF procedure at the variables that in the first difference level and the second difference level.

It is known that structural breaks in the time series can mislead the unit root tests. For this reason, it was deciced to apply the DF test for structural break series in addition to the ADF test. Structural break in the series can ocur in 4 different types. For the unit root test with structural breaks, there are 4 main models depending on the types of structural break. These models are shown in the equations of (15,) (16), (17) and (18).

Model 0: Level break in the trendless series

(16)

$$y_t = \mu_0 + \theta DU_t(T_b) + y_t^*$$

Model 1: Level break in trend series

$$y_t = \mu_0 + \beta_t + \Theta DU_t(T_b) + y_t^* \tag{17}$$

Model 2: Trend and Level break in trend series

$$y_t = \mu_0 + \beta_t + \Theta DU_t(T_b) + \gamma DU_t(T_b) + y_t^* \tag{18}$$

Model 3: Trend break in the trend series

$$y_t = \mu_0 + \beta_t + \gamma DT_t(T_b) + y_t^* \tag{19}$$

$DU_t(T_b)$ is the level break dummy variable for the breakout time and $DT_t(T_b)$ is the trend break dummy variable for the breakout time, y_t^* represents the error terms of the equations and the series are purified from the trend. The approach is two stages. At the first stage, the series is purified from the trend with the help of of the above equations. At the second stage, the existence of the unit root is investigated with the following test equations(Erdem, Yamak 2017: 101).

For model 0,1 and 2;

$$y_t^* = \sum_{i=0}^{k} w_i D_{t-i}(T_b) + \alpha y_{t-i}^* + \sum_{i=0}^{k} c_i \Delta y_{t-i}^* + \mu_i \tag{20}$$

For model 3;

$$y_t^* = \alpha y_{t-i}^* + \sum_{i=0}^{k} c_i \Delta y_{t-i}^* + \mu_i \tag{21}$$

In the case of inconsistency between the ADF unit root test and the unit root with structural break test for the variables with structural break, the findings of the unit root test with structural break which take into account the structural brake contained in the variables are more reliable. On the other hand, doubts about the structural breaks of the variables can be examined by checking the statistical significance of break dummies in the unit test with structural break. While the structural break periods can be determined externally in the test, the Dickey Fuller Min t statistic can be useful for the selection of the break periods, especially for the series in which more than one structural break seen.

In the light of the results of the ADF unit root test and the unit root test with structural break, it was observed that the variables Log (GDP), Log(EDU) and Log (DYY) in the research model are not stationary at their levels; however, at their first difference, it was determined that these 3 variables are stationary. In addition of this, it was determined that Log(IMP/EXP) is stationary variable at its level.

Cointegrated variables are variables that have been shown to be stationary after being combined with a linear combination of non-stationary series. The theory of economics is often connected to the concept of linear combination. The economic explanation of cointegration states that if two or more series are related to each other in such a way as to form a long term equilibrium equation, then even if the series includes a scholastic trend, the series will move closely with each other over time, and the difference between them will remain stable. This is true even if the series includes a scholastic trend. In this context, the idea of cointegration refers to the fact that the economic system tends to converge over the course of time and that there is a connection of long-term equilibrium(Harris, Sollis 2003: 22).

Although Engle and Granger were the ones who first presented the idea of cointegration to the academic community, there are a number of cointegration tests that are based on the implementation of root tests to residuals that have been derived using the cointegration model. In the present investigation of the possible presence of cointegration relations, the ARDL bound test methodology was used. It was taken into consideration while selecting the ARDL bound test that the test could identify the presence of a cointegration connection without taking into consideration the stationarity qualities of the variables. This led to the selection of the ARDL bound test. To put it another way, the ARDL bound test technique is more helpful than the Engle-Granger(1987) and Johansen(1989) tests. This is due to the fact that the ARDL bound test method enables us to investigate the cointegration connection that exists between series that are differently integrated. In light of the fact that the variables in the research model are integrated in varying degrees, the ARDL bound test technique was used for the investigation.

ARDL bound test which is developed by Pesaran et al. is an very useful approach for cointegration analysis. ARDL bound test method has some advantages over other cointegration tests. To do the analysis using this technique, practitioners do not require a stationary (I(0)) or difference stationary (I(1)) series and also practitioners can easily derive unrestricted error correction model to examine the series' short and long-run dynamics with this technique. Another advantage of using the ARDL bound test is that it can be used for small samples (Demirhan 2020: 13).

ARDL bound testing approach consists of two stages. The first stage is the testing of the existence of a long-run relationship between variables. In the second stage, the short and long-term coefficients of the series that were found to be cointegrated in the first stage are calculated. The following equation is estimated in order to test the long-run relationship in the bound test approach for a two variable research model.

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 X_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-1} + \sum_{i=0}^{q} \lambda_i \Delta X_{t-i} + \mu_t \qquad (22)$$

In the equation;

p= optimal number of lags in the dependent variable

q =optimal number of lags in the independent variable

beta, delta and lamda signs represent the coefficients

Δ = represents the difference of the variable

The null hypothesis for the cointegration relationship between the variables are as follows;

$$H_0: \beta_1 = \beta_2 = 0 \qquad (23)$$

If the computed value of the test statistic is below the lower limit critical value, the null hypothesis that there is no cointegration connection cannot be rejected. This is because the calculated value is less than the critical value. If the value of the test statistic that was produced is higher than the upper limit critical value, then the null hypothesis, which states that there is no cointegration connection, is rejected, and it is determined that there is cointegration. If the value of the test statistic falls anywhere in the middle of the lower bound critical value and the upper bound critical value, the question of cointegration can not be answered.

After detecting of cointegration between the series, ARDL(p,q) model is estimated.

The ARDL(p,q) model is shown at below equation;

$$Y_t = \beta_0 + \sum_{i=1}^{p} \delta_i Y_{t-i} + \sum_{i=1}^{q} \lambda_i X_{t-i} + \mu_t \qquad (24)$$

In the ARDL(p,q) model, the long-run coefficients for the independent variable are estimated as follows;

$$\frac{\lambda_0 + \lambda_p + \cdots . \lambda_p}{1 - \delta_1 + \delta_2 + \cdots \delta_q} \qquad (25)$$

After estimating the long-term coefficients, the short-term coefficients are produced by building the error correction model. This is done after the long-term coefficients have been estimated.

$$\Delta Y_t = \beta_0 + \beta_1 EC_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-i} + \sum_{i=1}^{q} \lambda_i \Delta X_{t-i} + \mu_t \tag{26}$$

EC in the equation refers to the error correction term in order to check the existence of a casuality connection from the independent variable to the dependent variable, the error correction term should be significant and be within the range of 0 to 2.

The Akaike information criterion was taken into account to determine the optimal lag lengths for the ARDL(p,q) model. According to the Akaike information criterion, many different lag length specifications were created and lag lengths with optimal information criteria were modeled.

4.5. Findings

In this part part of the study, the findings obtained as a result of data analysis are included.

Table 5. Variable Descriptive Statistics

Statistics	Log(GDP)	Log(EDU)	Log(DYY)	Log(IMP/EXP)
Avarage	8.394	19.126	21.295	2.988
Maximum	9.443	24.311	23.816	3.484
Minimum	7.128	10.747	17.644	2.109
Std.Deviation	0.778	4.611	1.907	0.295
Skewness	-0.125	-0.569	-0.273	-0.824
Kurtosis	1.590	1.806	1.866	3.381
Jarque-Bera (40)	3.418	4.533	2.639	4.766
p	0.181	0.104	0.267	0.092
Observations	40	40	40	40

(Bracket indicates the Jarque-Bera normal distribution test degrees of freedom.)

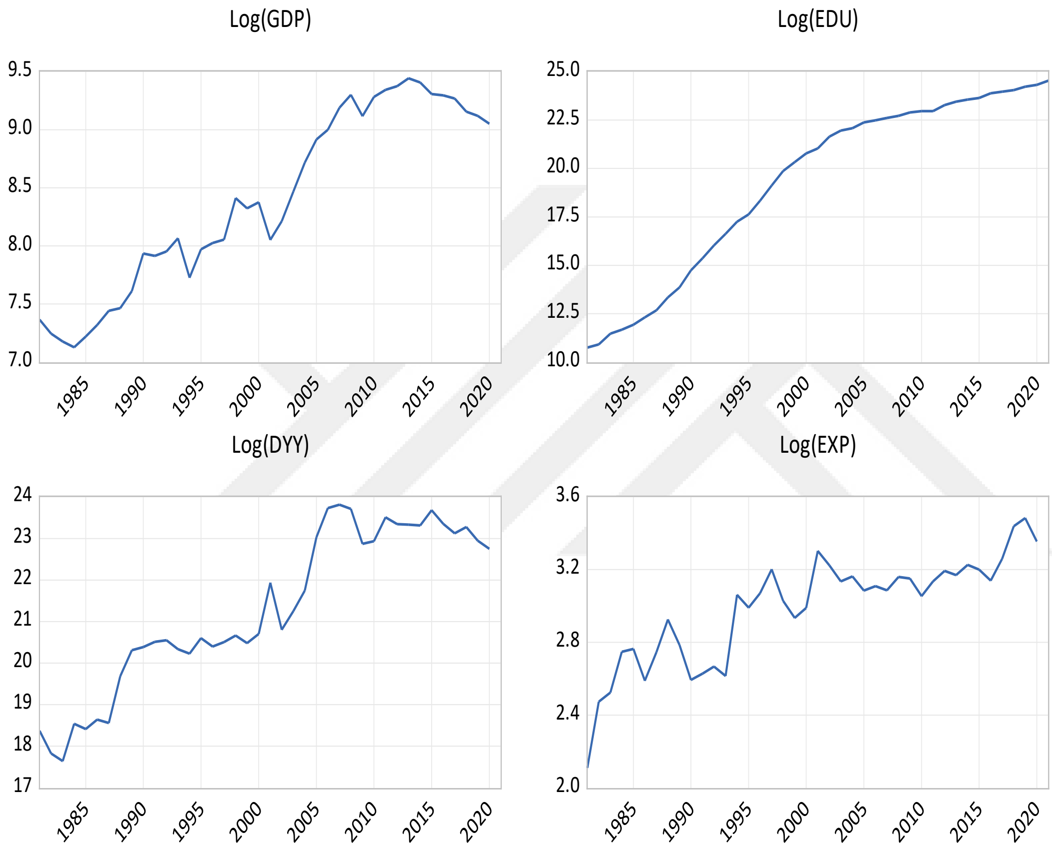
Log(GDP) variable is normally distributed between minimum 7.128 and maximum 9.443 values with 8.394 mean around 0.778 standard deviation value. (J.B(40)=3.418, p>0.10) for Log(GDP) variable.

Log(EDU) variable is normally distributed between minimum 10.747 and maximum 24.311 values with 19.126 mean around 4.611 standard deviation value. (J.B(40)=4.533, p>0.10) for Log(EDU) variable.

Log(DYY) variable is normally distributed between minimum 17.644 and maximum 23.816 values with 21.295 mean around 1.907 standard deviation value. (J.B(40)=2.639, p>0.10) for Log(DYY) variable.
Log(IMP/EXP) variable is normally distributed between minimum 2.019 and maximum 3.484 values with 2.988 mean around 0.295 standard deviation value. (J.B(40)=4.766, p>0.10) for Log(IMP/EXP) variable.

Time course graphs of the variables are as in Graph. 10.

Graph 10. Times Series Graphs of Variables



When the graph 10 is examined, the Log(GDP) variable has a clear upward trend. It is also seen that it is a varible that shows structural break characteristic throughout the period. On the other hand, Log(EDU) variable appears to be an unbroken variable with a clear upward trend. Log(DYY) variable is in an upward trend and it shows structural break characteristic. Log(IMP/EXP) variable is a variable with an upward trend and it shows structural break characteristic.

During the analysis of unit root tests for the variables of Log(GDP), Log(DYY) and Log(IMP/EXP), it was thought that it would be useful to examine unit root test with structural break along with classical unit root tests.

4.5.1. The Findings of ADF Unit Root Test

The findings of ADF unit root test performed to determine the statitionary of the variables are as in Table 6.

Table 6. ADF Unit Root Test Findings

Variables	ADF Unit Root Test Statistics		
	None	Intercept	Trend and Intercept
Log(GDP)	1.654$^{[0]}$ (0.974)	-1.041$^{[0]}$ (0.729)	-1.377$^{0]}$ (0.852)
ΔLog(GDP)	-5.737$^{[0]}$*** (0.000)	-6.206$^{[0]}$*** (0.000)	-6.275$^{[0]}$*** (0.000)
Log(EDU)	0.433$^{[2]}$ (0.803)	-2.0003$^{[2]}$ (0.285)	-1.202$^{[2]}$ (0.896)
Δ Log(EDU)	-1.384$^{[0]}$ (0.152)	-2.637$^{[0]}$* (0.094)	-4.011$^{[0]}$** (0.016)
Log(DYY)	1.259$^{[0]}$ (0.944)	-1.382$^{[0]}$ (0.581)	-1.744$^{[0]}$ (0.712)
ΔLog(DYY)	-5.951$^{[0]}$*** (0.000)	-6.267$^{[0]}$*** (0.000)	-6.421$^{[0]}$*** (0.000)
Log(IMP/EXP)	1.106$^{[0]}$ (0.927)	-3.064$^{[0]}$** (0.038)	-4.577$^{[0]}$ *** (0.004)

* (%10), **(%5), and *** (%1) represent stationary at the significance level.(The brackets contain the ADF test probability values(sig.) Δ represents the first level difference.[The square brackets contain the optimal lag lengths selected for the ADF regression]. The Schwarz Information Criterion was used for the optimal length of ADF regression (Maks.Lag:4).

When it is looked at the Table 6, it is seen that the Log(GDP) variable is a variable that is not stationary at the level(p>0.10), however; Log(GDP) variable becomes stationary at the first level difference according to the findings of the ADF unit rest performed for the *none*, *constant* and *constant & trend* specifications.

According to the findings of the ADF unit root test performed for the *none*, *constant* and *constant&trend* specifications in its level for the Log(EDU) variable, it was observed that the variable is non-stationary in its level(p>0.10). According to the findings of the unit root test of Log(EDU) variable's in its first difference level, it is seen that it is a non-stationary variable(p>0.10) in the *none* specification unit root test and it is a stationary variable at 10% and %5 significance levels in the *intercept* and *intercept & trend* specification unit root tests. Since it is known that the variable has a significant trend, it was decided that the variable is stationary variable in its first level difference with considering the *trend & intercept* specification unit root test findings.

According to the findings of the ADF unit root test performed for *the none, intercept* and *trend and intercept* specifications for the Log(DYY) variable, it was found that the variable is not stationary at its level(p>0.10), however; it becomes stationary at the first level difference(p<0.01).

Log(IMP/EXP) variable was found to be stationary(p>0.10) in its level for the *intercept* specifiction. In the unit root tests with intercept(p<0.05) and trend& intercept(p<0.01), it was found that the variable is stationary at 5% and 1% significance levels.Since it is known that the variable has an upward trend, it can be said that the variable is a stationary variable at the first level difference with considering the *intercept & trend* unit root test findings.

Since the structural break characteristics of the variables Log(GDP), Log(DYY), and Log(IMP/EXP) variables in the research model were observed in the time course graphs, it would be useful to examine the unit root processes of the variables with the structural break DF unit root test which takes into account the structural breaks.

4.5.2. The Findings of DF Unit Root With Structural Break Test

The findings of the structural break DF unit root test performed with mentioned variables are as in the Table 7.

Table 7. The Findings of DF Unit Root With Structural Break Test

Variables	Model Specifications			
	Intercept	Trend and Intercept		
		Break Specifications		
		Intercept	Trend	Trend&Intercept
Log(GDP)	-2.681[0] (0.838)	-3.102[0] (0.879)	-3.764[0] (0.272)	-3.507[0] (0.809)
Δ Log(GDP)	-6.755[0]*** (0.000)	-6.800[0]*** (0.000)	-6.928[0]*** (0.000)	-7.455[0]*** (0.000)
Log(DYY)	-2.718[1] (0.823)	-2.766[0] (0.959)	-3.121[0] (0.636)	-4.315[0] (0.329)
Δ Log(DYY)	-7.086[0]*** (0.000)	-7.101[0]*** (0.000)	-6.571[0]*** (0.000)	-7.009[0]*** (0.000)
Log (IMP/EXP)	-5.724[0]*** (0.000)	-5.639[0]*** (0.000)	-4.664[0]** (0.033)	-5.387[0]** (0.028)

* (%10), **(%5), *** (%1) represent stationarity at the significance level. (brackets include ADF test probability values(p). Δ represents the first level difference of the variable.[Square brackets include the optimal lag lengths selected for ADF regression.] Schwarz Information Criterion was used for the optimal lag length of the ADF regression (Maks.Lag:12).

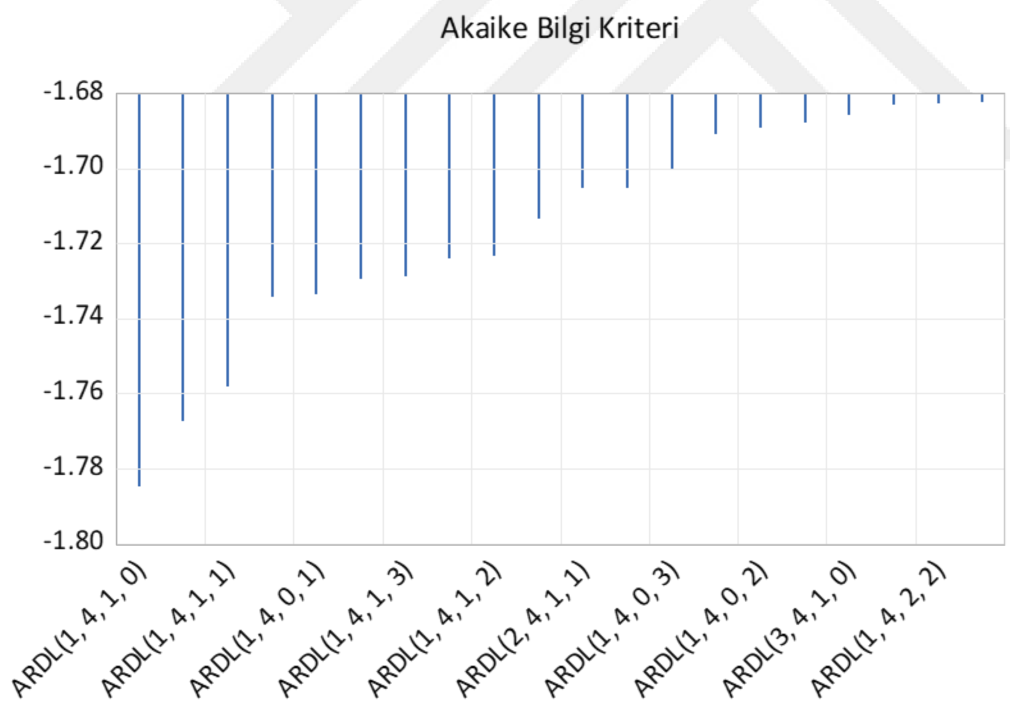
The table 7. indicates us that the findings of the DF root test with structural break support the findings of the ADF unit root test. To put it more clearly, Log(GDP) and Log(DYY) variables are non-stationary at their levels; however, the are stationary at their first level difference(≈I(1), $p<0.01$). Log(IMP/EXP) variable is stationary variable at its level(≈I(0), $p<0.01$).

4.5.3. Model Estimation

Since it was found that the variables in the research model were series with different degrees of integration, it was decided that ARDL bound test cointregration method was the appropriate estimation method. On the other hand, since ARDL bound test cointegration method is known to give better results for small sample compared to other cointegration methods, it is expected that this method give better results with existing data.

The values including the Akaike Information Criteria(AIC) comparisons for determining the optimal delays to be included in the Autoregressive model section for ARDL model estimation are as in Graph 11.

Graph.11 Akaike Information Criteria Comparisons for Optimal Delays



When graph 11. is examined, it is seen that the model gives the best(*minimum*) Akaike information criterion value is ARDL (1,4,1,0). In other words, the model with 1 lag for the dependent variable Log(GDP), 4 for the independent variable Log(EDU), 1 for the control variable Log (IMP/EXP) and 0 for the control variable Log(DYY) is the optimal model.

4.5.3.1. The Findings of ARDL(1,4,1,0) Autoregressive Model

The findings of the Autoregressive model created with optimal lags and the basic hypothesis tests on the Autoregressive model are as in the Table 8.

Table 8. The Findings of ARDL (1, 4, 1, 0) Autoregressive Model

Variables	β	S.H	t	p
$Log(GDP_{t-1})$	0.423	0.113	3.746***	0.001
$Log(EDU_{t})$	0.179	0.114	1.563	0.130
$Log(EDU_{t-1})$	-0.123	0.176	-0.696	0.493
$Log(EDU_{t-2})$	-0.002	0.166	-0.010	0.992
$Log(EDU_{t-3})$	-0.340	0.156	-2.183**	0.038
$Log(EDU_{t-4})$	0.371	0.106	3.508***	0.002
$Log(IMP/EXP_{t})$	-0.859	0.141	-6.112***	0.000
$Log(IMP/EXP_{t-1})$	0.251	0.179	1.402	0.173
$Log(DYY_{t})$	0.084	0.032	2.635**	0.014
Constant	3.400	1.002	3.394***	0.002
Descriptive Statistics				
Wald Test	F(9, 26)=246.601***		p=0.000	
LM Test	$\chi^2(02)=0.503$		p=0.777	
Breusch-Pagan-Godfrey Test	$\chi^2(09)=2.032$		p=0.991	
Error Terms	$\bar{\varepsilon}\approx0.000$	J.B(36)=1.455	p=0.483	

*** (%1), ** (%5), * (%10) represents statistical significance at the significance level F: F test statistic, χ^2:Chi-square test statistic, (parentheses includes the test degrees of freedom) χ^2(S.D), F(, S.D 1, S.D 2), $\bar{\varepsilon}\approx$ approximate value of error terms mean, J.B: Jarque-Bera normal distribution test statistic.

Although the coeffients in the autoregressive regression model are not meaningful for the short or long term, they are prefered to be reported because they are intermediate coefficients to be used in the calculation of the long term coeffients. On the other hand, the ARDL method is known to be sensitive to varying variance and autocorrelation, the subject assumptions should be examined on the Autoregressive model.

When the result of the LM test statistics examining the autocorrelation problem in the autoregressive model are examined, it is seen that there is no statistically significant autocorrelation problem in the model, even at the 10% signifcance level. ($\chi^2(02)=0.503$, p>0.10). When the correlogram graph showing the autocorrelation patterns up to 16 lags was examined, it was seen that all autocorrelation coefficients were statistically insignificant. (Appendix 1, p>0.10).

When the Breusch-Pagan-Godfrey test statistic which examines the variance problem in the model is examined, it is seen that there is no statistically significant variance problem even at the 10% significance level ($\chi^2(09)=2.032$, $p>0.10$)

Finally, since it is seen that the model error terms are normally distributed with a mean close to zero, it can be said that the basic assumptions about the autoregressive model are met. ($\bar{\varepsilon}\approx 0.000$, J.B(36)=1.455, $p>0.10$)

4.5.4. Long-Term Statistics

The long term coefficients calculated from the autoregressive model and the F bounds test statistics calculated from the constrained error correction model are as in Table 9.

Table 9. Long-Term Statistics

Variables	**β**	**S.H**	**t**	**p**
Log(EDU)	0.147	0.028	5.300***	0.000
Log(DYY)	0.146	0.050	2.943***	0.007
Log(IMP/EXP)	-1.053	0.300	-3.516***	0.002
Constant	5.891	1.263	4.666***	0.000
F Bound Test H0: No Cointegration				
		Significance	**I(0)**	**I(1)**
F=5.724***		10%	2.37	3.2
k=3		5%	2.79	3.67
		1%	3.65	4.66

***(%1), **(%5),*(%10) represents statistical significance at the significance level, F: F test statistic, k: the number of independent variables in the model.

According to the Table 9, it is seen that the calculated ARDL F cointegration test statistic is greater than the 1% critical table value. ($F=5.724>4.66$, $p<0.01$). In this situation, there is a statistically significant long-term balance at the 1% significance level for the variables in the model. In other words, it can be said that the variables are cointegrated variables. As a result of the finding that the variables are cointegrated, it will be meaningful to examine and interpret the long-term coefficients calculated for the variables.

It is seen that the Log(EDU) variable has a statistically and positive effect on Log(GDP) at 1% significance level in the long-term. ($\beta=0.147$, $p<0.01$). To put it more clearly, an increase in the public budget of higher education in the Turkish economy during the period discussed corresponds to an increase in the Turkey's gross domestic product per capita.

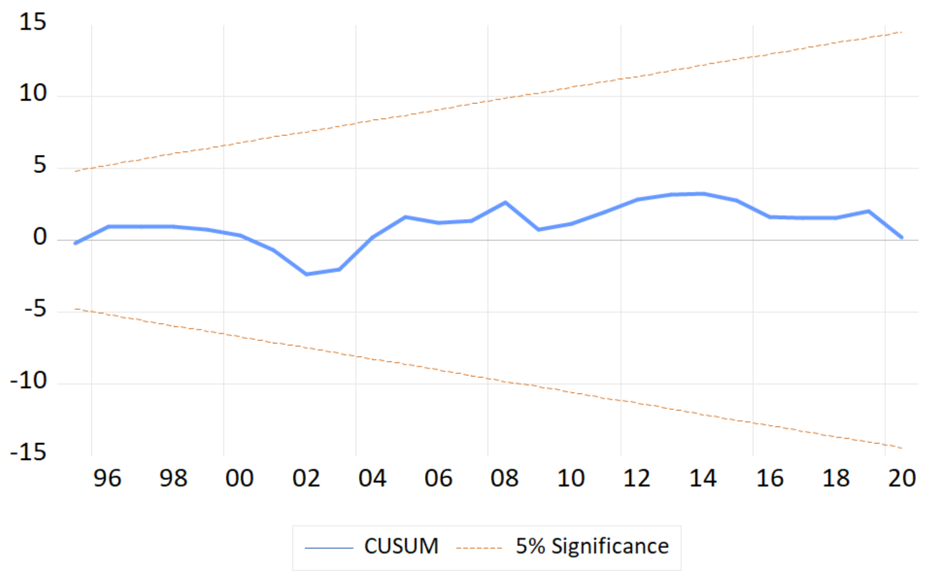
It was determined that the Log(DYY) variable has a statistically significant and positive effect on Log(GDP) at 1% significance level in the long-term. ($\beta=0.146$, $p<0.01$). To put it more clearly, an increase in foreign direct investments in the Turkish economy during the period discussed corresponds to an increase in the gross domestic product per capita.

Log (IMP/EXP) variable has a statistically significant and negative effect on Log(GDP) at 1% signifcance level in the long-term. (β=-1.053, $p<0.01$). More clearly, the increase in the ratio of imports to exports in the Turkish economy during the subject period causes a decrease in Turkey's gross domestic product per capita.

4.5.5. The Findings of Cusum and Cusum of Square Tests

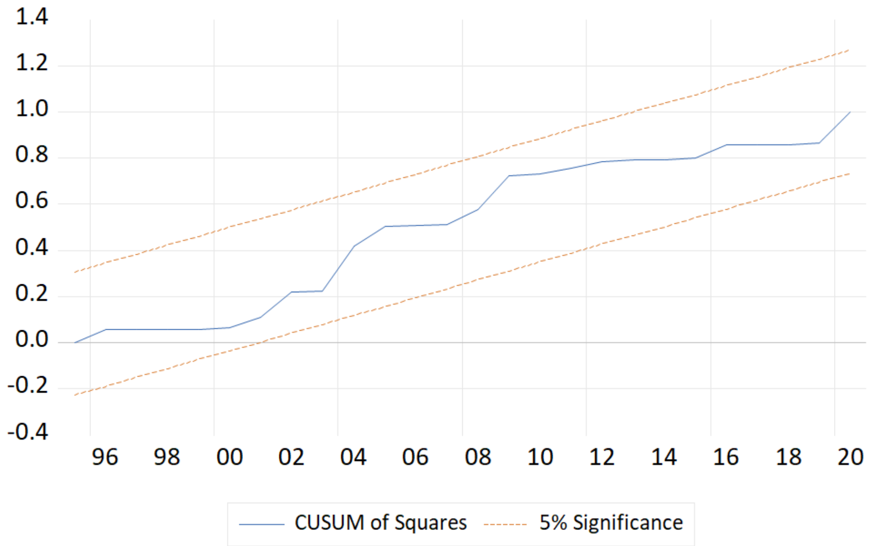
The findings of Cusum and Cusum of Square tests which were conducted to examine the stability conditions of the estimated long-term coefficients are as in Graph. 12 and Graph 13.

Graph 12. Cusum Test



According to the results of Custom test, it is seen that Cusum value is within the 5% significance band throughout the entire period. In this situation, the estimated long-term findings meet the stability condition at the 5% significance level according to the Cusum test.

Graph 13. Cusum of Square Test



Acocording to the findings of Cusum of Square test, the Cusum of Square value is within the 5% significance band throughout the entire period. This means that the estimated long-term findings meet the stability condition at the 5% significance.

Another expected finding for the variables with a cointegration relationship is that the error correction mechanism is functional and the deviations from the long-term equilibrium are brought back into balance by the error correction term. For the ARDL model, the Error Correction Term(ECM_{t-1}) in the unconstrained error correction model should be statistically significant, negative and absolute value of it should be smaller than one.

The error correction term between -1 and 0 in the ARDL model indicates that the equilibrium deviations are periodically balanced throughout the periods while the Error Correction Term between -1 and -2 indicates that the equilibrium deviations are eliminated in a fluctuating manner. A negative and less than -2 error correction term indicates that error correction mechanism is not working (Alam, Quazi 2003:17-18).

4.5.6. The Findings of Unconstrained Error Correction Model

Unconstrained Error Correction Model Findings are as in the Table 10.

Table 10. Unconstrained Error Correction Model Findings

Variables	β	S.H	t	p
$\Delta LOG(EDU_t)$	0.179	0.090	1.984*	0.058
$\Delta LOG(EDU_{t-1})$	-0.029	0.098	-0.296	0.770
$\Delta LOG(EDU_{t-2})$	-0.031	0.094	-0.324	0.749
$\Delta LOG(EDU_{t-3})$	-0.371	0.093	-3.969***	0.001
$\Delta LOG(IMP/EXP_t)$	-0.859	0.107	-8.057***	0.000
ECM_{t-1}	-0.577	0.100	-5.747***	0.000

***(%1), **(%5),*(%10) represents statistical significance at the significance level.

According to the findings at the Table 10, it is seen that ECM_{t-1} is statistically significant at the 1% significance level, negative and absolute value of it is smaller than 1. ($ECM_{t-1}=-0.577$, $p<0.01$). In this situation, the functionality of the error correction mechanism for the model exists. The deviations from the long-term equilibrium for the variables with long-term equilibrium between them are brought back to equilibrium periodically by the error correction term throughout the subject period. The coefficient of error term is -0.577. In this situation, it can be said that the equilibrium deviations return to equilibrium within approximately 2 periods which is 2 years ($1/0.577=1.73\approx2$).

SECTION 5

CONCLUSION

In this age of rapid development and tranformation, the importance of higher education is increasing day by day. In this age where knowledge is power, there is a need for qualified people who can produce knowledge more than ever. From this respect, each human being should be grown up in a sustainable environment interms of socially, politically and also economically because growing up in a sustainable environment is essential for education process. The government and its relevant ministries have important duties to provide this sustainable environment. One of the most important of these duties is to provide the enough quality assurance for Turkish higher education system. With the help of provided quality assurance for higher education institutions, Turkey will gain opportunity to compete with other developing or developed countries in the field of science and also in the field of economy. In order to become a brain-drain country, we need to ensure global quality standards in higher education.

In the 2nd section of this study, the subject of quality in higher education has been mentioned. The report of "*General Evaluation of Publication Performance in Turkey for the years 2015-2020"* by YÖKAK indicates that there are some remarkable improvements in the field of quality in higher education system. The existence of a board such as YÖKAK plays a crucial role in monitoring, auditing and improving quality processes of higher education institutions.

While it is seen that there are increasing trend in the field of quality in higher education, the relationship between economic growth and public expenditures in higher education has been analyzed in the 4th section of the study. Time period of this study covered from 1981 to 2020. Autoregressive Distributed Lag(ARDL) bound test approach has been used in this study. Gross Domestic Product(GDP) per capita has been used as dependent variable, public expenditures in higher education has been used as independent variable. There are also 2 control variables which are the ratio of total imports of goods and services to the total exports of goods and services and the foreign direct investments. The stationarity query was made with ADF unit root test and DF unit root with structural break test. According to the findings, the variables of "GDP","DYY" and "EDU" are stationary at their first level difference; however, the variable of IMP/EXP is stationary in its level. According to the result of the LM test statistics examining the autocorrelation problem in the autoregressive model, it was seen that there is no statistically significant autocorrelation problem in the model. According the result of Breusch-Pagan-Godfrey test statistic which examines the variance problem in the model, it was seen that there is no statistically variance problem even at the 10% significance level. According to the findings of the long-term statistics, it was seen that ARDL F cointegration test statistic value is greater than upper critical value in the table(9). This means that there is a statistically significant long-term balance at the 1% significance level for the variables in the model. In other words, it can be said that the variables are cointegrated variables and there is positively relationship between GDP per capita and EDU variables.

As a result of the study, the importance of higher education on economic growth in Turkey has been presented. Policymakers should make more actions to improve Turkish higher education system and ensuring quality assurance for Turkish higher education instutitions should be main aim. It is necessary to spend more effort on the quality process of higher education in Turkey. There are remarkable developments in the field of quality in Turkish higher education; however, the important point is to ensure the sustainability of these developments. In this development process, not only policymakers but also everyone from academicians to students should fulfill their responsibilities.

REFERENCES

Afşar, M. (2009), "Türkiye'de Eğitim Yatırımları ve Ekonomik Büyüme İlişkisi", *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, 9/1:85-98.

Akgül, İ., Koç, S. Ö. (2011), "Türkiye Cumhuriyeti Tarihinde Eğitim ve Büyüme İlişkisi: Eşik Otoregresif Yaklaşım", *Trakya Üniversitesi Sosyal Bilimler Dergisi*, 13/2: 1-35.

Aksu, L.(2014). "İktisat Ekollerinin İktisadî Büyüme Konusundaki Düşünceleri ve Modellerinin Analizi", *Türk Dünyası Araştırmaları Vakfı*, sayı 208: 351-392.

Alam, I., Quazi, R.M.(2003), "Determinants of Capital Flight: An Econometric Case Study of Bangladesh", *International Review Of Applied Economics,* 17/1: 1-32.

Alam, S., Sultana, A. Ve Butt, M.S. (2010), "Does social expenditures promote economic growth? A multivariate panel cointegration analysis for asian countries", *European Journal of Social Sciences,* 14/ 1: 44-54.

Alper, F.,Ö. (2019), " Ekonomik Büyümenin Belirleyicleri: Yapısal Kırılmalar Altında Türkiye Örneği", *Fiscaeconomia*, 3/1: 202-227.

Aykırı, M., Tokucu, E. (2017), "Ekonomik Büyümenin Sürdürülebilirliği Açısından Beşeri Sermayenin Önemi: Yüksek Gelirli Ülkeler Üzerine Bir Uygulama*", Kafkas Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 8/16: 259-293.

Bagolin, I.P., Comim,F.V. (2008), "Human Development Index(HDI) and its family of indexes: an evolving critical review, *Revista de Economia*, 34/2: 7-28.

Barro, R.J.(1996), “Determinant of Economic Growth: A Cross-Country Emprical Study”, *National Bureau of Economic Research*, NBER Working Paper 5698: 1-79.

Bilen, M., Yumuşak, İ.G. (2000), “Gelir Dağılımı- Beşeri Sermaye İlişkisi ve Türkiye Üzerine Bir Değerlendirme”, *K.Ü Sosyal Bilimler Dergis*i, 1/1: 77-96.

Bocutoğlu, E. (2016). *İktisadi Düşünceler Tarihi* (3. Baskı), Bursa: Ekin Basın Yayın Dağıtım.

Bogue, E. Grady (1998), “Quality Assurance in Higher Education: The Evolution Systems and Design Ideals”, *New Directions for Institutional Research, no.99*, 7-18.

Bozdağlıoğlu, E.Y., Sezgin, Y. (2017). “ Türkiye’de Beşeri Sermayenin Durumu(2005-2015)”, *Osmaniye Korkut Ata Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*”, 1/1: 48-67.

Breton, T.R. (2014), “A Human Capital Theory of Growth: New Evidence for an Old Idea”, *Center for Research in Economics and Finance (CIEF), Working Paper,* 14/13: 1-37

Çankaya, E., Karataş, M. (2010), “ İktisadi Kalkınma Sürecinde Beşeri Sermayeye İlişkin Bir İnceleme”, *Mehmet Akif Ersoy Üniversitesi Sosyal Bilimler Enstitüsü Dergis*i, year:2 issue: 3: 29-55.

Çinko,L.(2006), “İçsel Büyüme Teorisi Üzerine Genel Bir Değerlendirme”, *Vergi Raporu*, 14/80:141-146.

Daniele, S.(2017), “ A Glance At Solow’s Growth Theory”, *Journal of Mathematical Economics and Finance*,3/2;1-13.

Demir, S. (2006), “Birleşmiş Milletler Kalkınma Programı İnsani Gelişme Endeksihttp://file.setav.org/Files/Pdf/bm-kalkinma-programi---turkiye-degerlendirmesi.pdf.

Demir,O.,Duran,S., Üzümcü, A.(2006),” İçsel Büyümede İçselleşme Süreçleri:Türkiye Örneği”,*D.E.Ü.İ.İ.B.F Dergisi,* 21/1: 27-46.

Demirhan, H. (2020), “dLagM: An R package for distributed lag models and ARDL bounds testing”, *PLoS ONE*, 15/2: 1-23.

Devarajan, S., V. Swaroop V., H. Zou (1996), “The Composition of Public Expenditure and Economic Growth”, *Journal of Monetary Economics*, 37/2: 313-344.

Doğan, S., Şanlı, B. (2003), “İktisadi Kalkınmada Beşeri Sermaye”, *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi,* 8/1: 173-196.

Doyar, B. V., (2019), “Akdeniz Bölgesi İlleri Kapsamında Yükseköğretim ve Reel Gelir Değişkenlerinin Panel Nedensellik Analizi*”, Uygulamalı Sosyal Bilimler Dergisi*, 1/1: 21-29.

Erdem, E., Tuğcu, C. (2015), “Higher Education and Economic Growth: An Emprical Investigation of Cointegration and Casusality for Turkish Economy”,*Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 0/36: 1-14.

Eriçok, R.E. ve Yılancı, V. (2013), “ Eğitim harcamaları ve ekonomik büyüme ilişkisi: Sınır testi yaklaşımı”, *Bilgi Ekonomisi ve Yönetimi Dergisi*, 8/1: 87-101.

Eser, K., Gökmen, Ç.E (2009). “Beşeri Sermayenin Ekonomik Gelişme Üzerindeki Etkileri,: Dünya Deneyimi ve Türkiye Üzerindeki Gözlemler”, *Sosyal ve Beşeri Bilimler Dergisi,* 1/2: 41-56.

General Evaluation of Publication Performance in Turkey for the years 2015-2020 - https://yokak.gov.tr/Common/Docs/Site_Activity_Reports/EK4.pdf

Gözgör, G. (2016),“Türkiye Ekonomisinin Rekabetçiliği: Gümrük Birliği Sonrası Dönem İçin Ampirik Bir Değerlendirme”,*İstanbul Medeniyet Üniversitesi Siyasal Bilgiler Fakültesi Dergisi*, 1/2: 13-34.

Güler, M., Soyer, B. (2021). “Yükseköğretimde Yeniden Yapılanma: Türk Yükseköğretiminde Kalite Güvencesi Sisteminin Gelişimi”, *Trakya Üniversitesi Kalite ve Strateji Yönetimi Dergisi,* 1/1: 45-89.

Güneş, E.E. (2009),”İktisat Tarihi Açısından Nüfus Teorileri Ve Politikaları”, *Elektronik Sosyal Bilimler Dergisi*, 8/28: 126-138.

Haller, A. P. (2012), “ Concepts of Economic Growth and Development. Chalenges of Crisis and of Knowledge, *Economy Transdisciplinarity Cognition,*15/1: 66-71.

Hamutoğlu, N. B., Ünveren-Bilgiç, E. N., & Elmas, M. (2020), “Yükseköğretimde kalite süreçleri: insani gelişme endeksi raporlarına göre ülkelerin karşılaştırılmalı olarak incelenmesi,” *Yükseköğretim Dergisi”,* 10/1: 112–124.

Harris, R., Sollis, R. (2003), *Applied Time Series,* John Wiley & Sons.

Hobikoğlu, Elif H. (2011). “Entelektüel Sermayenin Önemi, Sınıflandırılması ve Ölçme Yöntemleri: Kuramsal Bir Çerçeve”. Sosyal Bilimler Dergisi, 1, 86- 99.

Human Development Report (HDR) 2016 ’s Technical Noteshttps://hdr.undp.org/sites/default/files/hdr2016_technical_notes.pdf Accessed February 22, 2022.

https://evds2.tcmb.gov.tr/

Milli Eğitim Bakanlığı- Strateji Geliştirme Başkanlığı (2021). “2021 Yılı Bütçe Raporu https://sgb.meb.gov.tr/meb_iys_dosyalar/2020_12/30125920_2021_BUTCE_SUNUYU.pdf

Milli Eğitim Bakanlığı- Strateji Geliştirme Başkanlığı (2007). “2007 Yılı Bütçe Raporu https://sgb.meb.gov.tr/e-kutuphane/butcesunuslari/butcesunusu_2007/html5/index.html?&locale=TRK&pn=15

Idrees, A.S. ve Siddiqi, M.W. (2013), “Does public education expenditure cause economic growth? comparison of developed and developing countries”, *Pakistan Journal of Commerce and Social Science*s, 7/1: 174-183.

Işık, S. ve Beykoz, S.Y. (2018), “Türk Yükseköğretiminde Yeni Bir Arayış, Kalite Güvence Sistemi”, *Kastamonu Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 20/3:7-22.

Karagül, M. (2003), Beşeri Sermayenin Ekonomik Büyümeyle İlişkisi Ve Etkin Kullanımı”, *Akdeniz İ.İ.B.F. Dergisi*(5), 79-90.

Kutlar, A. (2000), *Ekonometrik Zaman Serileri: Teori ve Uygulama*, Ankara: Gazi Kitap Evi.

Monteils, M.(2002), ”Education and Economic Growth: Endogenous Growth Theory Test. The French Case”, *Historical Social Research*, 27/4: 93-107.

Özçakır, D. (2020, 12 August), "Malthus and Limits of Population Growth".https://thefeasjournal.com/2020/08/12/malthus-and-limits-of-population-growth/

Özdemir, S., Boyacı, A., Kılınç, A. Ç. ve Koşar, S. (2019), " Türk yükseköğretim sistemi bağlamında girişimci üniversite modelinin incelenmesi: Nitel bir araştırma", *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi*, 39/2:989-1027.

Özgüven, A. (1984), *İktisadi Düşünceler-Doktrinler ve Teoriler*, Filiz Kitabevi

Özsoy, C. (2008), "Türk Yükseköğretim Sisteminin Durumu ve İktisadi Büyüme Performansına Katkısı", *Niğde Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 1/2: 31- 48.

Pamuk M., Bektaş H. (2014), "Türkiye'de Eğitim Harcamaları ve Ekonomik Büyüme Arasındaki İlişki: ARDL Sınır Testi Yaklaşımı", *Siyaset, Ekonomi ve Yönetim Araştırmaları Dergisi,* 2/2: 77-90.

Riasat S., R. M. Atif, K. Zaman (2011), "Measuring The Impact of Educational Expenditures on Economic Growth: Evidence from Pakistan", *Educational Research*, 2/13: 1839–1846.

Romer, P.M.(1994)," The Origins of Endogenous Growth, " *Journal of Economic Perspectives*", 8/1:3-22.

Sandmo, A. (2014), "Adam Smith and Modern Economics", "*NHH Deparment of Economics Discussion Paper No.13*:1-22.

Schindler, L., Puls-Elvidge, S., Welzant, H., & Crawford, L. (2015)." Definitions of Quality In Higher Education: A synthesis of the literature", *Higher Learning Research Communications*, 5/3: 3-13.

Schultz, T. W. (1968). "Education and Economic Growth: Return to Education", Readings in the Economics of Education, UNESCO, France, pp.277-292.

Sevütekin, M., Çınar, M. (2017), *Ekonometrik Zaman Serileri Analiz*i, Trabzon: Celepler Yayın ve Dağıtım.

Solaki, M. (2013), "Relationship between education and GDP growth: A bi-variate causality analysis for Greece", *International Journal of Economic Practices and Theories*, 3/2: 133-139.

Soysal Y., Radmard S., Kutluca A. Y., Ertepınar H., Ortaç F. R., Akdemir Z. G., & Türk Z., (2019), "Türkiye yükseköğretimindeki kavramsal, olgusal, tematik ve yöntembilimsel tercihler", *Yükseköğretim ve Bilim Dergisi,* 9/1: 17-36.

Steinsson, J.(2021). Malthus and Pre- Industrial Stagnation - https://eml.berkeley.edu/~jsteinsson/teaching/malthus.pdf

Şen, H., Kaya, A, Alpaslan, B. (2018), "Education, Health, and Economic Growth Nexus: A Bootstrap Panel Granger Causality Analysis for Developing Countries", *Sosyoekonomi,* 26/36: 125-144.

Şimşek, T. (2017), "Türkiye'de Eğitim Harcaması ve Ekonomik Büyüme: ARDL Sınır Testi", *Enderun Dergisi*, 1/1: 54-60.

Taban, S. (2008). *İktisadi Büyüme Kavram ve Modeller* (1. Basım), Ankara: Nobel Yayın Dağıtım.

Tanyeri,İ. (2000)," David Ricardo'nun İktisadi Analizi Üzerine", *H.Ü. İktisadi Bilimler Fakültesi Dergisi*, 18/2:1-15.

Taş, U., Yenilmez, F. (2008), " Türkiye'de Eğitimin Kalkınma Üzerindeki Rolü ve Eğitim Yatırımlarının Geri Dönüş Oranı", *Eskişehir Osmangazi Üniversitesi Sosyal Bilimler Dergisi*, 9/1: 155-186.

Tezsürücü, D., Bursalıoğlu, S.A.(2013), "Yükseköğretimde Değişim: Kalite Arayışları", *Kahramanmaraş Sütçü İmam Üniversitesi Sosyal Bilimler Dergisi*, 10/2: 97- 108.

Thurow, L. C. (1970). "Investment in Human Capital". California: Wadworth Publishing Company

Uçak, A. (2015). "Adam Smith: The Inspirer of Modern Growth Theories", *Procedia-Social and Behavioral Sciences,* 195: 663-672.

Uçan, O., Yeşilyurt, H. (2016), "Türkiye'de Eğitim Harcamaları ve Büyüme İlişkisi, *Niğde Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 9/2: 179-185.

UNDP (1990). United Nations Development Programme. *In Human Development Report 1990 https://hdr.undp.org/system/files/documents//hdr1990encompletenostatspdf.pdf* Accessed February 21, 2022.

Ünsal, E. M. (2016), *İktisadi Büyüme* (2.baskı)*,* BB101 Yayınları.

Yamak, R., Erdem, H.F. (2017). Uygulamalı Zaman Serisi Analizi. Trabzon: Celepler Yayın ve Dağıtım.

Yetik, H. (2018), "Beşeri Sermaye ve Eğitim", *Ekonomi, Yönetim ve Sosyal Araştırmalar Dergisi,* 3/1: 37-52.

Yıldırım, D.Ç., Yumuşak, İ.G. (2009), "Sağlık Harcamaları İktisadi Büyüme İlişkisi Üzerine Ekonometrik Bir İnceleme", *The Journal of Knowledge Economy & Knowledge Management*", 4/1: 57-70.

Yıldız, E. (2017), "Türkiye'de 1923-2016 Dönemi Yükseköğretim ve Ekonomik Büyüme İlişkisi, *Researcher*, 5/3: 112-125.

Yılmaz, D., V.(2016), " Türkiyedeki Devlet Üniversitelerinde Uluslararasılaşma Süreci: Stratejik Planlar Üzerinden Bir Değerlendirme" *Süleyman Demirel İktisadi ve İdari Bilimler Fakültesi Dergisi*, 21/4: 1191-1212.

YÖK (2007), " Türkiye'nin Yüseköğretim Stratejisi"- https://www.yok.gov.tr/Documents/Yayinlar/Yayinlarimiz/Turkiyenin-yuksekogretim-stratejisi.pdf

2015-2020 Yılları Türkiye Yayın Performansı Genel Değerlendirmesi-

https://yokak.gov.tr/Common/Docs/Site_Activity_Reports/EK4.pdf

Wooldridge, J.M. (2013). *Introductory econometrics: A modern approach (5th ed.)*. Mason, OH: South-Western, Cengage Learning

APPENDIX

Appendix 1. Correlogram

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	-0.086	-0.086	0.2903	0.590
		2	0.024	0.016	0.3128	0.855
		3	-0.091	-0.089	0.6597	0.883
		4	-0.148	-0.166	1.5952	0.810
		5	-0.068	-0.098	1.8012	0.876
		6	-0.249	-0.285	4.6297	0.592
		7	0.042	-0.062	4.7126	0.695
		8	0.075	0.023	4.9896	0.759
		9	-0.097	-0.198	5.4640	0.792
		10	0.065	-0.084	5.6846	0.841
		11	0.029	-0.031	5.7294	0.891
		12	-0.179	-0.337	7.5571	0.819
		13	0.075	-0.068	7.8879	0.851
		14	-0.014	-0.063	7.8999	0.894
		15	0.182	-0.007	10.054	0.816
		16	-0.068	-0.165	10.375	0.846

Appendix 2. Constrained Error Correction Model Findings

Değişken	Katsayı	Standart Hata	t	p
Sabit	3.400089	1.001705	3.394302	0.0022
Log(GDPt-1)	-0.577183	0.112865	-5.113909	0.0000
Log(EDUt-1)	0.085054	0.024398	3.486093	0.0018
Log(IMP/EXPt-1)	-0.607979	0.214125	-2.839360	0.0087
Log(DYYt-1)	0.084118	0.031926	2.634760	0.0140
ΔLog(EDUt-1)	0.178671	0.114300	1.563176	0.1301
ΔLog(EDUt-2)	-0.028949	0.106886	-0.270844	0.7886
ΔLog(EDUt-3)	-0.030570	0.109139	-0.280097	0.7816

ΔLog(EDUt-1)	-0.370980	0.105760	-3.507766	0.0017
ΔLog(IMP/EXPt-1)	-0.859035	0.140540	-6.112390	0.0000