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MASTER'S THESIS

**THE IMPACT OF TAX REVENUES ON
ECONOMIC GROWTH: THE CASE OF TURKEY
DURING THE 1994, 2001 AND 2008 CRISES**

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ABSTRACT

THE IMPACT OF TAX REVENUES ON ECONOMIC GROWTH: THE CASE OF TURKEY DURING THE 1994, 2001 AND 2008 CRISES

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Taxes are one of the most important financing sources of government. In addition, taxes are also the main tool of fiscal policy. In order for government to reach their its several economic targets through fiscal policy, tax policy becomes determining besides the spending option. There is a solid relationship between tax policy and the economic growth policy of government. For this reason, the effect of tax on the growth rates of countries and the policies to be implemented have been the subject of many economic growth models, especially since the period after the post second world war. Although there is a consensus in the literature that taxes can influence economic growth the economic crises that occurred after the 1990s resulted in the redesign of tax policies. As a matter of fact, the economic crises that occurred in recent years have led to changes in the tax policy in Turkey.

In this thesis, we examine whether there is an interaction between tax revenues and economic growth, with a specific focus on the 1994, 2001 and 2008 crises in Turkey. The main theoretical framework is in the line of study by Mankiw, Romer and Weil (MRW) model. We conduct the time series analysis based on data on taxes and economic growth of Turkey for the period 1985-2015.

We found that there is a positive relationship between tax revenues and economic growth in 1994, 2001 and 2008 crises. In all three crises positive relationship was detected both in the short term and in the long term. On the other hand, if there is a deviation from the equilibrium in the short term in all three models, equilibrium is restored in one year or less time.

As a result, has been determined by the results of the regression analysis that the effect of tax revenues on economic growth in 1994, 2001 and 2008 crises was positive.

Keywords: Economic crises, tax, tax revenues, economic growth, time series analysis, Mankiw-Romer-Weil Model



öz

VERGİ GELİRLERİNİN EKONOMİK BÜYÜMEYE ETKİSİ: 1994, 2001 VE 2008 KRİZLERİNDE TÜRKİYE ÖRNEĞİ

OSMAN YEREBASAN

Vergiler devletin en önemli finansman kaynaklarından biridir. Ayrıca vergiler maliye politikasının da temel aracıdır. Devletin maliye politikası aracılığıyla çeşitli ekonomik hedeflerine ulaşabilmesi için harcama seçeneğinin yanı sıra vergi politikası da belirleyici olmaktadır. Vergi politikası ile hükümetin ekonomik büyüme politikası arasında güçlü bir ilişki vardır. Bu nedenle vergilerin ülkelerin büyüme oranları üzerindeki etkisi ve uygulanacak politikalar, özellikle ikinci dünya savaşı sonrası dönemden itibaren birçok ekonomik büyüme modeline konu olmuştur. Literatürde vergilerin ekonomik büyümeyi etkileyebileceği konusunda fikir birliği olmasına rağmen 1990'lı yıllardan sonra ortaya çıkan ekonomik krizler, vergi politikalarının yeniden tasarlanmasına neden olmuştur. Nitekim son yıllarda yaşanan ekonomik krizler, Türkiye'de de vergi politikasında değişikliklere yol açmıştır.

Bu tezde, Türkiye'de 1994, 2001 ve 2008 krizlerinin yaşandığı yıllarda vergi gelirleri ile ekonomik büyüme arasında bir ilişki olup olmadığı incelenmiştir. Ana teorik çerçeve, Mankiw, Romer ve Weil (MRW) modeli ile yapılan çalışma doğrultusunda oluşturulmuştur. Oluşturulan ekonometrik modelde 1985-2015 dönemi için Türkiye'nin vergi ve ekonomik büyümesine ilişkin yıllık verilere dayalı zaman serisi analizi kullanılmıştır.

Analiz neticesinde 1994, 2001 ve 2008 krizlerinde vergi gelirleri ile ekonomik büyüme arasında pozitif bir ilişki olduğu sonucuna ulaşılmıştır. Her üç krizde de hem kısa dönemde hem de uzun dönemde pozitif ilişki tespit edilmiştir. Öte yandan, her üç modelde de kısa dönemde dengeden sapma olması durumunda tekrar dengenin tesis edilmesi bir yıl veya daha kısa sürmektedir.

Sonuç olarak, 1994, 2001 ve 2008 krizlerinde vergi gelirlerinin ekonomik büyüme üzerindeki etkisinin pozitif olduğu regresyon analizi sonuçları ile tespit edilmiştir.

Anahtar kelimeler: Ekonomik kriz, vergi, vergi gelirleri, ekonomik büyüme, zaman serileri analizi, Mankiw-Romer-Weil Modeli



FOREWORD

In the thesis, the effects of tax revenues, which is one of the most important subjects of economics, on economic growth have been investigated. In addition, was aimed to contribute to the literature by including the economic crisis factor in the analysis. In this context, relationship between the national and global crises experienced after the 1980s, when the economy in Turkey was made open to the outside, and tax revenues and economic growth was found worth examining.

From the beginning to the end of this study I would like to express my endless thanks to dear teacher and advisor, Dr. Türkan TURAN guided me and did not spare her support, knowledge and experience. I would also like to thank Prof. Dr. Hasan VERGİL contributed to the contribution of a different perspective to our thesis and whose ideas I consulted throughout the thesis.

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LIST OF ABBREVIATIONS

ADF Test	: Augmented Dickey and Fuller Test
CBRT's	: Central Bank of the Republic of Turkey
ECM	: Error Correction Model
EU	: European Union
GDP	: Gross Domestic Product
GNP	: Gross National Product
HC	: Human Capital
IMF	: International Monetary Fund
MPL	: Marginal Product of Labor
OECD	: Organization for Economic Co-Operation and Development
PEE	: Public Economic Enterprise
R&D	: Research and Development
US	: United States
VAT	: Value-Added Tax

INTRODUCTION

In general terms, economic crises are associated with decreases in employment and production, leading to decreases in the level of welfare. Therefore, economic crises interrupt the long run economic growth, which ultimately lowers the level of welfare. Economic crises disrupt the decision making processes in all markets. Crises that emerged after the 1990s have led to deterioration in the terms of trade all over the world. They have also brought forth adverse effects in the financial markets.

Economic crises occur in all countries from time to time. Turkey has survived many periods of economic crises that deeply affected its economy. It has implemented various monetary and fiscal policies in order to counteract these crises. In fact, the country has heavily suffered from fiscal deficits during the crises. In tackling these deficit problems, it implemented economic programs which incorporated increases in tax revenues. Consequently, public deficits could be reduced to sustainable levels.

Taxes constitute the major source of income of governments throughout history. The role of the government in the modern world manifests itself in much different ways than in history. In our age, the regulation of economic life and the elimination of social differences between individuals have come to the fore front among the duties of governments. In response, governments have begun to use taxes as a more effective instrument while performing their duties. Both the diversification of the responsibility areas of governments and the expansion of their organizational structures have further increased the importance of taxes. Undoubtedly, the highest share in public revenues belongs to taxes. Therefore, it is inevitable to use it as an effective tool of fiscal policy.

In addition to their traditional and modern -much more comprehensive- functions, taxes affect the economic growth to a great extent. For this reason, we investigate the relationship between, tax revenues, crises and economic growth. We take the Mankiw, Romer and Weil (MRW) growth model as our theoretical basis and proceed within the confines of the model, also known as “Extended Solow Model.”

Our main reason for using the MRW model is its being an human capital-extended version of the Solow model. Solow model is, as is known to all, forms the basis of modern growth theories. Besides, the human capital-extended Solow model has been increasingly used in understanding the contemporary growth process all over the world.

Our primary research question in the study is about the relationships between crises, tax revenues and economic growth. We question the possibility of curing recessions and promoting economic growth by raising tax revenues. We further question the role of taxation during the national and the global crises. To be able to see in what way changing the tax revenues affects the performance of the economy during the domestic and global crises and in the long run, we examine the three major crises the Turkish economy experienced at great length. The crises in question occurred in 1994, 2001, and 2008, respectively. We conduct time series analysis by using annual data from data sources such as TURKSTAT, World Bank, and PWD.

Our thesis study consists of five chapters. In the first chapter, the concept of economic growth, which is a dependent variable in the model, and the independent variables: capital stock, labor force, human capital, tax income are explained. Finally, the concept of economic crisis and the 1994-2001-2008 crises are explained.

In the second chapter, relations between economic growth and tax revenues in Turkey and OECD countries are discussed. Relationship between tax revenues and growth rates in various years has been discussed for many different countries and various evaluations have been made. In addition, tax structure and growth relationship are discussed within the framework of Turkey's five-year development plans. Evaluations were made about the tax structure for growth.

In the third chapter, literature review was made. Theoretical and empirical studies examining the relationship between tax revenues and economic growth have been examined. The findings obtained within the framework of these studies; evaluated in terms of purpose, scope, method and result.

Fourth section is the section where the econometric analysis part is explained to test the stated hypothesis. Growth model and data set used in the analysis are

explained. Afterwards, a different model was established for each crisis period by means of dummy variables. In this way, with the help of three models, the relationship between tax and growth in crisis periods was examined. After the models were established, information about the confidence tests and the results of the short and long-term analysis were given.

Finally, in the conclusions, regression results obtained are summarized and comments, evaluations and suggestions are made regarding these results.



CHAPTER ONE

DEFINITION OF ECONOMIC GROWTH AND CAPITAL STOCK, LABOR, HUMAN CAPITAL, TAX INCOME AND ECONOMIC CRISES IN A CONCEPTUAL FRAMEWORK

1.1. Economic Growth

Economic growth, in general terms, is an increase in the amount of production of an economy. In order to determine whether economic growth has taken place in a country, it is usually checked whether the real gross domestic product of that country's economy has increased. Indicator used to measure production in the economy is real gross domestic product. Increases in real GDP indicate economic growth. Increase in real gross domestic product is mainly due to the increase in two groups of factors. The first group includes the factors of production (labour, physical capital, human capital and entrepreneurial power) owned by the economy. The second group includes technological development. If the productivity of factors increases as a result of technological development, growth will be positively affected. In addition, the increase in the country's natural resources also positively affects growth¹.

Gross domestic product, which is used as an important indicator in measuring economic growth, is the monetary value of all final goods and services produced by the factors of production in a country in a given time period. GDP includes all goods produced in an economy and legally sold in markets. In other words, Turkey's GDP is the market price of all goods and services produced in Turkey in a certain period of time².

Economic growth refers to changes in real GDP rather than nominal GDP. Nominal GDP increases for two reasons. An increase in the amount of production and/or an increase in the prices of the goods or services produced. Real gross domestic

¹Turan, Türkan. **İktisadi Büyüme Teorisine Giriş**. 2008, pp. 11.

²Parasız, İlker. **İktisada Giriş**. 2010, pp. 279-281.

product, on the other hand, provides the opportunity to measure the change in physical production (the monetary value of the real increase in national product) between periods by evaluating the goods and services produced in different periods at the same prices. For this reason, the increase in the level value of real gross domestic product as of a certain period is expressed as economic growth³.

1.2. Capital Stock

In the historical process, many different sources that determine economic growth have been emphasized. Number and quality of the production factors of the countries are among the factors that determine the growth. Growth of a country's economy is closely related to capital stock⁴.

Consideration that capital accumulation forms the basis of economic development goes back to A. Smith. According to A. Smith, realization of specialization and division of labor, which is of great importance in ensuring economic growth and productivity increase, requires capital accumulation. Capital accumulation has been one of the center points of K. Marx's analysis as well as Smiths. K. Marx attributed importance to the concept of capital accumulation, starting from the mechanization process of production that will emerge depending on capital accumulation. In addition to the classical economists, in the Keynesian and Post-Keynesian economics tradition, capital stock and investments are considered as the essentiality of economic growth. In post-Keynesian approach, increase in demand stimulates investments, and productivity and economic growth accelerate due to the internal and external economies that will emerge as a result of investments⁵.

Capital stock includes all machinery and equipment in the economy, factories, production facilities, service facilities and residences. Productive capacity of the economy expands through the use of capital goods, thereby accelerating economic

³ Azgün, Sabri. **Büyüme ve Kalkınma İktisadı**. 2022, pp. 25.

⁴ Biçer, Ömer Faruk. **Yükselen Piyasa Ekonomilerinde Sıcak Para Hareketlerine Bağımlılık Ve İktisadi Büyüme**. 2018, pp. 9-10.

⁵ DPT: **Türkiye Ekonomisinden Sermaye Birikimi, Verimlilik ve Büyüme**. 2005, pp. 6.

growth. Because increase in capital stock will increase production, expansion and growth will occur in the economy ⁶.

1.3. Labor Force

Before defining the labor, is necessary to define the active population in a country. Active population is the population formed as a result of the exclusion of those residing in institutions such as hospitals, nursing homes, prisons, barracks or army houses from the total population. Among the active population, there are business in any job and the unemployed. Those who work in a job within the active population and the unemployed who want to work at the current wage level but cannot find a job constitute the total workforce. Concept of labor has a very important place in the realization of economic growth ⁷.

If we examine the effect of the increase in the amount of labour on output, that is, if the amount of labour increases by ΔL units, how much does output increase? The marginal product of labour, MPL, show how much output changes as labour increases by 1 unit. Well:

$$MPL = F(K, L + 1) - F(K, L) \dots \dots \dots (1)$$

Therefore, when the amount of labor increases by ΔL units, output increases by approximately $MPL \times \Delta L$. For example, suppose the marginal product of labour is 2; that is, an additional unit of labour increases the amount of output produced by 2 units. If increase the amount of labor by 10 units, can calculate the additional amount of output as follows:

$$\begin{aligned} \Delta Y &= MPL \times \Delta L \\ &= 2 \frac{\text{units of output}}{\text{unit of labor}} \times 10 \text{ units of labour} \\ &= 20 \text{ units of output} \end{aligned}$$

⁶Yıldırım, Kemal. **Makro Ekonomi**. 2019, pp. 515-530.

⁷ Sekmen, Fuat. **500 SORUDA MAKRO İKTİSAT**. 2016, pp.135.

By increasing labour by 10 units, we obtain 20 more units of output. Thus, we use the marginal product of labour to convert changes in labour into changes in output⁸.

1.4. Human Capital

Concept of human capital explained as the sum of features such as experience, knowledge and skills that enable more efficient use of production factors. Just as concepts such as factory, equipment and vehicle stock come to the fore in physical capital, the productivity skills, areas of expertise, experience and knowledge of the workforce come to the fore in human capital. With the development of these capabilities, productivity per capita increases and an internal resource for economic growth is created. Development of human capital provides very important contributions to economic growth in increasing the productivity of individuals and thus increasing the total output.

Today, human resources are considered by some to be the primary source of the wealth of nations. A country's physical capital and natural resources are passive factors that contribute to production. Human capital, on the other hand, are factors with an active character that have an important role in increasing economic growth, developing and supporting with internal factors.

Human capital are the energy, capability and knowledge that can be applied to inert physical factors to produce goods and services. Lucas, in study in 1988, emphasizes that human capital, which he defines as the physical, intellectual and technical capacity of individuals, is the primary impulse of growth. Like physical capital, human capital can also be accumulated. Lucas' model;

$$Y = K^{\alpha} (hL)^{1-\alpha} \dots\dots\dots(2)$$

Y is output, K is capital and L is labor force. h stands for human capital per capita. Lucas defined human capital h as:

$$h=(1-u)\dots\dots\dots(3)$$

⁸ Mankiw. **Macroeconomics**. 2010, pp. 247-248.

u stands for time spent on work and $1-u$ stands for time spent on accumulating skill. When the equation is interpreted, an increase in the time spent on human capital accumulation will increase the growth rate of human capital. Therefore, an increase in the h coefficient will lead to an increase in output, as can be seen in equation 2, and will be the driving force of growth⁹.

1.5. Tax Revenues

Tax has a history as old as human history. In ancient times, tax was accepted as a debt that the defeated had to pay to the victors, and a part of the income and wealth of the defeated were taken under the name of "tribute". In the years before Christ; taxes, which had various applications in Egyptian, Greek and Roman civilizations and were the main source of income, lost these attributes to a great extent in the Middle Ages and turned into an extraordinary source of income. In the medieval period, tax was applied in an exceptional way and its meaning changed. Taxes this period has started to be used to express the values that the members of the society give a part of their wealth or income to the rulers in the form of 'gifts' or the values that the rulers receive from the individuals under the name of 'help'¹⁰.

Voluntary aid or donations made by people to people such as tribal chiefs and overlords before they become a state can be considered as the first forms of tax. Although tax was thought to be based on voluntarism in these periods, with the establishment of state mechanisms over the years, tax has become a compulsory payment. When the tax subject matter is evaluated in terms of Turkey, first of all, is necessary to mention the constitution. Article 73 of our constitution defines paying taxes as a "duty". In the constitution, "tax duty" is defined as; "Everyone is obliged to pay taxes according to their economical power in order to finance the public expenditure. A fair and balanced distribution of the tax burden is the social goal of fiscal policy. Taxes, duties, fees and similar obligations are imposed, changed or

⁹Robert, E. Lucas Jr. **On The Mechanics Of Economic Development**. University of Chicago, USA, Received August 1987, final version received February 1988 1988, pp. 17-27.

¹⁰ Akdoğan, Abdurrahman. **Kamu Maliyesi**. 2009, pp. 127.

removed by law"¹¹. Conclusion to be drawn from the expressions in the constitution In Turkey, taxes are accepted as compulsory payments.

Tax is undoubtedly the most important and foremost of the public revenue types. Share of revenues collected by the government through taxation in total public revenues occupies an important place between 70% and 90% in many countries¹².

High ratio of tax revenues to public revenues has been criticized by some economists. Study of Barro on the effect of financing public expenditures with taxes on production and utility functions draws attention. According to Barro, maximizing the growth rate in a perfectly competitive market depends on the fact that the share of public expenditures in GDP is equal to the public services provided/GDP ratio. Thus, education, health, infrastructure investments, promotion of R&D studies and public services will be at the most appropriate level. He thinks that more government activity in that type of infrastructure is good for growth and investment in the beginning, because anarchy is a burden for private production. However, as the government expands, there will be an increase in the tax rate and this increase will cause a decrease in private sector investment. This will happen eventually. Government, which needs tax revenues to finance public expenditures, will expand in this way causes a negative situation for growth rate¹³.

In addition to the classical financial functions of financing public expenditures mentioned above, taxes have a great potential to realize social justice through taxes by reducing inequalities in income distribution, supporting social production, investment decisions, supporting competition in the economy, improving scientific and technological progress. When the income policies of governments are examined, in recent years, is determined that the aim of generating income continues on the one hand, and on the other hand, methods that emphasize social life, justice and equality of opportunity are applied. For this reason, when designing tax policies of governments; has been determined that both economic and social functions such as

¹¹ Constitution of the Republic of Turkey. Article 73.

¹²Pehlivan, Osman. **Kamu Maliyesi**. 2004, pp. 95.

¹³ Barro, Robert J. **Government Spending in a Simple Model of Endogeneous Growth**. University of Harvard, Journal of Political Economy, 1990, pp. 103-125.

combating current account deficit, combating unregistered economic activities, strengthening justice, equality, stability and predictability in taxation are considered together¹⁴.

1.6. Economic Crisis and Crises in 1994-2001-2008

In economic context, concept of crisis defined as a transition from the expansion period in the economic conjuncture to a long or short depression or contraction phase. In other words, defined as the transition of the economy from an equilibrium state to an unstable state or from a stable state to an unstable state¹⁵.

Instability in economies causes capital flight and financial crises with the strengthening of the belief that economic parameters cannot be sustained. Concept of financial crisis includes panics in the banking sector as well as decreases in asset prices, failures of financial and non-financial institutions, distortions in the foreign exchange market and other similar macroeconomic developments¹⁶.

Financial crises basically divided into four groups. The first is currency crises. These are the crises in which the country's currency depreciates significantly with a speculative attack against the country's currency and the public authority starts to use its international reserves to defend the exchange rate or tries to defend its currency with a sharp increase in domestic interest rates. The second is the banking crisis. These were the crises that emerged when the banks that were or might become bankrupt lost their ability to fulfill their obligations or the public had to support them with large-scale interventions. The third type of financial crisis is systemic financial crisis. These are the crises that occur when the financial markets are exposed to distortions in such a way that they cannot function effectively and these disruptions damage the real sector. The fourth type of financial crisis is the foreign debt crisis. In this type of crisis, a country becomes unable to pay its private or public sector external debts. All these types of financial crises can occur together or trigger each other¹⁷.

¹⁴ Kalkınma Bakanlığı. **11. Kalkınma Planı Çalışma Grubu Raporu**. 2018, pp. 30.

¹⁵ Kaykusuz, Murat. **İktisadi Kriz Teorileri**. 2016, pp.4.

¹⁶ Özçelebi, Oğuzhan. **Finansal Kriz Modelleri**. 2018, pp. 3-4.

¹⁷ IMF. **World Economic Outlook. 1998, Chapter IV**. pp. 74-97.

After 1980, when the free market economy was determined, the Turkish economy experienced four major crises in 1994, 2001 and 2008.

1.6.1. 1994 Financial Crisis

First deep financial crisis experienced by the Turkish economy after 1980 was the 1994 crises. Although economic problems lie on the basis of the financial crisis, whether is caused by internal or external factors, political, sociological and even psychological factors may pave the way for a crisis to occur. In other words, these factors may trigger the crises by causing the deteriorated macroeconomic balances to deteriorate further or the expectations for the future of the economy/country to turn negative. In this context, both political, economic and psychological reasons such as terrorist incidents in Turkey in these years, cessation of investments, and decrease in foreign capital investments caused the disruptions in the financial market to grow even more in 1994¹⁸.

Main reason for the crisis that occurred in 1994: Increasing domestic interest rates due to the rising public deficits accelerated the inflow of hot money and caused the Turkish Lira to appreciate in real terms. This development, combined with the real increases in labour costs and the decrease in direct and indirect export incentives, caused the Turkish economy to lose its competitiveness rapidly. Consequently, internal instability of the economy caused by high public deficits caused a rapid deterioration in the external equilibrium, imports increased, exports slowed down and foreign trade deficits reached significant dimensions. Quickly deteriorating internal and external balances led to a serious crisis in the money, capital and foreign exchange markets at the beginning of 1994. Economic Measures Implementation Plan was put into effect on April 5, 1994 in order to stabilize the economy rapidly, narrow the public deficits, create a growth structure based on external demand, and initiate structural reforms that will sustain economic stability¹⁹.

¹⁸ Çakmak, Umut. **Türkiye Ekonomisinde Kriz Dinamikleri**. 2020, pp. 99-103.

¹⁹Kalkınma Bakanlığı. **7. Kalkınma Planı**. 1995, pp. 5.

In addition to the adoption of tight monetary and fiscal policies in the 5 April 1994 Stabilization Program, the PEE(public economic enterprise) product prices were frozen for six months after they were significantly increased, wage increases were made at a very low level in April, then none in July. Was decided that wage increases would be detached from the indexation of the previous period's inflation rate and limited within the framework of forward-looking targets and budgetary possibilities. Also includes stabilization measures such as using the exchange rate as an anchor and keeping the exchange rate increases below the inflation rate in order to control inflation. With the Stability Program of April 5, 1994, it was envisaged that the state would withdraw from the economy and turn to its main functions of surveillance, supervisory and standard setting²⁰.

The implementation of the 5 April Stability Program was delayed due to the local elections to be held in March 1994 and political interests preceded the need for urgent intervention in the economy. Determination and discipline shown at the beginning in the implementation of the program was distorted due to the possibility of early general elections at the end of the year, even before the end of the year, and the tight monetary policy was abandoned and structural measures were not implemented²¹.

1.6.2. 2001 Financial Crisis

In the early 2000s, Turkey faced two major economic crises. The first of these was the financial crisis that broke out on November 22, 2000. On that date, the overnight borrowing simple interest in the interbank market nearly tripled, jumping to an average of 110.8% and a peak of 210%. In this period, almost all of the rapid inflow of foreign resources was in the form of borrowing. However, the ability to repay foreign debt was gradually decreasing. On the other hand, important decrease was observed in the CBRT's foreign exchange reserves. Turkey managed to repel the intense speculative attack on foreign currency in November 2000 with very high interest rates, significant loss of foreign exchange reserves and an additional \$7.5 billion IMF loan. Defended the exchange rate table at a high cost. But unfortunately

²⁰ DPT. Köse, Saliha. **24 Ocak 1980 ve 5 Nisan 1994 İstikrar Programları Çerçevesinde Yapılan-Hukuki ve Kurumsal Düzenlemelerin Mukayeseli Analizi**. 2000, pp. 141-168.

²¹ DPT. **Planlama Dergisi**, DPT Kuruluşunun 42. Yılı, Özel Sayı. 2002, pp. 126.

defense power against a similar attack that could happen later was greatly reduced. While the November crisis was over, three months later, on February 19, 2001, a discussion between the Prime Minister and the President launched a second speculative attack, and this time the currency crisis began. On February 21, the overnight interest rate in the interbank money market increased to 6200% and averaged 4018.6%. The foreign exchange reserve of the Central Bank, which was \$27.94 billion on February 16, decreased to \$22.58 billion on February 23 and the loss of reserves was \$5.36 billion. In the November crisis, the attack on foreign currency was limited to foreigners, and in the February crisis, the local people, especially the banks, attacked the foreign currency. When the strength to withstand the attack on the foreign exchange was no longer available, CBRT announced that the exchange rate was left to fluctuate on the night of February 21. Exchange rate increase reached 40% in ten days. Crisis in February was the currency crisis and could have been triggered by a different event. Almost reach peak interest rate could not prevent the demand for foreign currency ²².

1.6.3. 2008 Global Crisis

Crisis that occurred in 2008 is a global crisis, unlike the 1994 and 2001 crises. Emerged in the last months of 2008 and adversely affected many countries.

In 2008, so-called global financial crisis broke out. Crisis originated in the USA. It is seen that the triggering event for the crisis that started in the US housing market was bankruptcy of Lehman Brothers, an investment bank, on September 15, 2008. However, crisis that started in the US housing market triggered new crisis floods abroad, causing the crisis to reach a global dimension. Crisis first spread to Western Europe and Japan, and then to many of the rest of the world²³.

Main effects of the crisis; as a result of the increase in the default and foreclosure rates of housing loans at an unprecedented level, negative effects have emerged on the households that are the loan debtors and in the immediate environment where this house is located. Majority of loan borrowers lost their houses. Rate of home

²² Uygur, Ercan. **Krizden Krize Türkiye: 2000 Kasım ve 2001 Şubat Krizleri**. 2001, pp. 1-21.

²³ Krugman, Paul. **The Return of Depression Economics and the Crisis of 2008**. 2015, pp. 160-165.

ownership has decreased across the country. Capacity of financial institutions to extend credit has shrunk and many large financial institutions have been closed due to the financial difficulties faced. Eventually contraction in total demand in the country, the decrease in the production volume, the increase in unemployment and the increase in public borrowing and budget deficits as a result of the measures taken by the Federal government have occurred²⁴.

Turkey is one of the countries that was most affected by the 2008 global crisis and experienced a major collapse in the real sector, especially in the manufacturing industry. Rate of decline in manufacturing, which was 20% in the last months of 2008, is 23.7% in January 2009. On the other hand, companies and domestic banks that benefited from cheap and abundant loans in 2007 and 2008 were faced with the situation of repaying these loans in the autumn of 2008. Credit crunch in the outside world was transferred to the interior. Meanwhile, fund outflows had gone to pull the stock market indices down and the foreign exchange price up. Stagnation in bank loans brought a pause in consumer loans along with increasing unemployment. Thus, consumption expenditures also fell. However, the most serious problem was the jump in the unemployment rate. According to official data, jobless rate in cities increased from 13% in 2008 (January) to 17.2% in 2009. As a result of all these, the GDP, which was 729.4 billion dollars in 2008, decreased to 644.8 billion dollars in 2009²⁵.

Within the framework of financial developments in Turkey and in the world analysis of growth performances and a growth-oriented tax structure is required. For this reason, in the second part of our thesis, tax structures and growth performances in OECD countries and Turkey will be analyzed.

²⁴ Akçay, Belgin. **21. Yüzyılın İlk Finansal Krizi**. 2012, pp.218.

²⁵ Kazgan, Gülten. **Türkiye Ekonomisi 1908-2018**. 2010, pp. 21-27.

CHAPTER TWO

TAX STRUCTURES AND GROWTH PERFORMANCES IN OECD COUNTRIES AND IN TURKEY

2.1. Tax Structure in OECD Countries

Although the tax is a burden on taxpayers because is obtained for free, actually returns to the society as a public service. Due to the burden of tax on society, is necessary to mention the concept of tax burden. Concept of tax burden, which indicating the share of total tax revenue in GDP (Gross Domestic Product), is most important variable used in analyzing the tax structures of countries.

Table 2.1. shows the tax burden rates in OECD countries for the years 2000-2014-2015 and 2016. In addition, is shown what percentage of income tax and corporate tax, which constitute the most important share in tax revenues, constituted in 2015.

Table 2.1. Tax Burden in OECD Countries (% of GDP)

Summary of key tax revenue ratios in OECD countries						
	Tax revenue as % of GDP				Tax revenue as % of total tax revenue in 2015	
	2016p	2015	2014	2000	Taxes on income, individuals (PIT)	Taxes on income, corporates (CIT)
OECD - Average(1)	34,3	34,0	33,9	33,9	24,4	8,9
Australia	..	28,2	27,6	30,4	41,5	15,3
Austria	42,7	43,7	43,1	42,4	24,1	5,2
Belgium	44,2	44,8	45,0	43,5	28,3	7,4
Canada	31,7	32,0	31,2	34,8	36,9	9,9
Chile	20,4	20,5	19,6	18,8	9,8	21,0
Czech Republic	34,0	33,3	33,1	32,4	10,7	10,8
Denmark	45,9	45,9	48,6	46,9	55,2	5,6

Estonia	34,7	33,9	32,8	31,1	17,2	6,2
Finland	44,1	43,9	43,8	45,8	30,2	4,9
France	45,3	45,2	45,3	43,1	18,9	4,6
Germany	37,6	37,1	36,8	36,2	26,5	4,7
Greece	38,6	36,4	35,9	33,4	15,0	5,9
Hungary	39,4	39,0	38,2	38,6	13,7	4,6
Iceland	36,4	36,7	38,6	36,2	36,7	6,5
Ireland	23,0	23,1	28,5	30,8	31,6	11,3
Israel	31,2	31,3	31,1	34,9	19,4	9,5
Italy	42,9	43,3	43,5	40,6	26,0	4,7
Japan	..	30,7	30,3	25,8	18,9	12,3
Korea	26,3	25,2	24,6	21,5	17,2	13,1
Latvia	30,2	29,0	28,8	29,1	20,4	5,5
Luxembourg	37,1	36,8	37,4	36,9	24,5	11,9
Mexico	17,2	16,2	14,2	13,1	20,6	20,1
Netherlands	38,8	37,4	37,5	37,2	20,5	7,2
New Zealand	32,1	33,0	32,4	32,5	38,1	13,8
Norway	38,0	38,3	38,9	41,9	27,9	11,5
Poland	33,6	32,4	32,0	32,9	14,4	5,7
Portugal	34,4	34,6	34,3	31,1	21,2	9,0
Slovak Republic	32,7	32,3	31,2	33,6	9,7	11,5
Slovenia	37,0	36,6	36,5	36,6	14,0	4,0
Spain	33,5	33,8	33,7	33,2	21,3	7,0
Sweden	44,1	43,3	42,6	49,0	29,1	6,9
Switzerland	27,8	27,7	27,0	27,4	31,1	10,8
Turkey	25,5	25,1	24,6	23,6	14,6	5,7
United Kingdom	33,2	32,5	32,2	33,2	27,7	7,5
United States	26,0	26,2	25,9	28,2	40,5	8,5

Source: Data in the table is taken from OECD: Tax revenue trends 1965-2016.

When Table 2.1. is examined the highest tax burden figure in 2000 belongs to Sweden with 49.0%. In 2014-2015 and 2016, the country with the highest tax burden is Denmark. In 2014, the tax burden in Denmark was 48.6%, and in 2015 and 2016 it was 45.9%. The country with the lowest tax burden is Mexico. Tax burden in Mexico is 13.1% in 2000, 14.2% in 2014, 16.2% in 2015 and 17.2% in 2016. Average tax

burden rate in OECD countries was 33.9% in 2000 and 2014, 34.0% in 2015 and 34.3% in 2016.

Between 2000 and 2014, the highest increase in tax burden was in Japan with 4.5%. Between 2015 and 2016, the highest increase in tax burden was observed in Greece with 2.2% points. Considering the countries where tax burden has decreased, the biggest decrease between 2000 and 2014 was in Sweden with 6.4%. Between 2015 and 2016, a decrease of approximately 1% is observed in Austria and New Zealand.

In 2016, 20 OECD countries had an increase in their tax-to-GDP ratio revelation to 2015. In all of this countries, GDP growth was positive, although to a lesser degree than tax revenue growth. Of the thirteen OECD countries that experienced a decline in their tax-to-GDP ratio in 2016, twelve had higher levels of tax revenues, although to a lesser degree than nominal GDP levels; no countries had positive nominal GDP growth and negative tax growth; and one country (Norway) experienced declines in both nominal tax revenues and GDP. In addition, changes between 2014 and 2015 are shown for Australia and Japan, where the tax to GDP ratio is not available in 2016. In both countries, nominal tax revenues grew faster than GDP, leading to increases in the tax-to-GDP ratio²⁶.

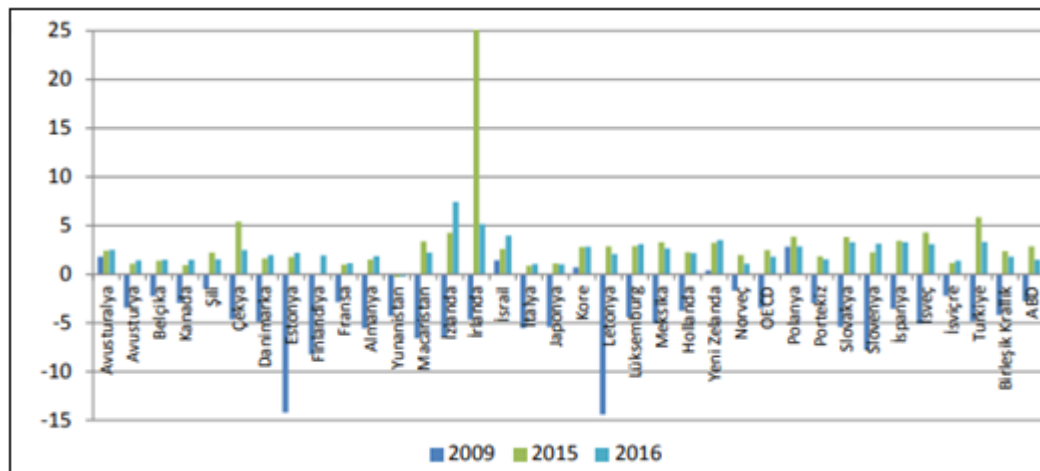
In Table 2.1. income and corporate tax rates, which have the most important share in the distribution of tax revenues in terms of subjects, are also mentioned. Income tax and corporate tax constitute a constraint in terms of savings. This constraint has an impact on investment and therefore on growth. In 2015, the total rate of income and corporate taxes in OECD countries was 33.3%. Country with the highest corporate tax rate is Chile with 21.0%. Country with the lowest rate is Slovenia with 4%. Considering the income tax rates, the country with the highest income is Denmark with 55.2%. Country with the lowest is Slovak Republic.

²⁶ OECD, **Tax revenue trends**. 2017, https://read.oecd-ilibrary.org/taxation/revenue-statistics-1965-2016/tax-revenue-trends-1965-2016_rev_stats-2017-4-en#page4, pp. 18-19.

2.2. Economic Growth in Oecd Countries

Figure 2.1 presents the growth rates of OECD countries in 2009, 2015 and 2016. Due to the negativities experienced behind the 2008 global crisis, negative growth values emerged in some countries in 2009. Estonia, Latvia; Slovenia is some of these countries.

Figure 2.1: Growth in OECD Countries (%)



Source: Ministry of Development Eleventh Development Plan-Growth-Oriented Tacation Working Group Report: 2018:7

According to Figure 2.1, peak of growth in 2015 is Ireland. Turkey and the Czech Republic are the other countries that follow Ireland. There are no negative growth figures this year. In 2016, the country with the highest growth was Iceland. The countries that follow Iceland are Ireland and Israel.

With the 2008-2009 global economic and financial crisis, economic growth performance of OECD countries was adversely affected. In order to correct this situation, member states have used tax as a tool in the last ten years and have turned to tax reforms for this purpose. The common feature of these reforms is to reduce tax rates, ensure efficiency and increase the tax base. Tax reforms observed in OECD countries envisage redesigning tax policies to support growth. In this policy design, it is aimed to increase the growth performance by shifting tax revenue from certain tax issues to other tax issues. When examined from this point of view, empirical studies

and findings related to OECD; taxes with the least disruptive effect on economic growth in the long run are respectively; property taxes, consumption taxes, income and corporate is taxes²⁷.

2.3. Taxation and Economic Growth Reforms in OECD Countries

Much of the discussion of the link between tax structure and economic performance has focused on the effects on growth rate. Taxes that have the most impact on GDP figures are income taxes and corporate taxes. Because these taxes have direct effects on savings and this effect is felt by individuals. However, since to reflect is easy in indirect taxes, this effect may not always be felt to the same extent.

When income taxes are analyzed, is revealed that personal income taxes are more harmful than consumption taxes on growth rates for two reasons. First, they are generally progressive, with marginal tax rates that are higher than their average rates. This means that they discourage growth more per unit of tax revenue than consumption taxes, which are generally flat rate and no t(or not very)progressive. There is evidence that flattening the tax schedule could be beneficial for GDP per capita, notably by favouring entrepreneurship(once again, this implies trade- off between growth and equity) Second, they typically tax the return to savings (interest of dividends) in addition to taxing the income from which savings are made, thus discouraging savings. Corporate income taxes are the most harmful for growth as they discourage the activities of firms that are most important for growth: investment in capital and productivity improvements. In addition, most corporate tax systems have a large number of provisions that create tax advantages for specific activities, typically drawing resources away from the sectors in which they can make the greatest contribution to growth. However, lowering the corporate tax rate substantially below the top personal income tax rate can jeopardize the integrity of the tax system as high-income individuals will attempt to shelter their savings within corporations²⁸.

²⁷ Kalkınma Bakanlığı. **Büyüme Odaklı Vergilendirme**. 2018, pp. 47.

²⁸ OECD. **Tax Policy Reform and Economic Growth**. 2010, https://read.oecd-ilibrary.org/taxation/tax-policy-reform-and-economic-growth_9789264091085-en#page1, pp. 22.

Taxes on consumption (such as VAT), especially if they are broad-based, do not distort business decisions about production techniques and are thus likely to be less damaging to growth. While an increase in VAT is likely to raise the price level, with present margins of unused capacity in many countries, this seems unlikely to have a continuing effect on inflation rates. However, higher prices would reduce the real incomes of individuals with fixed incomes and savers whose accumulated savings would now buy a smaller volume of goods and services. In practice, most OECD countries have kept their standard VAT rates constant for long periods of time, and the OECD average has remained at just under 18% for over a decade²⁹.

For this reason, when income and corporate tax rates in OECD countries are examined, they generate more income from taxes on consumption and taxes on residences. In addition, has been determined that there is a tendency to change the general structure of taxation in order to obtain less income from corporate tax and income tax. In order to keep these rates low, tax bases are being tried to be expanded. Within the framework of the reforms, is observed that the share of tax revenues in GDP tends to decrease in OECD countries in general³⁰.

2.4. Tax Structure and Economic Growth in Turkey

2.4.1. Tax Structure in Turkey

Developments in taxation after the proclamation of the Republic in Turkey are examined, reforms are remarkable. Some of these reforms include the abolition of taxes such as the tithe tax, which poses a great burden on citizens, and some of them include the practices of increasing tax collection through mechanisms such as voluntary tax compliance. In addition, is aimed to reduce the exceptions and exemptions in the Income, Corporate and Value Added Tax Laws by reviewing them to a minimum level and thus increasing the efficiency of investment incentives.

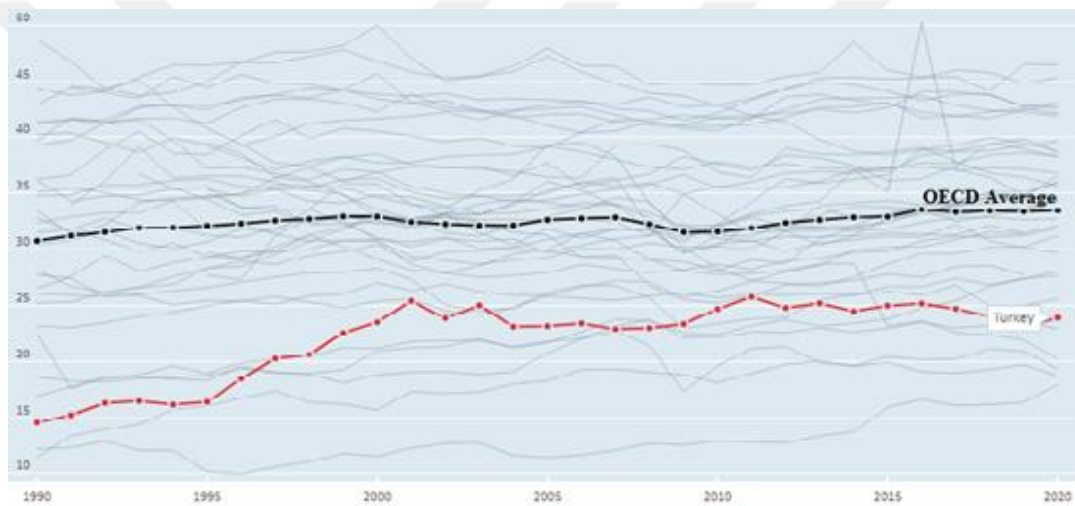
²⁹ OECD. **Tax Policy Reform And Fiscal Consolidation**. 2010, <https://www.oecd.org/ctp/tax-policy/46600079.pdf>, pp. 5.

³⁰ <https://data.oecd.org/tax/tax-on-personal-income.htm#indicator-chart> and <https://data.oecd.org/tax/tax-on-corporate-profits.htm#indicator-chart>.

Considering the negative effects of income and corporate taxes on savings and investments, it is aimed to focus on consumption taxes.

In recent years, new regulations have been made in tax laws in order to harmonize Turkey tax system with EU countries. Since is aimed to attract investments on an international scale to our country, Turkey tax structure has been shaped by the effect of tax competition. As can be seen from Figure 2.2. Turkey is one of the countries with the lowest total tax burden when compared to EU countries.

Figure 2.2: Tax revenue total % of GDP , 1990-2020



Source:OECD data, indicators, Tax revenue total % of GDP

(<https://data.oecd.org/chart/6VWU>)

The tax burden figures in Turkey between 1990 and 2020 are shown in Figure 2.2. Determined from Figure 2.2. that the tax burden in Turkey has increased continuously from the 1990s to the beginning of the 2000s.. Although there were constant fluctuations in the following years, is observed that the tax burden figures in Turkey are well below the average of OECD countries.

2.4.2. Relationship of Tax Burden and Economic Growth in Turkey

Growth plans in Turkey have started to be made systematically with development plans. In the first development plan published in 1963-1967, was aimed to accelerate investment activities on the one hand and to finance the increasing rate of investments with domestic savings on the other hand. Thought is that the increase

in consumption expenditures will be kept within certain limits and the savings will be directed to investments ³¹.

During the plan years, additional efforts were made to increase tax revenues. In this period, changes were made especially in the field of indirect taxes. Tax revenues were increased by enacting new taxes such as Foreign Travel Expenditures Tax and Import Stamp Duty. Conversely, in the field of Indirect Taxes, Motor Vehicles Tax has been introduced, and efforts have been made to increase the Income Tax taken from agricultural earnings³².

In this period, regulations have been made regarding the Income and Corporate tax rates, which have the highest share among tax revenues. While the corporate tax rate was 20% in 1960-1963, started to be applied as 25% with the regulation made in 1964³³. On the other hand, income tax rate has been determined according to the tranches as follows and has been applied for the years 1963-1979³⁴.

<u>Income Tranche (TL)</u>	<u>Tranche Tax Rate (%)</u>
First 2.500	10
next earnings2.500	15
5.000	20
15.000	25
30.000	35
60.000	45
150.000	55
225.000	65
285.000	68

³¹ Kalkınma Bakanlığı. **1. Kalkınma Planı**. 1963, pp. 31-59.

³² Kalkınma Bakanlığı. **2. Kalkınma Planı**. 1968, pp.19.

³³ Tosuner, Mehmet. **1980 Sonrası Türk Vergi Sisteminin Yapısı ve Gelişim**.1989 pp.5.

³⁴ Ergün, Yücel. **Gelir Vergisi Oranlarının Gelişimi**. Maliye Dergisi, Sayı: 40, Temmuz-Ağustos 1979, pp .3-11.

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And more base

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Although there were significant increases in tax rates in the period between 1963 and 1967, when the First Development Plan was valid, both the gross national product and the external deficit realizations fell behind the plan targets. The fact that the gross national product and the current account deficit fell behind the plan targets resulted in the total resources of the economy not reaching the anticipated level, and therefore the plan target in other expenditures could not be reached³⁵.

In 1968, the starting year of the second five-year plan, tax burden was 11.3%. In 1969, it increased to 12.1%. Although there was a decreasing trend in 1970, increased again in the following years and followed a fluctuating course. In 1972, the rate was 10.6%.³⁶ The targeted growth rate in this period was 7%, while the actual growth rate was 6.3%. In addition to economic and political reasons, the increasing tax burden played an important role in staying below the targeted growth rate³⁷.

First oil shock in the world in 1973 and the negative developments due to the Cyprus issue reflected on the domestic market, causing price hikes, an extraordinary growth in public sector deficits, and thus a rapid increase in the need for public finance. Covering the years 1973-1977, III. during the plan period; predicted growth rate of 7.4 percent was realized as 6.5 percent. Again in the same period, growth rate of the gross domestic product (GDP) was targeted as 7.6 percent per year on average, and the realization was 6.9 percent. The oil crisis that emerged at the international level during the 3rd Plan period was effective in not achieving the foreseen target. In addition, due to the developments initiated by the oil crisis in Western economies, where Turkey's relations are intensified, and the bottlenecks in the supply of energy and imported raw materials from time to time, necessary progress has not been achieved in industrial production. Likewise, in the first and last years of the plan period, agricultural

³⁵ Kalkınma Bakanlığı. **2. Kalkınma Planı**, 1968, pp.13-22.

³⁶ OECD. **Stad- Revenue Statistics OECD Countries**: Comparative Tables
<https://stats.oecd.org/index.aspx?DataSetCode=REV>.

³⁷ Kalkınma Bakanlığı. **3. Kalkınma Planı** 1972, pp. 3-24.

production fell behind the target. As a result of all these developments, the plan targets were lagged behind³⁸.

Considering the developments in the tax field in the third development plan period covering the years 1973-1977 except for 1974, a constantly increasing trend was observed in tax burden rates. Negativities experienced in growth rates in this period were also effective in the tax field. Tax policy, which is one of the important fiscal policies in the redistribution of income according to the principles of social justice, did not function in the 3rd Plan period. About 65% of the income tax burden remained on wages and salaries, which account for one-third of total disposable income³⁹.

World economy was rocked by the first oil shock in December 1973, with a nearly 400% rise in oil prices. Before the effects of this shock were overcome in the world, a new oil shock occurred in 1979 with the increase in oil prices by approximately 100%. Turkey did not make any adjustments to prevent the consequences that may occur as a result of the first oil shock. Instead tried to finance the current account deficits caused by the oil shock with reserve movements and short-term borrowing. Tried was to overcome the crisis with radical stabilization measures to be taken. Thus, until 1978, there was a period of unadjusted crisis. Moreover, in the fourth development plan (1979-1983), which came into effect in 1978 with a one-year delay, the growth rate was determined as 8% and the investment rate as 23%. However, the Turkish economy, which was experiencing a great crisis, entered a great recession. As a matter of fact, the growth rates of GNP and GDP were -0.6, -0.5 and -0.4 and 1 in 1979 and 1980, respectively. On the other hand, domestic saving rate, which was 22.5% in 1976, decreased to 16% towards 1980⁴⁰.

Considering the developments in taxation in the period between 1979-1983, the years when the fourth development plan was implemented, was determined that the tax burden increased compared to the previous periods. As a matter of fact, while

³⁸ Kalkınma Bakanlığı. **4. Kalkınma Planı**, 1978, pp. 7.

³⁹ Ibid. pp. 22-23.

⁴⁰ Parasız, Eroğlu. **Türkiye Ekonomisi**, 2017, 224.

the tax burden rate was 11.4% in 1979, initial year of the plan, was 13% in 1980, 13.8% in 1981, 13.4% in 1982 and 12.5% in 1983⁴¹.

Effectiveness of the measures to be taken by the Turkish economy to get out of the economic depression in 1979 was largely dependent on foreign financing. In order to overcome the economic crisis, the governments of the period put into effect two stabilization measures programs, approximately one year apart, in March 1978 and April 1979. However, mentioned economic stabilization measures were not enough to get the Turkish economy out of the depression. In late 1979, as the economic depression widened, the government changed hands. New government opened the package of measures, known as the January 24 Decisions, on January 24, 1980, in order to get the economy out of the depression. The January 24 Stability Program has some features that are not present in the stability programs implemented in Turkey before. Stabilization programs implemented before 1980 generally had short-term aims, and did not aim for radical changes in industrialization and foreign trade policy and the role of the state in the economy. However, when the 24 January Stabilization Program was put into effect, it was intended to be implemented decisively in the long term. Main strategy of the program was to make the market economy operative by minimizing the state intervention in the economy and the economic activities of the state. On the other hand, the import substitution industrialization policy, which has been implemented since the 1930s, has been shifted to an export-oriented industrialization policy. Various decisions were taken to liberalize imports. For example, stamp duty and guarantees received from imports have been significantly reduced, and the number of goods subject to quota has been reduced. From January 1984, nominal customs duties were reduced from an average of 76.3% to 48.9%. In 1980, when the Stability Program was put into practice, there was not a growth in GNP, but a decline of 1.1%. However, since 1981, the economy started to grow again. GNP increased by 4.2% in 1981, 4.6% in 1982 and 3.3% in 1983 at constant prices. When we compare this growth rate with the growth rates in the 1960s and the first half

⁴¹ OECD data, **Tax Revenue** <https://data.oecd.org/tax/tax-revenue.htm#indicator-chart>.

of the 1970s, not possible to find it sufficient. However, it should not be forgotten that after January 24, 1980 is a regulation period⁴².

With the stabilization programs put into practice after the years of economic depression, public infrastructure investments were concentrated on, and studies were carried out for projects with incentives in order to ensure an increase in investments, especially in sectors that increase the country's foreign exchange earning potential. In addition, Value Added Tax, which did not impair the efficiency in resource allocations and simplified the tax system, was introduced in this period. Tax structure was shifted to indirect taxes, the rate of taxes on income was reduced and the incentives for savings were given importance. For this purpose, the tax receivable which was taken at the rate of 1/3 over the corporate tax, which was previously applied as 40%, was abolished in 1985. Instead, corporate earnings are subject to only 46% corporate tax. Consequently all these developments, a rapid economic growth was realized in the 1985 - 1988 period. GNP increased by 6.0% annually on average⁴³.

After 1980, significant increases were achieved in the growth of the GNP, the capacity utilization of the manufacturing industry, export volume, the share of the manufacturing industry in exports and the ratio of foreign trade volume to GNP. Despite these developments in the 1980s, public deficits, chronic high inflation, lack of investment in the manufacturing industry and especially the problems created by the inability to improve the competitive environment remained important. In this environment, rising domestic interest rates due to rising public deficits accelerated the inflow of hot money and caused Turkish Lira to appreciate in real terms. Rapidly deteriorating internal and external balances led to a serious crisis in the money, capital and foreign exchange markets at the beginning of 1994. As a result of all these, the Economic Measures Implementation Plan was put into effect on April 5, 1994 in order to stabilize the economy rapidly, narrow the public deficits, create a growth structure based on external demand, and initiate structural reforms that will sustain economic

⁴²Şahin, Hüseyin. **Türkiye Ekonomisi**. 2009, pp. 187-197.

⁴³ Kalkınma Bakanlığı. **6. Kalkınma Planı**. 1989, pp. 334-338.

stability. With the Implementation Plan, priority was given to measures aimed at controlling public expenditures and increasing public revenues, as well as arrangements for ensuring economic stability. In this context, state-owned enterprises price adjustments were made, regulations were made in taxes on petroleum products, and additional taxes were introduced for economic balance. In the 1990-1993 period, the GNP growth rate reached an average of 6% per year, but developed in an unstable structure. As a result of the significant contraction in domestic demand due to the stabilization measures put into effect with the 5 April Decisions, the GNP with fixed prices decreased by 6 percent in 1994. Thus, the average GNP growth rate in the VI. Plan period was 3.5%⁴⁴.

In the seventh development plan covering the years 1996-2000, envisaged was to ensure a sustainable growth environment, to decrease real interest rates and to revive private sector investments. In the face of foreign competition that will increase after the customs union with the EU, predicted is that the private sector's restructuring in terms of organization, technology and management, and the effective, flexible and efficient structure of factor markets will increase factor productivity and contribute to growth. In this context, VII. During the Plan period, is estimated that the annual average growth rate of Gross Domestic Product (GDP) will be 5.0-6.6% and the annual average growth rate of Gross National Product (GNP) will be in the range of 5.5-7.1%. In the first two-year period of the Seventh Development Plan, annual average growth rate of GNP was 7.7%. However, this rapid growth performance could not be sustained in the following years. GNP growth rate declined to 3.9% in 1998. In 1999, there was a 6.4% contraction in the GNP. Thus, in the 1996-1999 period, the annual average growth rate of GNP remained at the rate of 3.1%⁴⁵.

When the 1996-1999 period is analyzed in terms of tax, has been determined that the ratio of tax revenues to GDP has increased. As a matter of fact, tax burden increased to 18.5% in 1996, 20.20% in 1997, 20.60% in 1998 and 22.5% in 1999. On

⁴⁴ Kalkınma Bakanlığı. **7. Kalkınma Planı**. 1995, pp. 4-6.

⁴⁵ Kalkınma Bakanlığı. **8. Kalkınma Planı**. 2001, pp. 1-19.

the other hand, public sector savings were negative, except for 1997, due to the rise in current expenditures and rapidly increasing interest burden⁴⁶.

In the early 2000s, Turkey faced two major economic crises. The first of these is the financial crisis that broke out on November 22, 2000. On that date, the overnight borrowing simple interest rate in the interbank market nearly tripled, jumping to an average of 110.8% and a peak of 210%. In this period, almost all of the rapid inflow of foreign resources was in the form of borrowing. However, the ability to repay foreign debt was gradually decreasing. On the other hand, CBRT's foreign exchange reserves fell sharply. Turkey was able to repulse the intense speculative attack on foreign currency in November 2000 with very high interest rates, significant loss of foreign exchange reserves and an additional IMF loan of 7.5 billion dollars. Turkey was able to defend against the exchange rate attack at very high costs, but his defense against a similar attack later on was greatly reduced. Just when the November crisis was saying that was over, exactly three months later, on February 19, 2001, a discussion between Prime Minister and the President launched a second speculative attack and a new foreign currency crisis began. On February 21, the overnight interest rate in the interbank money market increased to 6200% and averaged 4018.6%. The foreign exchange reserve of the Central Bank, which was \$27.94 billion on February 16, decreased to \$22.58 billion on February 23 and the loss of reserves was \$5.36 billion. In the November crisis, the attack on foreign currency was limited to foreigners. In the February crisis, it was seen that locals, especially banks, attacked foreign currency. When the strength to withstand the attack on the foreign currency was no longer available, CBRT (central bank of the Turkish Republic) announced that the exchange rate was left to fluctuate on the night of February 21. Exchange rate increase reached 40% in ten days. Crisis that started in February was now a foreign currency crisis. The almost sky-high interest rate could not prevent the demand for foreign currency⁴⁷.

Turkish economy entered into a contraction period after the crisis in the financial markets at the beginning of 2001. In the first nine months of the year,

⁴⁶ OECD data. **Tax Revenue** <https://data.oecd.org/tax/tax-revenue.htm#indicator-chart>.

⁴⁷ Ercan, Uygur. **Krizden Krize Türkiye: 2000 Kasım ve 2001 Şubat krizleri**, 2001, pp. 1-21.

compared to the same period of the previous year, GNP decreased by 8.3 percent and GDP by 6.4 percent. The rapid capital outflows that emerged with the economic crisis, the increasing uncertainties in the economy, especially in the exchange rate, and the loss of confidence in economic units caused a contraction in domestic demand and thus the economy⁴⁸.

Considering the tax developments in the 2000s, has been observed that there has been an increase in tax rates due to the burden of the crisis. As a matter of fact, the tax burden rate, which was 20.6% in 1998, reached 23.50% in 2000 and 25.40% in 2001, reaching very high levels⁴⁹.

We examine the growth rates in these years, “Turkey's economy in 2000, which is the VIII.base year of the plan, grew by 7.4 percent, but contracted by 9.5 percent as a result of the 2001 crisis. However in the post-crisis period, important steps were taken to ensure macroeconomic stability and high growth performance was achieved thanks to the tight fiscal and monetary policies implemented decisively⁵⁰.

When the period covering the years 2007-2013 is examined, has been determined that the tax burden is between 22.87 and 25.16. “In the first years of the Ninth Development Plan, the developments in the domestic political conjuncture and the global crisis that followed were important factors affecting the Turkish economy. Increasing uncertainty due to the global crisis adversely affected the environment of confidence and future expectations, causing investment and consumption decisions to be postponed and economic activities to slow down. Accordingly, GDP, which increased by an average of 7.2 percent annually in the 2002-2006 period, grew by 3.3 percent in the 2007-2012 period⁵¹.

Between 2007 and 2013, when the tenth development plan was implemented, the crisis called 2008 global financial crisis broke out in the world. The crisis emerged in the USA. It is known that the triggering event for the crisis that started in the US

⁴⁸ TCMB. **Yıllık Rapor** , 2001 <https://www.tcmb.gov.tr/wps/wcm/connect/8297d79e-819f-450e-9525-eca9a83504e0/YR2001.pdf?MOD=AJPERES&CACHEID=8297d79e-819f-450e-9525-eca9a83504e0>, pp. 14.

⁴⁹ OECD data, **Tax Revenue** <https://data.oecd.org/tax/tax-revenue.htm#indicator-chart>.

⁵⁰ Kalkınma Bakanlığı. **9. Kalkınma Planı**, 2006, pp. 13.

⁵¹ Kalkınma Bakanlığı. **10. Kalkınma Planı**, 2013, pp. 19.

housing market was the bankruptcy of Lehman Brothers, an investment bank, on September 15, 2008. However, the crisis that started in the US housing market triggered new crisis floods abroad, causing the crisis to reach a global dimension. The crisis first spread to Western Europe and Japan, and then to many of the rest of the world⁵².

Main effects of the crisis; as a result of the increase in the default and foreclosure rates of housing loans at an unprecedented level, negative effects have emerged on the households that are the loan debtors and in the immediate environment where this house is located. Majority of loan borrowers lost their houses. The rate of home ownership has decreased across the country. Capacity of financial institutions to extend credit has shrunk and many large financial institutions have been closed due to the financial difficulties they faced. As a result of all these, the contraction in the total demand in the country, decrease in the production volume, increase in unemployment and the increase in public borrowing and budget deficits as a result of the measures taken by federal government have occurred⁵³.

Turkey is one of the countries that was most affected by the 2008 global crisis and experienced a major collapse in the real sector, especially in the manufacturing industry. Rate of decline in manufacturing, which was 20% in the last months of 2008, is 23.7% in January 2009. On the other hand, companies and domestic banks that benefited from cheap and abundant loans in 2007 and 2007 were faced with the situation of repaying these loans in the autumn of 2008. The credit crunch in the outside world was transferred to the interior. Meanwhile, fund outflows had gone to pull the stock market indices down and the foreign exchange price up. Stagnation in bank loans, along with increasing unemployment, brought about a stagnation in consumer loans. Thus, consumption expenditures also fell. However, the most serious problem was the skyrocketing unemployment rate. According to official data, the unemployment rate in cities increased from 13% in 2008 (January) to 17.2% in 2009.

⁵² Paul, Krugman. **The return of depression Economics and the Crisis of 2008**. 2015 pp. 160-165.

⁵³ Belgin, Akçay. 21. **Yüzyılın İlk Finansal Krizi**. 2012, pp. 218.

As a result of all these, the GDP, which was 729.4 billion dollars in 2008, decreased to 644.8 billion dollars in 2009⁵⁴.

When the post-2010 period is examined in terms of tax, is determined that the tax burden in the 2010-2015 period is between 24% and 25%⁵⁵. These high rates are also a reflection of the increase in public expenditures. In this period, when the average tax burden is compared to OECD countries, although the tax burden tends to increase in Turkey, approximately is 8 points below the OECD average. Considered that the informal economy and tax reductions, exemptions play an important role in the low tax burden in Turkey. If tax revenues are evaluated in terms of tax types; as of 2011, approximately 30 percent of total taxes are collected on income and earnings, while approximately 65 percent are taxes on product and services⁵⁶.

When the economic growth performance in the world in the last years covering 2010 and 2011 is analyzed, it is clear that Turkey has shown a serious growth performance. However, although the positive growth continues especially in the post-2013 period, some weakening in the growth performance is observed. While the growth rate in GDP reached the highest values with 9.2% in 2010 and 8.8% in 2011, this rate was at the level of 2.1%, 4.2%, 3% and 4% in the four years after 2011, respectively. Although a relatively positive course is observed when compared to OECD countries and developed economies, the growth trend has been on a slowing path especially in recent years⁵⁷.

Compared with the growth levels of OECD countries, Turkey, which is among the developing countries, has exhibited a significant economic growth performance in the last ten years, excluding the crisis years. However, the slowdown in the growth rate observed recently makes it necessary to review all fiscal policies, primarily tax policies, from the perspective of supporting and accelerating growth. In this respect, tax reforms directed by other countries, especially OECD and EU countries, are

⁵⁴ Gülten, Kazgan. **Türkiye Ekonomisi 1908-2018**, 2010, pp. 21-27.

⁵⁵ OECD data. **Tax Revenue** <https://data.oecd.org/tax/tax-revenue.htm#indicator-chart>.

⁵⁶ Kalkınma Bakanlığı. **Özel Komisyon Raporu**. 2014, pp.3-14.

⁵⁷ Kalkınma Bakanlığı. **11. Kalkınma Planı**. 2018, pp. 34.

carefully examined and it is evaluated that a growth-oriented tax reform designed for our country can increase the economic performance in our country⁵⁸.

In this section, relationship between growth plans and tax burden in Turkey between 1963 and 2015 is discussed. Importance of the growth-oriented tax concept, which has been on the agenda in recent years, has emerged. Since the main determinant of the economic growth rate is investments and the savings that are the source of these investments, taxation and tax types should encourage and accelerate savings and investments.

Growth-oriented taxation approach expresses a multidimensional structure in which especially developed and developing countries have focused on fiscal policies and tended to change since the late 1990s. This structure aims to support and accelerate sustainable economic growth as well as financing public expenditures with tax revenues. From this point of view, today's tax systems aim to increase savings, labor supply, human and physical capital investments. While trying to support investment and production decisions, new business ideas and R&D activities, should also provide equality, justice, predictability, transparency, accountability and be at a level that can prevent tax evasion and tax avoidance. Because of all these functions, the concept of growth-oriented taxation has become a multidimensional and effective policy and practice area that includes international economic developments and tax competition, taking into account economic and social problems such as tax costs, justice in income distribution and social exclusion⁵⁹

In terms of the tax burden and economic growth relationship, current situation in OECD countries and in our country is mentioned in detail and the growth-oriented taxation approach is mentioned. There are many studies in the literature that analyze growth performances and tax structures. In the continuation of our thesis, the studies in this literature will be mentioned.

⁵⁸ Kalkınma Bakanlığı. **Büyüme Odaklı Vergilendirme Çalışma Grubu Raporu**. 2018, pp. 34.

⁵⁹ Ibid. pp. 47.

CHAPTER THREE

LITERATURE REVIEW

3.1. Literature Review of The Relationship Between Tax Revenues and Economic Growth

There are many studies investigating the effect of tax revenues on the economic performance of countries. When the studies are examined, determined that the relationship between tax and economic growth has started to be discussed in the context of Solow type neoclassical growth models. With the emergence of endogenous growth models in the following periods, these models were also included in the studies. From the 1950s to the present, many studies have been carried out in the light of these models, and the subject of tax and growth has been discussed.

When the Solow-Swan (1956) model, which is one of the neoclassical economic growth models, is examined, the relationship between savings, capital and economic growth is discussed. Neo-Classical growth theory proposes that real GDP per capita will grow as technological development encourages savings and investment, which causes per capita capital growth. If technological change stops, growth will cease⁶⁰. According to the neoclassical growth theory is claimed that the steady state equilibrium level will be reached in the long run and that fiscal policies, namely taxes, will not have an effect on the long-term economic growth rate.

Harberger (1964), in his study “The Role of Direct and Indirect Taxes in the Federal Reserve System”, investigated whether the tax burden and mix have an effect on economic growth by using US data. In his study with the hypothesis that taxes are neutral in terms of saving decisions; “...It is likely that the feature which best distinguishes the economic thinking (both professional and popular) of the postwar period from earlier decades is the emphasis placed upon economic growth—as a phenomenon to be explained, as a criterion of economic performance, and as an objective of policy. In today’s environment it is quite natural, therefore, to

⁶⁰Parasız, İlker. **İktisada Giriş**. 2010, pp. 279-281.

inquire into the likely effects of alternative policies upon the rate of growth. In the terms of reference of this conference, and of my paper, this boils down to the question of how significantly the rate of growth could be influenced by plausible changes in the mix of direct and indirect taxation. I think that the answer is not very much.”⁶¹. When Harberger's 1964 article is analyzed based on these statements; has shown that Solow's job of increasing the rate of growth by increasing investment is indeed difficult. To increase the rate a lot; major changes in savings and investment rates, labor force participation or productivity changes are required. This is not to say that small changes are insignificant, but it does seem to come to the conclusion that we cannot expect major changes without major revisions in economic policy. Harberger concluded in his study that although reductions in the tax burden have temporary and positive effects in the short term, they will not have a significant effect in the long term. He revealed that taxes are superneutrality⁶².

Reynolds (1985), in his study; “The main reason high-tax countries experienced little or no real revenue growth is that they experienced little growth of real GNP (or GDP), which roughly measures the potential tax base. The top three in taxes—Sweden, Belgium, and the Netherlands—had annual real GDP growth of 1.7 percent from 1976 to 1983. Which has a lower tax rate economic growth in the United States, Portugal, and Japan averaged 4.1 percent”⁶³. “...Compare average growth of real GDP in the three highest-taxed countries with the three lowest-taxed countries. The low-tax countries grew, on average, by 4.9 percent a year in the troublesome four years, 1979—83, while the high-tax economies actually shrank by 1.4 percent a year”⁶⁴. In summary, in his study, he concluded that there is a negative relationship between tax burden and economic growth.

P. Romer (1985), in his study: Increasing Returns and Long-Run Growth stated that the new knowledge emerging as a result of physical capital investments leads to long-term growth by leading to increased returns on the entire economy through externalities. In a sense, this study was the beginning of endogenous growth models

⁶¹ Harberger, Arnold. **The Role of Direct and Indirect Taxes in the Federal Reserve System**. Princeton University Press, 1964, pp. 62-63.

⁶² Ibid. pp. 25-80.

⁶³ Reynolds, Alan. **Some international comparisons of supply-side tax policy**. 1985, pp. 543.

⁶⁴ Ibid. pp. 558.

(Third Generation Growth Models)⁶⁵. With the emergence of endogenous growth models, the belief that fiscal policies are effective on long-term growth rates has increased, and empirical studies have turned their attention to this point.

King and Rebelo (1990) in their study; concluded that relatively small changes in tax rates, in both open and closed economies, could lead in countries to prolonged recession or even downturn. In addition, in the study, it was determined that there was a lower rate of growth and a decrease in welfare due to the increase in tax rates. It is shown that taxation predicts much higher values for welfare costs than the neoclassical model. Basically, this difference reflects the fact that the long-run growth rate is affected in the linear technology economy but not in the neoclassical model. As a result, in the study, it has been revealed that income taxes have a reducing effect on per capita income in the long run⁶⁶.

Barro (1990) in their study; argues that governments should both invest for growth and support the private sector with tools such as tax incentives and subsidies to increase investments. He concluded that an increase in the average marginal tax rate will tend to lower growth and savings rates. Barro also stated that reductions in tax rates will contribute positively to long-term economic growth⁶⁷.

Roubini and Milesi-Ferretti (1995) investigated the effects of income and consumption taxes on the growth process in economies within the framework of endogenous growth models. They found that the growth rate of the economy is affected by both tax rates. They noted that human and physical capital should be taxed alike if they contribute to long-term growth. They noted that even a skewed excise tax affects long-term growth when growth is endogenous. In general terms, they found that taxation of factor incomes had a reducing effect on growth, while the effect of

⁶⁵ Biçen, Ömer Faruk. **Yükselen Piyasa Ekonomilerinde Sıcak Para Hareketlerine Bağımlılık ve İktisadi Büyüme**. 2018, pp. 41.

⁶⁶ King, Robert and Rebelo, Sergio - **Public Policy and Economic Growth: Developing Neoclassical Implications**. The University of Chicago Press, Oct., 1990, pp. 126-150.

⁶⁷ Barro, Robert J. **Government Spending In A Simple Model Of Endogeneous Growth**. Harvard University, 1990, pp. 03-124.

consumption taxes on growth mostly changed according to labor supply elasticity and therefore leisure preferences⁶⁸.

Engen and Skinner (1996) investigated the effect of a general tax cut on long-run growth. They conclude that countries that can mobilize tax resources through broad-based tax structures with effective governance and enforcement are likely to have faster growth rates than countries with lower overall tax collections, which are considered inefficient. Also concluded that taxes are likely to have a modest but cumulatively significant impact on long-term growth rates⁶⁹.

Mendoza, Milesi-Ferretti and Asea (1997) in their study, discussed the inference that tax policy is an ineffective tool to affect growth in practice, although they predict that changes in tax rates affect investments and long-term growth in Harberger's superneutrality conjecture approach. For this purpose, they analyzed the data of 18 OECD countries for the period 1965-1991. As a result of the study; Although Harberger's theory predicts that the mix of direct and indirect taxes is an important determinant of long-term growth and investment rates, evidence has been presented to support his claim that in practice reasonable changes in tax rates are pointless. Concluded that the obtained estimates are roughly compatible with Harberger's superneutrality conjecture assumption. They was agreed that tax rates is not a statistically significant determinant of growth. They concluded that changes in existing tax structures would have to be much larger for them to have noticeable effects on economic growth. However, they also stated that this result does not mean that tax reforms are worthless⁷⁰.

Karras (1999) investigated the effects of tax rates on economic growth of 11 OECD countries between 1960 and 1992. He found that tax rates had a negative effect on output in the short run, but had no significant effect on long-term growth rates. Results of the study suggest that changes in a number of policy variables may have

⁶⁸ Milesi, Ferretti. **Taxation And Endogenojs Growi'h In Open Economies**. 1995, pp. 1-35.

⁶⁹ Engen and Skinner- **Taxation And Economic Growth**. National Tax Journal , December, 1996, Vol. 49 pp. 617- 642.

⁷⁰ Milesi, Ferretti and Roubini. **Growth Effects of Income and Consumption Taxes**. Journal of Money, Credit and Banking , Nov., 1998, pp. 99-124.

lasting effects on output, but only temporary effects on the growth rate. In terms of tax policy, the findings of this paper reveal that an increase in the tax rate will permanently reduce the level of output per capita, but will only temporarily slow the growth rate⁷¹.

Kneller, Bleaney and Gemmell (1999) tested systematically using a panel data set for 22 OECD countries during the 1970-95 period in order to determine the effects of the structure of public expenditures and taxes on the steady-state growth rate, and the data were collected in 5-year averages. As a result of the study, it was determined that deflative taxes (income, corporate and consumption taxes) and inefficient public expenditures (social security, general services) decreased growth rates, while non-diverting taxes (consumption and foreign trade) and efficient public expenditures (education, health, housing, defense, infrastructure, communication) increased the growth rates. The study shows that even at the lowest estimates, increasing productive spending or reducing distortive taxes by 1% of GDP can modestly increase the growth rate⁷².

Widmalm (2001) analyzed the relationship between taxation and economic growth based on data from 23 OECD countries for years 1965-1990. As a result of the study, was determined that the share of total tax on personal income is strongly and negatively related to economic growth. Personal income also includes capital income. A tax that reduces the return on capital accumulation is predicted by most growth theories to have a negative growth effect. But on the other hand, he found some evidence that the consumption tax boosted growth. Correlation between this tax share and growth is even robust (at the 10% level) in a data set excluding Japan. Of course, this should not be interpreted as if this tax is growth promoting per se but that it is less harmful than taxing alternative tax bases. Results of this study support the idea that

⁷¹ Georgios, Karras. **Taxes and growth: Testing the Neoclassical and Endogenous Growth Models.** 1999, pp.177-188.

⁷² Kneller, R., Bleaney, M.F. and Gemmell, N. **Fiscal Policy and Growth: Evidence From OECD Countries.** 1999, pp. 171-190.

both the tax mix is important and that progressive taxes have negative effects on growth⁷³.

Durkaya and Ceylan (2006) investigated the long-term and short-term relationships between tax revenues and economic growth. As a result of the study, in which annual data for the period 1980-2004 were used, they determined that direct taxes had a negative effect on long-term growth. They concluded that tax increases to be applied in order to increase tax revenues will be made on indirect tax items, which will prevent taxes from having a negative effect on growth⁷⁴.

Furceri and Karras (2008) examined the effects of tax changes on real GDP growth per capita using annual data from 1965 to 2003 for a panel of 19 OECD countries. As a result of the study, it has been found that the increase in taxes has a negative and permanent effect on real GDP per capita⁷⁵.

Padda and Akram (2009) analyze the effects of tax rate changes on economic growth in their study. Three countries with lower tax rates compared to developed countries; the effect of tax rate changes was examined in the analysis made on the data of Pakistan, India and Sri Lanka. While tax rate increases are temporary and negative in the short term in Pakistan and India, they have a positive effect on Sri Lanka for the first year and then negatively on economic growth⁷⁶.

Göçer, Mercan, Bulut and Dam (2010) examined relationship between economic growth and tax revenues in Turkey using annual data for the period 1924-2009. Considering that different tax types may have different effects on economic growth, direct and indirect taxes are examined separately. According to the findings obtained in the study, is understood that both direct and indirect taxes have a statistically significant effect on growth in the long-term analysis. In addition, it has been determined that direct taxes increase economic growth more than indirect taxes.

⁷³ Widmalm, Frida. **Tax Structure and Growth: Are Some Taxes Better Than Others?**. 2001, pp. 199-219.

⁷⁴ Durkaya and Ceylan. **Vergi Gelirleri ve Ekonomik Büyüme**. 2006, pp.79-89.

⁷⁵ Furceri and Karras, **Tax changes and economic growth: Empirical evidence for a panel of OECD countries**. 2008, pp. 1-29.

⁷⁶ Padda and Akram. **The Impact of Tax Policies on Economic Growth: Evidence from South-Asian Economies**. 2009, pp. 961-971.

In the short-term analysis, it was concluded that direct and indirect taxes were effective in increasing growth and at a statistically significant level⁷⁷.

Mangır and Ertuğrul (2012) examined the relationship between tax burden and economic growth in Turkey by using the data for the period of 1988–2011 in their study. Has been concluded that the increase in the tax burden negatively affects growth in the long, short and long run. Result obtained that the practices in Turkey negatively affect growth in terms of increasing the tax burden is in line with the views put forward by the endogenous growth theory about tax policies⁷⁸.

Acosta-Ormaechea and Yoo (2012) in their study, investigated the relationship between changes in tax composition and long-term economic growth in the period 1970-2009 in 69 countries with different income levels. As a result of the study, they determined that income tax has a negative effect on long-term economic growth. They also found that the transition from consumption and property taxes to income taxes was negatively associated with long-term growth. On the other hand, they determined that the negative effect of personal income tax on growth is higher than that of corporate tax⁷⁹.

Çevik (2015) in his study, examined the effect of the tax structure in Turkey on the level of national savings, which is important for growth, for the period 1965-2011. As a result of the study, they determined that the tax burden and mix affect the domestic savings levels, which is the source of growth, in the short and long term. In the long run, taxes on income affect the level of domestic savings negatively, while taxes on consumption affect positively. The study also implies that a change in the tax mix for income taxes may impose costs related to domestic savings⁸⁰.

⁷⁷ Göçer, Mercan, Bulut and Dam. **Ekonomik Büyüme ile Vergi Gelirleri Arasındaki İlişki**. 2010, pp. 1-11.

⁷⁸ Mangır ve Ertuğrul. **Vergi Yüğü ve Ekonomik Büyüme İlişkisi**. 2012, pp. 256-265.

⁷⁹ Acosta-Ormaechea, Santiago and Jiae Yoo. **Tax Composition and Growth: A Broad CrossCountry Perspective**. 2012, pp. 1-35.

⁸⁰ Savaş, Çevik. **Vergi Yapısının Ekonomik Büyüme Üzerine Etkisi**. 2015, pp. 87-112.

CHAPTER FOUR

THE IMPACT OF TAX REVENUES ON ECONOMIC GROWTH THE CASE OF TURKEY DURING THE 1994, 2001 AND 2008 CRISES: EMPIRICAL RESULTS

4.1. Content of Econometric Research

In this study, the effects of capital stock, labour force, human capital and tax revenues on Turkey's growth performances between 1985 and 2015 were investigated.

In this section, firstly, the data set, econometric models and econometric methodology are explained. Analyzes will be applied according to the econometric methodology chosen in the thesis, the results of the analysis will be introduced and the results will be interpreted.

4.2.Data

In the empirical analysis, data on GDP, capital stock, workforce, human capital figures from Penn World Table⁸¹ and tax revenues from the GİB (Gelir İdaresi Başkanlığı) ⁸² were used. The dataset can be viewed in Appendix 1 at the end of the study. Applied analysis covers the period 1985 – 2015.

Indicators related to the variables selected for empirical analysis are explained in Table 4.1. In addition, dummy variables were created specifically for crisis periods. Thus, was possible to observe the crisis periods separately, and the dummy variables and the years they belonged to are also indicated in the table.

On the other hand, in order to make the distribution of our data a normal distribution, logarithm of all data except Hc (human Capital) was taken and added to

⁸¹ Penn World Table version 9.0 <https://www.rug.nl/ggdc/productivity/pwt/?lang=en>.

⁸² https://www.gib.gov.tr/sites/default/files/fileadmin/user_upload/VI/GBG1.htm.

the model. Since the Hc index deviates less than other variables, it is not necessary to take its logarithm. By taking the logarithm of the variables, results of the regression analysis obtained from these data become more confidential. In case of our data is included in our analysis logarithmically, as the log transform significantly reduces the skewness of our original data.

Table 4.1: Variables used and their descriptions

Variables	Indicator	Abbreviations
Economic Growth	Real GDP at constant 2017 national prices (in mil. 2017US\$)	Lnrgdpna
Capital Stock	Capital stock at constant 2017 national prices (in mil. 2017US\$)	Lnrnna
Labour	Number of persons engaged (in millions)	Lnemp
Human Capital	Human capital index, based on years of schooling and returns to education	Hc
Tax Revenues	Tax revenues at constant 2017 national prices (in mil. 2017US\$)	Lntaxes
Dummy Variables	1994 crisis	D1
Dummy Variables	2001 crisis	D2
Dummy Variables	2008 crisis	D3

In order to measure economic growth, annual values of real GDP are taken as the dependent variable, as is used in many empirical studies. Capital stock, labour, human capital and tax revenues were added to our model as independent variables to evaluate their impact on economic growth. In addition, D1-D2-D3 variables were included in our model as dummy variables representing the three crisis periods (1994-2001-2008) in order to determine how the changes in the independent variables affect the dependent variable during the crisis periods.

4.3. Empirical Models and Methodology

4.3.1. Empirical Model

In the thesis effects of capital stock, labor, human capital and tax revenues on Turkey's growth performance during the economic crisis are analyzed with the data of 1985-2015. To measure this effect, growth model, also known as the "Extended Solow Model", Mankiw, Romer and Weil (MRW) model, will be used in the study. Mankiw, Romer and Weil (1992), estimated by panel data analysis for the years 1960–1985 non-oil producing countries, moderately developed countries, and OECD countries. In order to explain the reasons for income differences between countries, the Solow model was expanded by including the human capital variable in the Solow model. Thus, the production function is raised to three explanatory variables⁸³. Accordingly, the MRW growth model is modeled as in the following equation:

$$\ln(\text{GDP}) = \alpha_0 + \alpha_1 \ln(K) + \alpha_2 \ln(L) + \alpha_3 \ln(H) + e_{it} \dots \dots \dots (4.11)$$

Shows α_0 : $\ln A(0) + g$ according to equation (4.11), α_1 indicates $(\frac{\alpha+\beta}{1-\alpha-\beta})$, $\ln(K)$ indicates $[\ln(n + g + \delta)]$, α_2 indicates $(\frac{\alpha}{1-\alpha-\beta})$, $\ln(L)$ indicates $\ln(s_k)$ and finally α_3 indicates $(\frac{\beta}{1-\alpha-\beta})$.

While real GDP per capita is used as the dependent variable, as independent variables; physical capital investment ratio (K) [real investments/real GNP (I/Y)], population growth rate (L) [population growth rate(n), technology development rate(g) and physical capital erosion rate(δ) sum of $(n + g + \delta)$] and human capital (H). Equation states that per capita income is a negative function of population growth and a positive function of growth rates in physical and human capital.

⁸³ Mankiw, Gregory, Romer and Weil. **A Contribution to the Empirics of Economic Growth**. 1992, pp. 407-432.

In the thesis, the main hypothesis within the framework of the MRW growth model is that the crises affect economic growth by causing a change in tax revenues.

In this context, a dummy variable was used to define the crisis variable in the research. Dummy variable was created for each crisis period according to the year of the crisis. Dummy variable was created by giving a value of “1” to the crisis year, while taking the value “0” before these years. Thus, the change that occurred before and after the crisis period can be revealed.

In the thesis, the number of explanatory variables in the model has been increased by including the tax revenues variable and the crisis variable in the MRW model. Since a different model was created for each crisis period, 3 different models consisting of D1-D2-D3 puppets representing 3 crisis periods, respectively, were created.

Model I: $\ln(\text{rgdpna}) = \alpha_0 + \alpha_1 \ln(\text{rrna}) + \alpha_2 \ln(\text{emp}) + \alpha_3(\text{hc}) + \alpha_4(\text{taxes}) + \alpha_5(D_1) + u_t$

Model II: $\ln(\text{rgdpna}) = \alpha_0 + \alpha_1 \ln(\text{rrna}) + \alpha_2 \ln(\text{emp}) + \alpha_3(\text{hc}) + \alpha_4(\text{taxes}) + \alpha_5(D_2) + u_t$

Model III: $\ln(\text{rgdpna}) = \alpha_0 + \alpha_1 \ln(\text{rrna}) + \alpha_2 \ln(\text{emp}) + \alpha_3(\text{hc}) + \alpha_4(\text{taxes}) + \alpha_5(D_3) + u_t$

Variables in the model will not be explained again because they are specified in the section where the function of the MRW model is explained. However, the tax revenues (taxes) that we have included in the MRW model will be explained. Tax revenues included in the model are taken from the database of the Revenue Administration and represent all tax revenues collected by the state treasury. These revenues are added to our analysis in million dollars based on 2017 prices. In addition, crisis periods that are not included in the MRW model indicate three national and international crisis periods (1994 – 2001 and 2008 crises) corresponding to the relevant years.

4.3.2. Methodolog

In this part of the thesis, information will be given about the method to be used in regression analysis. For the analysis to be made with 31-observed annual data covering the period 1985-2015, is aimed to examine short and long-term effects of

changes in tax revenues during crisis periods on economic growth within the framework of the MRW growth model by using the EViews 10 package program.

In a regression model, the factors that affected relationships between variables in the past may continue to affect them in the future. For this reason, examining the factors affecting the observation values is important for the estimation of the effect in the future periods. As it is known, the variables that show the observation values of the variables defined in relation to time in order according to time such as day, month, year are called time series. Time series data are numerical values in which variables are observed consecutively from one period to the next⁸⁴. For this reason, we preferred the time series analysis technique considering the data set used in our thesis.

Important is to determine the stationarity of the data used in time series analysis. Therefore, the stationarities of the variables used in the study were determined by unit root tests.

4.4.1. Unit Root Tests

In regression analysis, is very important to make the series stationary when analyzing with time series. Not making the series stationary may prevent the regression analysis from giving reliable results. In a stationary series, a long-term constant mean, a constant variance, and theoretical autocorrelation decrease as the lag length increases. On the other hand, in a non-stationary series, it is seen that there is no long-term mean to reverse the series, the case of varying variance, that is, the variance is independent of time and the theoretical autocorrelation does not disappear by decreasing. Therefore, in order to understand the long-term characteristics of a series, it is necessary to determine how the values of the past period affect the series. Therefore, in order to understand time path process of the series, the relationship of Y_t and Y_{t-1} needs to be estimated. Among the methods developed for this purpose, the most widely used method is known as the unit root test. With this method, it can be easily understood whether a series is stationary or not⁸⁵.

⁸⁴ Dikmen, Nedim. **Ekonometri Temel Kavram ve Uygulamalar**. 2012, pp. 297.

⁸⁵ Ibid, pp. 315.

Unit root tests are a widely used method to reveal the stationarity properties of data. There are many tests to find the unit root in econometrics. Augmented Dickey-Fuller (ADF) unit root test will be used in the thesis.

4.4.2 Augmented Dickey-Fuller (ADF) Unit Root Test

Dickey Fuller test was developed by D. A. Dickey and W. A. Fuller in the 1970s. ADF test is a statistical process used to determine whether a time series contains a unit root. ADF test is important in econometric analysis. Because one of the first steps for the analysis is the stationarity test. For this purpose, together lag lengths of the variables were determined. We used the ADF unit root test to determine the stationarity level in our regression analysis. Fact that the aforementioned ADF and t statistics are absolute higher than the MacKinnon critical values indicates that the series is stationary. Otherwise, the difference must be taken until the stationarity condition is met. ADF test results are given in the table below.

Table 4.2: ADF Unit Root Test

Variables	Level (Sabit t statistic /p value)	First Differences (Sabit t statistic /p value)	Second Differences Sabit t statistic /p value	Decision
LNRGDPNA	0.1485 /0.9643	-5.748 /0.0001	-	I(1)
LNRRNA	-0.5331 /0.8705	-3.0868 /0.0388	-	I(1)
LNEMP	-0.2787 /0.9169	-4.8279 /-0.0006	-	I(1)
HC	1.9686 /0.9997	-1.9744 /-0.2958	-6.2672 /-0.0000	I(2)
LNTAXES	-1.1434 /0.6850	-5.4320 /0.0001	-	I(1)

ADF unit root test was applied for the stationarity of the variables. The hypotheses in this test are as follows:

H_0 : There is a general unit root in the series.

H_1 : There is not a general unit root in the series

When the difference of the data sets belonging to the variables is the H_0 hypothesis stating that the series contains unit root was rejected at 5% significance level. Alternative H_1 hypothesis, which states that the series do not contain unit roots, is accepted. However, the Hc variable is not stationary at the level due to the porb. value. When the 2nd difference of the series is taken, it becomes stationary.

4.4.3. ARDL Bounds Test

While performing cointegration analysis with ARDL bounds test method, there is no requirement that the stationarity levels of the variables be the same. Therefore, ARDL model will be used in my analysis. ARDL bounds testing approach consists of two stage. The first stage tests the existence of a long-run relationship between the 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.

When three different models are used in our analysis, the validity of the ARDL equation established for each model will be tested separately with diagnostic tests such as autocorrelation, varying variance, specification error and normality problem test.

4.4.3.1. Model of 1994 Crisis (Model I)

Model I: $\ln(\text{rgdpna}) = \alpha_0 + \alpha_1 \ln(\text{rrna}) + \alpha_2 \ln(\text{emp}) + \alpha_3(\text{hc}) + \alpha_4(\text{taxes}) + \alpha_5(D_1) + u_t$

Cointegration analysis is required for Model 1, which includes the D_1 dummy variable representing the 1994 crisis. Through the analysis, is aimed to capture the long- and short-term causality relationships.

While performing cointegration analysis with ARDL bounds test method, there is no requirement that the stationarity levels of the variables be the same. F-statistic found during the analysis is compared with the lower limit, which assumes that all series are stationary in level, and the upper limit, which assumes that all series are

stationary at first differences. If the F-statistic is greater than the upper limit values, the basic hypothesis is rejected and it is concluded that there is cointegration between the variables. Bounds test results performed according to the ARDL method are shown in the table below.

Table 4.3: Model 1 ARDL Cointegration Bounds Test Results

ARDL Bounds Test Results				
k	F statistics	Significant	I(0)Bounds	I(1)Bounds
4	128.6746	10%	2.752	3.994
		5%	3.354	4.774
		1%	4.768	6.67

When the ARDL bounds test results are examined, it is determined that the F statistical value is greater than the upper bounds I(1) values according to all three levels of importance. Therefore, the null hypothesis H_0 , which states that there is no long-term relationship between the series, is rejected.

Validity of the established ARDL equation is tested with diagnostic tests such as autocorrelation, varying variance, specification error and normality. Diagnostic statistics table of the equation established within the framework of the ARDL model is shown below.

4.4.3.2. ARDL Model I Diagnostic Statistical Test Results

Table 4.4: Model I Diagnostic Test Statistics

Diagnostic Test Statistics Results		
Test	F-statistic	Prob.
Autocorrelation Test BG	37.53776	0.1193
Varying Variance Test BPG	0.661945	0.7665
Specification Error Test	0.000724	0.9802

When the results in Table 4.4 are examined respectively, the autocorrelation test results are in the first place. Results in the table show that the probability value is greater than 0.05 ($p=0.1193$) In this case:

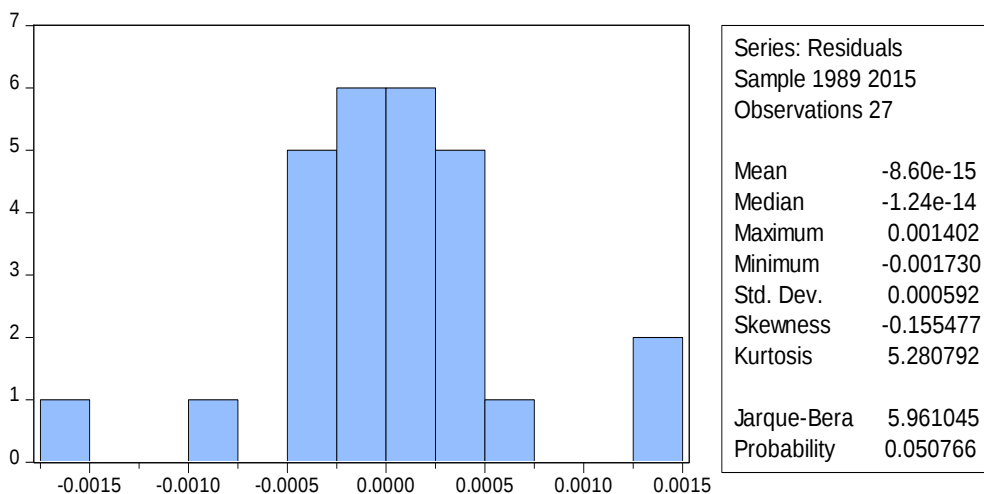
H_0 : no autocorrelation hypothesis is accepted, alternative H_1 hypothesis: there is a serial correlation hypothesis is rejected. In this case, it is concluded that the time series are free of serial correlation according to the ARDL model.

When the heteroskedasticity test result, which is in the second place in Table 4.4, is examined: probability value is 0.7665, ie $p>0.05$, means that the H_0 hypothesis in the expression "there is no varying variance" cannot be rejected. According to this result, there is no problem of varying variance in the model.

Finally, specification error results in Table 4.4 will be evaluated. Specification error occurs when unnecessary variables are included in the model and necessary variables are not included in the model. This test is done with the help of ramsey reset test. Probability value of the test result is 0.9802, ie $p>0.05$, H_0 means that the hypothesis: "no specification error" cannot be rejected. Thus is concluded that there is no model building error.

Last of the diagnostic tests applied in thesis is the normality test. After applying the logarithmic transformation to the series, histogram graph is created.

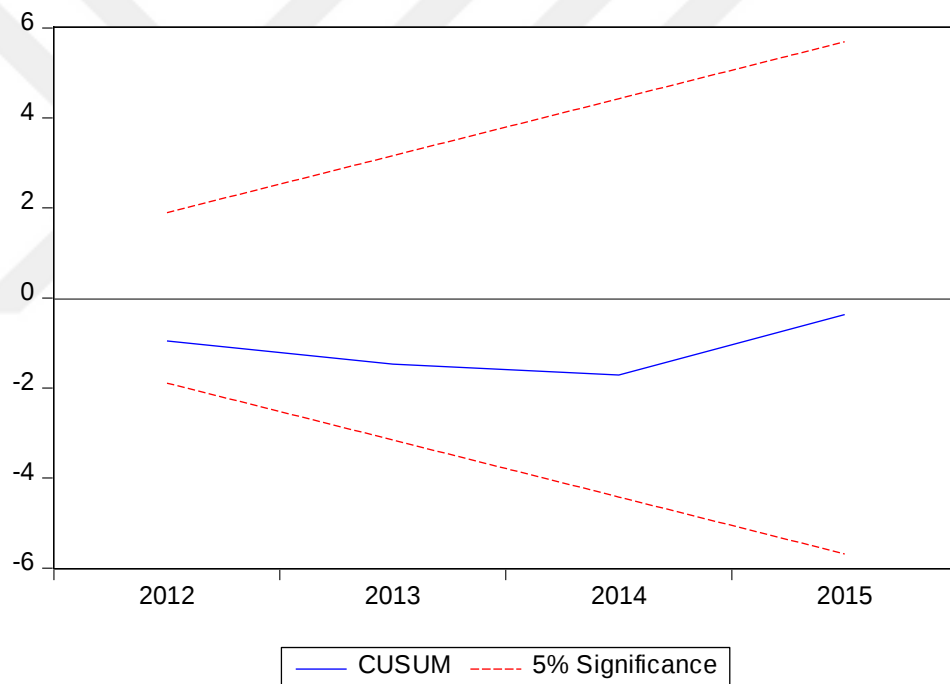
Figure 4.1: Model I normality test



As seen in Figure 4.1, the p-value that corresponds to the Jarque-Bera test statistic is 0.0507. In this case, since p-value is greater than 0.05, the H_0 hypothesis will not be rejected, and it will be concluded that the residues are normally distributed.

After this stage is completed, CUSUM and CUSUM Q tests will be performed to check whether the parameter estimations of the series are stable or not. In other words, the CUSUM test is performed to determine whether the error terms are within the desired limits in the 95% confidence interval. Results of the CUSUM and CUSUM Q tests for the model are shown in the graphs below.

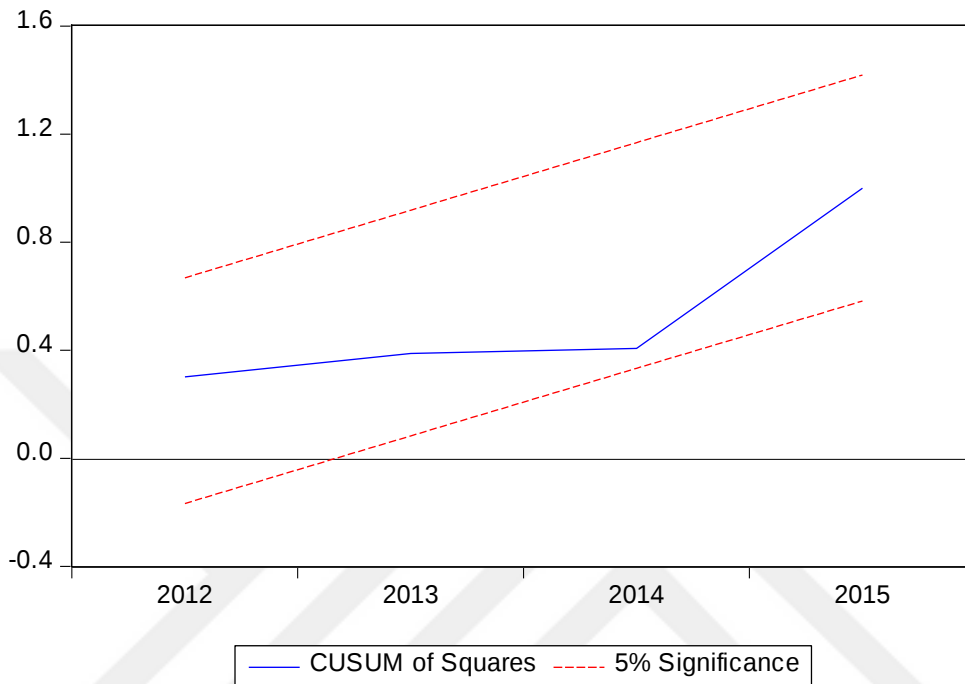
Figure 4.2: Model I CUSUM test results



The dashed red lines represent the 95% confidence limit. Solid blue line represents the parameter estimate. Since the parameter estimation is between the dashed lines, it is determined that the parameter estimation satisfies the stability condition here.

CUSUMQ test, on the other hand, cumulatively shows whether the squares of the error terms are within the desired limits at the 95% confidence interval.

Figure 4.3: Model I CUSUM Q test results



When the CUSUMQ test results are examined, it is determined that the parameter estimation satisfies the stability condition here, as the parameter estimation is between the dashed lines. According to the CUSUM and CUSUM Q test results, it was determined that the stability condition was provided in the model.

Since there was a cointegration relationship as a result of the boundary test and no problems were found in the diagnostic tests, long-term model was established. In the long-term model, coefficient values of the variables are given, and the rate of influence of the independent variables on the dependent variable is shown. Analysis, the third method (case 3) and model (3, 3, 3, 4, 4), which express the steady and trend-free state, were chosen. Table of the long-term coefficients created according to the selected model is shown below:

Table 4.5: Model I ARDL Long-Run Coefficients

ARDL Model (3, 3, 3, 4, 4) For Fixed and Trendless Conditions				
Long Run Coefficients				
Variable	Coefficient	Std.Error	t-statistics	Prob.
LNRNNA	0.539816	0.017512	30.82584	0.0000
LNEMP	0.334085	0.026697	12.51391	0.0002
HC	0.055685	0.049635	1.121905	0.3247
LNTAXES	0.073197	0.010435	7.014280	0.0022

Examining the table, is determined that there is a significant long-term relationship between GDP, capital stock, labor and tax revenues. Variables affect growth positively. However, was concluded that there is no significant long-term relationship between human capital and GDP. Representation of the equation established according to the model with its coefficients is as follows.

$$\text{LnRGDPNA} = 0.5398 \cdot \text{LnRNNA} + 0.3341 \cdot \text{LnEMP} + 0.0557 \cdot \text{HC} + 0.0732 \cdot \text{LnTAXES}$$

(4.1)

According to the equation: 1% change in capital stock causes 0.5398% increase in GDP, 1% change in employment causes 0.3341% increase in GDP, while 1% increase in tax revenues causes 0.0732% increase in GDP.

In the third stage of the ARDL model, the short-run coefficients and the error correction term are estimated. Because the economy is generally considered to be in equilibrium in the long run. However, in some cases, shocks or deviations may occur in the long term. In this case, analysis is made by establishing a short-term regression. Error correction term estimated by short-run regression shows how quickly the shocks or deviations that have occurred are reverted back to their original state. The short-term coefficients and the error correction term of the ARDL model, whose long-term coefficients are estimated above, are given in the table below.

Table 4.6: Model I ARDL Short-Run Coefficients

Model I ECM Short-Run Coefficients				
Dependent Variable D(LnRGDPNA)				
Variable	Coefficient	Std.Error	t-statistics	Prob.
C	3.643122	0.101734	35.81039	0.0000
D(LNRGDPNA(-1))	0.002838	0.022404	0.126679	0.9053
D(LNRGDPNA(-2))	0.202749	0.018059	11.22705	0.0004
D(LNRNNA)	2.701161	0.032193	83.90475	0.0000
D(LOGRNNA(-1))	1.697876	0.116283	14.60129	0.0001
D(LOGRNNA(-2))	-0.785373	0.065577	-11.97644	0.0003
D(LOGEMP)	0.091486	0.013430	6.812130	0.0024
D(LNEMP(-1))	-0.441837	0.022597	-19.55310	0.0000
D(LNEMP(-2))	-0.231858	0.012336	-18.79457	0.0000
D(HC)	1.472226	0.080876	18.20351	0.0001
D(HC(-1))	-1.125142	0.090330	-12.45595	0.0002
D(HC(-2))	0.828405	0.099683	8.310428	0.0011
D(HC(-3))	0.658519	0.103445	6.365868	0.0031
D(LNTAXES)	0.063282	0.003496	18.10118	0.0001
D(LNTAXES(-1))	-0.091979	0.003337	-27.56549	0.0000
D(LNTAXES(-2))	-0.063105	0.003971	-15.89033	0.0001
D(LNTAXES(-3))	-0.017130	0.002131	-8.037554	0.0013
D1	-0.056828	0.003320	-17.11700	0.0001
CointEq(-1)*	-1.261164	0.035158	-35.87124	0.0000

CointEq (-1)* means that a one-period lag of the residuals is included in the model. Found to be negative and statistically significant. However, is necessary to test

at what significance levels the t statistic value of $\text{CointEq}(-1)^*$ is significant. For this reason, a boundary test is also needed for the t-statistic. Boundary test results are presented in Table 4.7

Table 4.7: Model I $\text{CointEq}(-1)^*$ Boundary test results

Boundary Test For t-Statistic Value of the Coefficient $\text{CointEq}(-1)^*$				
Test statistics	Value	significant	I(0) Bounds	I(1) Bounds
t-statistic	-35.87124	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2,5%	-3.13	-4.26
		1%	-3.43	-4.6

As a result of the test, t statistic value (-35.87124) should be above I(0) and I(1). Since the values in the table are negative values, they should be considered as absolute values. Since the t statistic value in absolute value is above the upper critical value at all significance levels, our error correction coefficient is statistically significant. From here is concluded once again that there is a cointegration relationship between the series.

A negative and significant error correction coefficient means: $\text{CointEq}(-1)^*$ is -1.261164. This is approximately 0.79 ($1/1.261=0.79$). In other words, a deviation from a equilibrium that will occur in the short term means that it reaches the long-term equilibrium by improving after 0.79 years.

On the other hand, when prob. values are taken into account during the interpretation of the coefficients of the short-term variables in Table 4.6, all independent variables are significant. When coefficients are interpreted short term:

1% increase in capital stock leads to 2.70% increase in GDP. 1% increase in the capital stock in a 1-period delay causes an increase of 1.69 in GDP. 1% increase in the 2-period delay causes a 0.78% decrease in GDP. Therefore, when the capital stock is increased in the short term during the crisis, it affects the growth negatively after the second period.

While the 1% increase in the workforce causes an increase of 0.09% in GDP, the increase in the 1st and 2nd term lag causes a decrease of -0.44% and -0.23%, respectively. Therefore, when the labor force is increased in the short term during the crisis, it negatively affects the growth after the 1st period.

While a 1% increase in Human Capital causes an increase of 1.47% in GDP, the increase in a 1-period delay causes a -1.12% decrease in GDP. On the other hand, the increases in the 2nd and 3rd periods of Hc cause an increase of 0.82% and 0.65%, respectively. Reason for this is that investments made for the development of human capital may take time. The benefits of investments made in areas such as education and personal skills can be seen in the following periods rather than the year they are made.

Finally, 1% increase in tax revenues causes an increase of 0.063% in growth. However, 1% increase in tax revenues in the 1st, 2nd and 3rd periods causes a decrease of 0.091%, 0.063% and 0.017% in GDP, respectively. Reason for this is that increasing tax revenues in the crisis period may not have increased growth performances much, but increasing tax revenues in the following periods causes both a decrease in disposable income and a decrease in savings. Decrease in savings leads to a decrease in investment potential. As a result of all these, the increase in tax revenues may cause a decrease in GDP in the following periods.

4.4.3.3. Model of 2001 Crisis (Model II)

Model II: $\ln(\text{rgdpna}) = \alpha_0 + \alpha_1 \ln(\text{rrna}) + \alpha_2 \ln(\text{emp}) + \alpha_3(\text{hc}) + \alpha_4(\text{taxes}) + \alpha_5(D_2) + u_t$

Cointegration analysis is required for Model II, which includes the D_2 dummy variable representing the 2001 crisis. Through the analysis, it is aimed to capture the long- and short-term causality relationships.

While performing cointegration analysis with ARDL bounds test method, there is no requirement that the stationarity levels of the variables be the same. F-statistic found during the analysis is compared with the lower limit, which assumes that all series are stationary in level, and the upper limit, which assumes that all series are

stationary at first differences. If the F-statistic is higher than the upper limit values, the basic hypothesis is rejected and it is concluded that there is cointegration between the variables. Bounds test results performed according to the ARDL method are shown in the table below.

Table 4.8: Model II ARDL Cointegration Boundary Test Results

ARDL Bounds Test Results				
k	F statistics	Significant	I(0)Bounds	I(1)Bounds
4	111.2504	10%	2.752	3.994
		5%	3.354	4.774
		1%	4.768	6.67

When the ARDL bound test results are examined, it is determined that the F statistical value is greater than the upper limit I(1) values for all three levels of importance. Null hypothesis H_0 , which states that there is no long-term relationship between the series, is rejected. Accordingly, there is a long-term relationship between the series and it is concluded that the series are cointegrated.

Validity of the established ARDL equation is tested with diagnostic tests such as autocorrelation, varying variance, specification error and normality. Diagnostic statistics table of the equation established within the framework of the ARDL model is shown below.

4.4.3.4. ARDL Model II Diagnostic Statistical Test Results

Table 4.9: Model II Diagnostic Test Statistics

Diagnostic Test Statistics Results		
Test	F-statistic	Prob.
Autocorrelation Test BG	11.25475	0.0816
Varying Variance Test BPG	0.981919	0.5805
Specification Error Test	1.167019	0.3591

When the results in Table 4.9 are examined respectively, the autocorrelation test results are in the first place. Here is seen that the probe value is greater than 0.05. ($p=0.0816$) In this case:

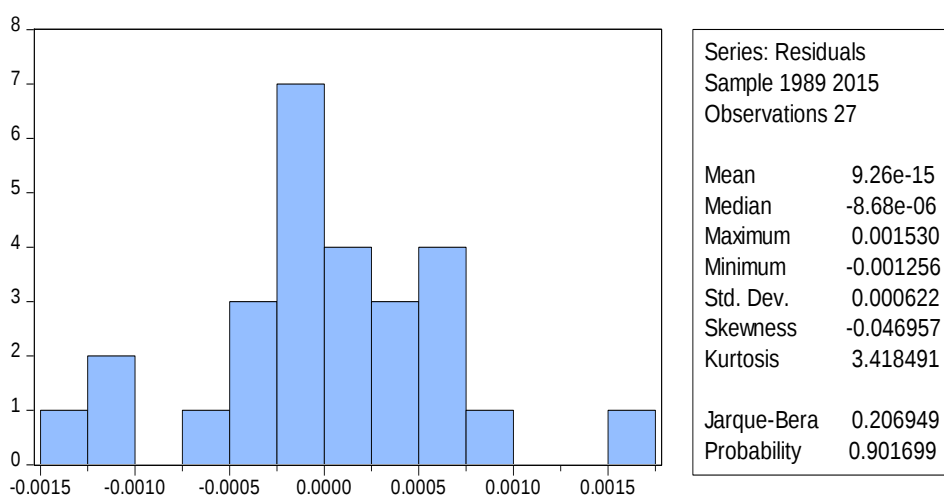
H_0 : no autocorrelation hypothesis accepted, alternative H_1 hypothesis: there is serial correlation hypothesis is rejected. In this case, it is concluded that the time series are free of serial correlation according to the ARDL model.

When the heteroskedasticity test result, which is in the second place in Table 4.9, is examined: probability value is 0.5805, ie $p>0.05$, means that the H_0 hypothesis in the expression "there is no varying variance" cannot be rejected. According to this result, there is no problem of varying variance in the model.

Finally, the Specification Error results in Table 4.9 will be evaluated. Specification error occurs when unnecessary variables are included in the model and necessary variables are not included in the model. This test is done with the help of ramsey reset test. Probability value of the test result is 0.9802, ie $p>0.05$, H_0 means that the hypotsy: "No specification error" cannot be rejected. Thus is concluded that there is no model building error.

Last of the diagnostic tests applied in the thesis is the normality test. After applying the logarithmic transformation to series, the histogram graph is examined.

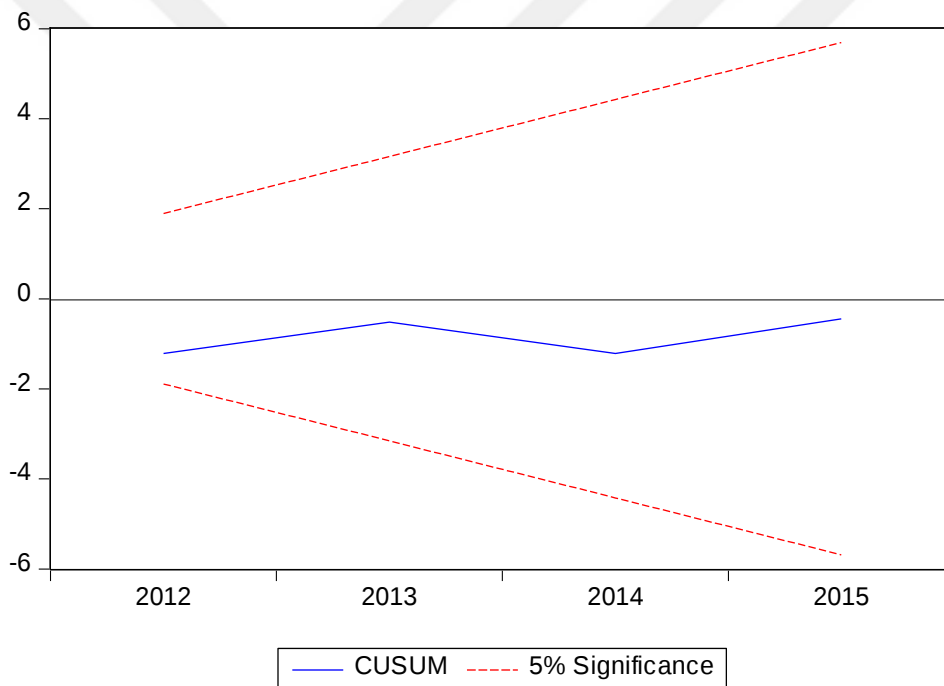
Figure 4.4: Model II normality test



As seen in Figure 4.1, the p-value that corresponds to the Jarque-Bera test statistic is 0.9016. In this case, since p-value is greater than 0.05, the H_0 hypothesis will not be rejected, and it will be concluded that the residues are normally distributed.

After this stage is completed, for model II CUSUM and CUSUM Q tests will be performed to check whether the parameter estimations of the series are stable or not. In other words, the CUSUM test is performed to determine whether the error terms are within the desired limits in the 95% confidence interval. Results of the CUSUM and CUSUM Q tests for the model are shown in the graphs below:

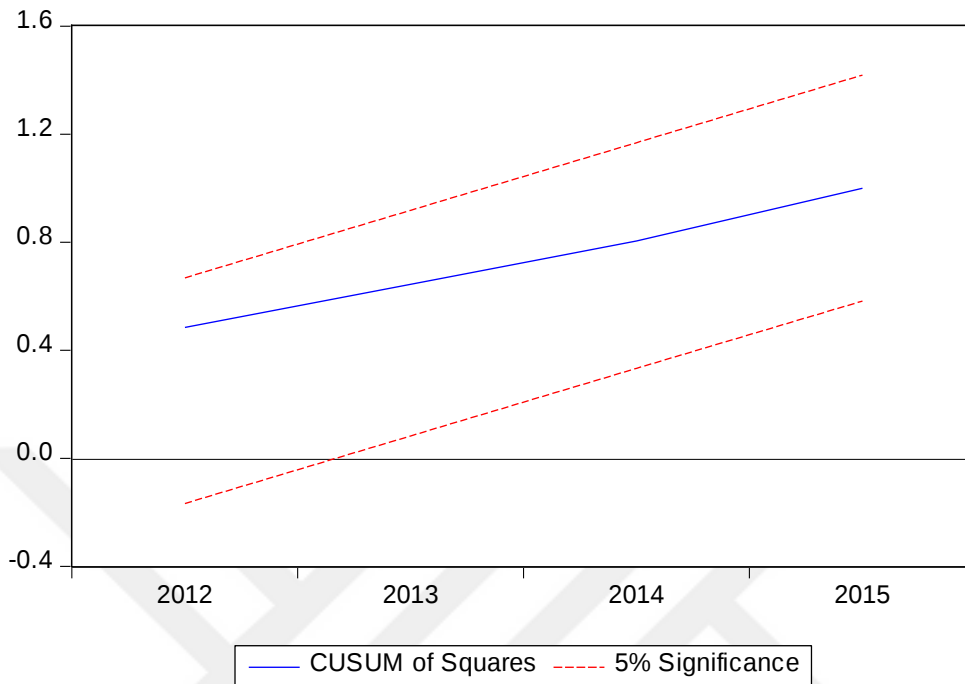
Figure 4.5: Model II CUSUM test results



The dashed red lines represent the 95% confidence limit. Solid blue line represents the parameter estimate. Since the parameter estimation is between the dashed lines, it is determined that the parameter estimation satisfies the stability condition.

CUSUMQ test, on the other hand, cumulatively shows whether the squares of the error terms are within the desired limits at the 95% confidence interval.

Figure 4.6: Model II CUSUMQ test results



When the CUSUMQ test results are examined, it is determined that the parameter estimation satisfies the stability condition here, as the parameter estimation is between the dashed lines. According to the CUSUM and CUSUM Q test results, it was determined that the stability condition was provided in the model.

Since there was a cointegration relationship as a result of the boundary test and no problems were found in the diagnostic tests, the long-term model was established. In the long-term model, the coefficient values of the variables are given, and the rate of influence of the independent variables on the dependent variable is shown. In the analysis, the third method (case 3) and model (4, 3, 3, 4, 3), which express the steady and trend-free state, were chosen. The table of the long-term coefficients created according to the selected model is shown below:

Table 4.10: Model II ARDL Long-Run Coefficients

ARDL Model (4, 3, 3, 4, 3) For Fixed and Trendless Conditions				
Long Run Coefficients				
Variable	Coefficient	Std.Error	t-statistics	Prob.
LNRNNA	0.473397	0.033151	14.28010	0.0001
LNEMP	0.481732	0.061427	7.842365	0.0014
HC	0.248420	0.045816	5.422089	0.0056
LNTAXES	0.058789	0.011381	5.165532	0.0067

Examining the table 4.10 is determined that there is a significant long-term relationship between GDP and capital stock, labour, human capital and tax revenues. Variables affect growth positively. The representation of the equation established according to the model with its coefficients is as follows:

$$\text{LNRGDPNA} = 0.4734 * \text{LNRNNA} + 0.4817 * \text{LNEMP} + 0.2484 * \text{HC} + 0.0588 * \text{LNTAXES} \dots \dots \dots (4.2)$$

According to the equation, in the long run, a 1% change in capital stock causes an increase of 0.4734% in GDP, a 1% change in employment causes an increase of 0.4817%, while a 1% change in human capital causes an increase of 0.2484%, and a 1% increase in tax revenues causes an increase of 0.0587% in GDP. causes an increase.

In the third step of the ARDL model, the short-run coefficients and the error correction term are estimated. Because the economy is generally considered to be in equilibrium in the long run. . However, in some cases, shocks or deviations may occur in the long term. In this case, analysis is made by establishing a short-term regression. Error correction term estimated by short-run regression shows how quickly the shocks or deviations that have occurred are reverted back to their original state. The short-term coefficients and the error correction term of the ARDL model, whose long-term coefficients are estimated above, are given in the table below:

Table 4.11: Model II ARDL Short-Run Coefficients

Model II ECM Short-Run Coefficients				
Dependent Variable D(LnRGDPNA)				
Variable	Coefficient	Std.Error	t-statistics	Prob.
C	3.323671	0.100707	33.00347	0.0000
D(LNMGDPNA(-1))	0.188887	0.022222	8.499909	0.0011
D(LNMGDPNA(-2))	-0.070608	0.013671	-5.164793	0.0067
D(LNMGDPNA(-3))	-0.063761	0.008913	-7.153661	0.0020
D(LNRNNA)	2.515175	0.037788	66.55998	0.0000
D(LNRNNA(-1))	0.308287	0.096955	3.179703	0.0335
D(LNRNNA(-2))	0.387495	0.069238	5.596530	0.0050
D(LNEMP)	-0.047318	0.011537	-4.101435	0.0148
D(LNEMP(-1))	-0.294206	0.018547	-15.86231	0.0001
D(LNEMP(-2))	-0.324590	0.013744	-23.61718	0.0000
D(HC)	1.696863	0.092768	18.29149	0.0001
D(HC(-1))	-1.189099	0.091009	-13.06572	0.0002
D(HC(-2))	0.979600	0.097109	10.08760	0.0005
D(HC(-3))	-0.623088	0.083769	-7.438162	0.0017
D(LNTAXES)	0.119597	0.004209	28.41503	0.0000
D(LNTAXES(-1))	-0.046974	0.003181	-14.76539	0.0001
D(LNTAXES(-2))	0.007317	0.003000	2.438609	0.0713
D2	0.028327	0.002134	13.27690	0.0002
CointEq(-1)*	-0.994566	0.029818	-33.35423	0.0000

CointEq (-1)* means that a one-period lag of the residuals is included in the model. Found to be negative and statistically significant. However, is necessary to test at what significance levels the t statistic value of CointEq(-1)* is significant. For this reason, a boundary test is also needed for the t-statistic. Boundary test results are presented in Table 4.12

Table 4.12: Model II CointEq(-1)* Bound test results

Boundary Test For t-Statistic Value of the Coefficient CointEq(-1)*				
Test statistics	Value	Significant	I(0)Bounds	I(1)Bounds
t-statistic	-33.35423	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6

As a result of the test, the t statistic value (-33.35423) should be above I(0) and I(1). Since the values in the table are negative values, they should be considered as absolute values. Since the t statistic value in absolute value is above the upper critical value at all significance levels, our error correction coefficient is statistically significant. From here is concluded once again that there is a cointegration relationship between the series.

A negative and significant error correction coefficient means: Value of CointEq(-1)* is -0.994566. This corresponds to a value of approximately 1 (1/ 0.994). In other words, means that the deviation from the equilibrium that will occur in the short term improves after 1 year and reaches the long term equilibrium.

On the other hand, when the prob. values are taken into account during the interpretation of the coefficients of the short-term variables in Table 4.11, all variables are significant except for the 2-period delay of tax revenues. When the coefficients are interpreted in short term:

While the 1% increase in the capital stock and its 1-period delay causes an increase of 2.51% and 0.30% in GDP, respectively. Increase in the 2-period lag causes a 0.38% decrease in GDP. Therefore, when the capital stock is increased in the short term during the 2001 crisis, at first it affects the growth at a high rate, then this effect decreases and turns negative.

While the 1% increase in the workforce causes a -0.04% decrease in GDP, the increase in the 1st and 2nd term lag causes a 0.29% and 0.32% decrease, respectively. Therefore, when the labour force is increased in the short-term during the 2001 crisis affects growth negatively and this effect is increasing.

Reason for this is that the increase in the cost of labour during the crisis may cause a decrease in the productivity of the labour force due to low wages and heavy working conditions. In this case, there may be a negative relationship between growth and labour force.

While a 1% increase in Human Capital causes an increase of 1.69% in GDP, the increase in 1 period delay causes a decrease of 1.18% in GDP. 1% increase in the 2-period lag of Hc causes an increase of 0.97% in GDP. 1% increase in the 3-period delay of Hc causes a 0.62% decrease in GDP. Has been determined that increases in human capital follow a fluctuating course in growth. Investments in human capital may not yield immediate and objective results like physical capital. Ultimately, since the subject of human capital is human, is not always certain that it will be as efficient as a machine. Investments made in human beings, which are affected by many reasons such as psychological reasons, crisis environment, political and economic reasons, contain various risks. Ultimately natural and acceptable for the short-term effect to be volatile, since the effects of investments in human capital emerge in the long-term.

Finally, a 1% increase in tax revenues causes an increase of 0.11% in growth. However, a 1% increase in the 1-period delay of tax revenues causes a -0.04% decrease in GDP. Reason for this is that the increase in tax revenues during the crisis period increased the growth performances, albeit slightly. However, increasing tax revenues in the following periods causes both a decrease in disposable income and a decrease in savings. Decrease in savings leads to a decrease in investment potential. As a result of all these, the increase in tax revenues may cause a decrease in GDP in the following period.

4.4.3.5. Model of the 2008 Crisis (Model III)

Model III: $\ln(\text{rgdpna}) = \alpha_0 + \alpha_1 \ln(\text{rrna}) + \alpha_2 \ln(\text{emp}) + \alpha_3(\text{hc}) + \alpha_4(\text{taxes}) + \alpha_5(D_3) + u_t$

Cointegration analysis is required for Model III, which includes the D_3 dummy variable representing the 2008 crisis. Through the analysis, it is aimed to capture the long- and short-term causality relationships.

While performing cointegration analysis with ARDL bounds test method, there is no requirement that the stationarity levels of the variables be the same. F-statistic found during the analysis is compared with the lower limit, which assumes that all series are stationary in level, and the upper limit, which assumes that all series are stationary at first differences. Regression results are determined in table 4.13.

Table 4.13: Model III ARDL Cointegration Boundary Test Results

ARDL Bounds Test Results				
k	F statistics	Significant	I(0)Bounds	I(1)Bounds
4	25.44387	10%	2.752	3.994
		5%	3.354	4.774
		1%	4.768	6.67

When the ARDL bound test results are examined, is determined that the F statistical value is greater than the upper limit I(1) values for all three levels of importance. Null hypothesis H_0 , which states that there is no long-term relationship between the series, is rejected. Accordingly, there is a long-term relationship between the series and it is concluded that the series are cointegrated.

Validity of the established ARDL equation is tested with diagnostic tests such as autocorrelation, varying variance, specification error and normality. Diagnostic statistics table of the equation established within the framework of the ARDL model is shown below.

4.4.3.6. ARDL Model III Diagnostic Statistical Test Results

Table 4.14: Model III Diagnostic Test Statistics

Diagnostic Statistical Test Results		
Test	F-statistic	Prob.
Autocorrelation Test BG	1.229764	0.5376
Varying Variance Test BPG	0.579994	0.8100
Specification Error Test	0.217182	0.8482

When the results in Table 4.14. are examined respectively, the autocorrelation test results are in the first place. Here is seen that the probe value is greater than 0,05 ($p=0.5376$) In this case:

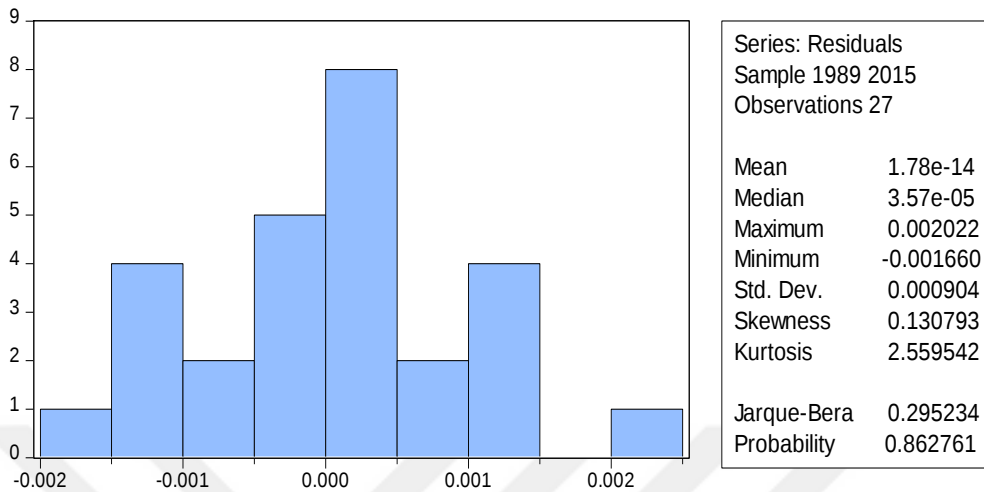
H_0 : no autocorrelation hypothesis accepted, alternative H_1 hypothesis: there is serial correlation hypothesis is rejected. In this case concluded that the time series are free of serial correlation according to the ARDL model.

When the heteroskedasticity test result, which is in the second place in Table 4.14, is examined: probability value is 0.8100, ie $p>0.05$, means that the H_0 hypothesis in the expression "there is no varying variance" cannot be rejected. According to this result, there is no problem of varying variance in the model.

Finally, the Specification Error results in Table 4.14. will be evaluated. Specification error occurs when unnecessary variables are included in the model and necessary variables are not included in the model. This test is done with the help of ramsey reset test. Probability value of the test result is 0.8482, ie $p>0.05$, H_0 means that the hypotsy: "No specification error" cannot be rejected. Thus is concluded that there is no model building error.

Last of the diagnostic tests applied in the thesis is the normality test. After applying the logarithmic transformation to series, histogram graph is examined.

Figure 4.7: Model III normality test



As seen in Figure 4.7, the p-value that corresponds to the Jarque-Bera test statistic is $=0.8627$. In this case, since prop value is greater than 0.05, the H_0 hypothesis will not be rejected, and it will be concluded that the residues are normally distributed.

After this stage is completed, for Model III CUSUM and CUSUM Q tests will be performed to check whether the parameter estimations of the series are stable or not. In other words, the CUSUM test is performed to determine whether the error terms are within the desired limits in the 95% confidence interval. Results of the CUSUM and CUSUM Q tests for the model are shown in the graphs below:

Figure 4.8: Model III CUSUM test results

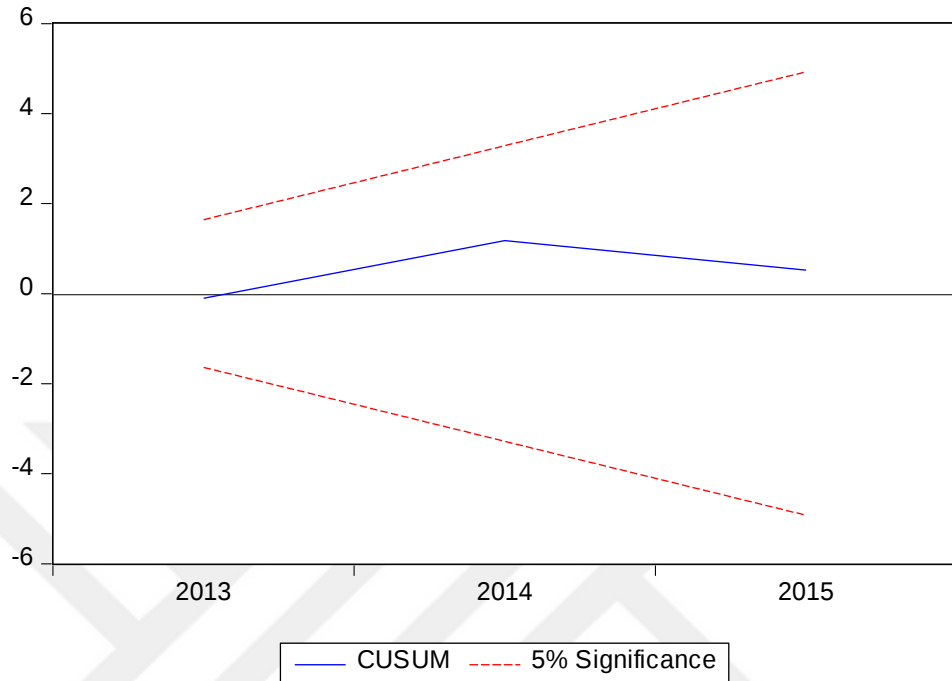


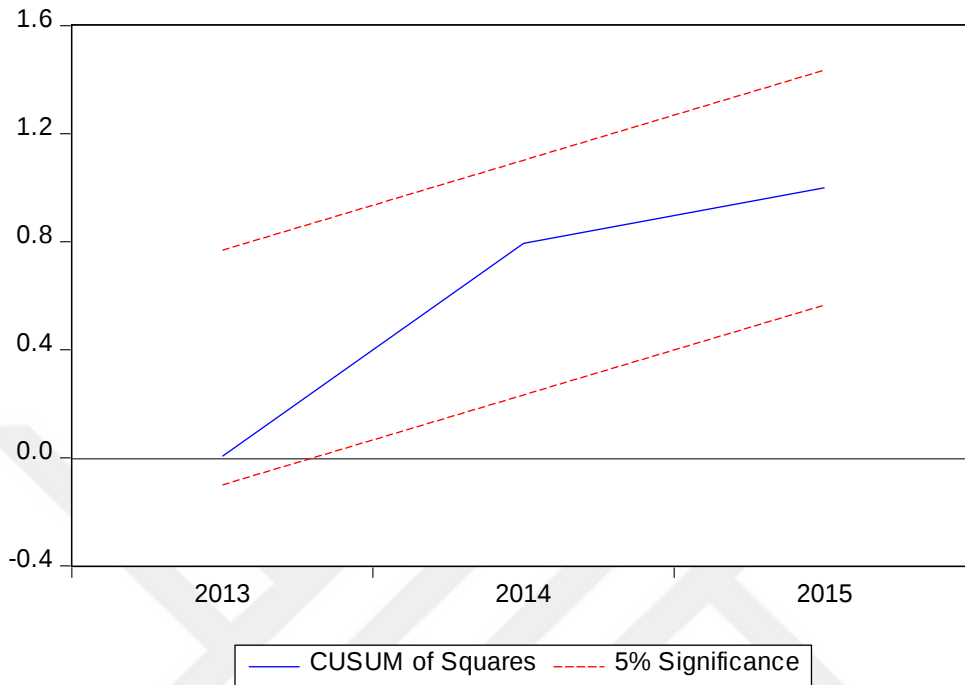
Figure 4.8. CUSUM test results for Model III

The dashed red lines represent the 95% confidence limit. Solid blue line represents the parameter estimate. Since the parameter estimation is between the dashed lines, is determined that the parameter estimation satisfies the stability condition here.

CUSUMQ test, on the other hand, cumulatively shows whether the squares of the error terms are within the desired limits at the 95% confidence interval.

As a result of the CUSUMQ test for Model III, was determined that structural breaks occurred in the years 2012-2013-2014 and the squares of the error terms were not within the confidence limits in these years. For this reason, another dummy variable was added to the model III, unlike the other 2 models, in order to eliminate the problem in the relevant years. Thanks to the dummy variable included in the model as the D_4 variable, the CusumQ test also allowed to obtain results within confidence limits. The test result is shown below.

Figure 4.9: Model III CUSUMQ test results



When the CUSUMQ test results are examined, it is determined that the parameter estimation satisfies the stability condition here, as the parameter estimation is between the dashed lines. According to the CUSUM and CUSUM Q test results, it was determined that the stability condition was provided in the model.

Since there was a cointegration relationship as a result of the boundary test and no problems were found in the diagnostic tests, the long-term model was established. In the long-term model, the coefficient values of the variables are given, and the rate of influence of the independent variables on the dependent variable is shown. In the analysis, the third method (case 3) and model (3, 4, 4, 4, 2), which express the steady and trend-free state, were chosen. The table of the long-term coefficients created according to the selected model is shown below

Table 4.15: Model III ARDL Long-Run Coefficients

ARDL Model (3, 4, 4, 4, 2) For Fixed and Trendless Conditions				
Long Run Coefficients				
Variable	Coefficient	Std.Error	t-statistics	Prob.
LNRNNA	0.613259	0.038592	15.89073	0.0005
LNEMP	0.384124	0.073807	5.204425	0.0138
HC	0.040864	0.102459	0.398829	0.7167
LNTAXES	0.034988	0.014351	2.438059	0.0927

When the table is examined, it is determined that there is a significant long-term relationship between GDP, capital stock and labor at the 5% significance level. There is also a significant relationship between tax revenues and GDP at the 10% significance level. According to the table results, it has been determined that there is no significant relationship between human capital and GDP. Capital stock, labor force and taxes variables affect growth positively. Representation of the equation established according to the model with its coefficients is as follows:

$$\text{LNRGDPNA} = 0.6133 \cdot \text{LNRNNA} + 0.3841 \cdot \text{LNEMP} + 0.0409 \cdot \text{HC} + 0.0350 \cdot \text{LNTAXES} \dots\dots\dots (4.2)$$

According to the equation, a 1% change in the capital stock in the long run causes an increase of 0.6133% in GDP, and a 1% change in employment causes an increase of 0.3841%. 1% increase in tax revenues increases GDP by 0.0350%

In the third step of the ARDL model, short-run coefficients and the error correction term are estimated. Because the economy is generally considered to be in equilibrium in the long run. However, in some cases, shocks or deviations may occur in the long term. In this case, analysis is made by establishing a short-term regression. Error correction term estimated by short-run regression shows how quickly the shocks or deviations that have occurred are reverted back to their original state. Short-term

coefficients and the error correction term of the ARDL model, whose long-term coefficients are estimated above, are given in the table below:

Table 4.16: Model III ARDL Short-Run Coefficients

Model III ECM Short-Run Coefficients Dependent Variable D(LnRGDPNA)				
Variable	Coefficient	Std.Error	t-statistics	Prob.
C	3.564209	0.206739	17.24016	0.0004
D(LNRGDPNA (-1))	0.088379	0.035145	2.514707	0.0866
D(LNRGDPNA (-2))	-0.135878	0.037262	-3.646502	0.0356
D(LNRNNA)	2.476986	0.065235	37.97023	0.0000
D(LNRNNA(-1))	1.777465	0.238618	7.449013	0.0050
D(LNRNNA(-2))	0.283704	0.167881	1.689913	0.1896
D(LNRNNA(-3))	-0.633472	0.118352	-5.352422	0.0128
D(LNEMP)	-0.039338	0.017497	-2.248291	0.1101
D(LNEMP(-1))	-0.197144	0.036837	-5.351747	0.0128
D(LNEMP(-2))	-0.012287	0.025938	-0.473688	0.6681
D(LNEMP(-3))	0.149295	0.021800	6.848470	0.0064
D(HC)	0.450394	0.166230	2.709469	0.0732
D(HC(-1))	-1.266956	0.180286	-7.027489	0.0059
D(HC(-2))	1.393147	0.144363	9.650306	0.0024
D(HC(-3))	0.674243	0.209315	3.221181	0.0485
D(LNTAXES)	0.103385	0.006488	15.93480	0.0005
D(LNTAXES(-1))	-0.026507	0.005621	-4.715665	0.0181
D3	-0.001077	0.002125	-0.506957	0.6471
D4	-0.015476	0.002250	-6.877855	0.0063
CointEq(-1)*	-1.456474	0.084535	-17.22920	0.0004

CointEq (-1)* means that a one-period lag of the residuals is included in the model. Found to be negative and statistically significant. However, is necessary to test at what significance levels the t statistic value of CointEq(-1)* is significant. For this reason, a boundary test is also needed for the t-statistic. Boundary test results are presented in Table 4.17

Table:4.17: Model III CointEq(-1)* Bound test results

Boundary Test For t-Statistic Value of the Coefficient CointEq(-1)*				
Test statistics	Value	Significant	I(0)Bounds	I(1)Bounds
t-statistic	-17.22920	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6

As a result of the test, the t statistic value (-17.22920) should be above I(0) and I(1). Since the values in the table are negative values, they should be considered as absolute values. Since the t statistic value in absolute value is above the upper critical value at all significance levels, our error correction coefficient is statistically significant. From here is concluded once again that there is a cointegration relationship between the series.

If the error correction coefficient is negative and significant, means: value of CointEq(-1)* is -1.456474. This is approximately 0.68(1/1.456) In other words, a deviation from a short-term equilibrium means that it reaches a long-term equilibrium by improving after approximately 0,68 years.

On the other hand, considering the probe values in interpretation of the coefficients of the short-term variables in Table 4.17: except for the two-period lag of the capital stock, significant results were obtained. 1 and 3 period delays in

employment show significant results. 1, 2 and 3 period lags of human capital show significant results. Finally determined that tax revenues and a period delay give significant results. When the coefficients are interpreted, in the short run:

While 1% increase in the capital stock and its 1-period delay causes an increase of 2.47% and 1.77% in GDP, respectively, increase in the 3-period delay causes a 0.63% decrease in GDP. Therefore, when the capital stock is increased in the short term during the 2008 crisis, it first affects growth positively, then this effect decreases and becomes negative. In this period, many developing countries, under the influence of the global crisis, implemented precautionary capital controls due to macroeconomic and financial stability concerns. Thus predicted that it could create a welfare-enhancing effect by mitigating the fluctuations in output and financial variables. This situation may have negative effects on GDP growth. Because countries that implement this situation: they reduce the capital supply, increase the cost of financing, thus increase the financial difficulties faced by domestic firms that cannot access international capital markets. Weaken the position of the markets at the point of decision making, increase the unnecessary bureaucracy, as well as restrict the use of private property rights. Therefore, increases in the capital stock during crisis periods may not cause a continuous increase in GDP.

While 1% increase in the one-term delay of the labor force causes a -0.19% decrease in GDP, increase in the 3-term delay causes an increase of 0.14%. Therefore, when the labour force is increased in the short term during the 2008 crisis, it affects growth negatively. However, the increase in the workforce affects the growth positively in the following period. As a result of directing the workforce to the right areas, can be concluded that the negative effect turns positive.

While the 1% increase in the one-term delay of Human Capital causes a -1.26% decrease in GDP, the increase in the 2-term delay causes an increase of 1.39% in GDP. Increase in the 3-period lag of Hc causes an increase of 0.67% in GDP. Determined that increases in human capital follow a fluctuating course in growth. While the effect was negative at first, it started to give positive results later on. Investments in human capital may not yield immediate results like physical capital. Ultimately, since the

subject of human capital is human, it is not always certain that it will be as efficient as a machine. Investments in human beings, which are affected by many reasons such as psychological reasons, crisis environment, political and economic reasons, contain various risks. Ultimately, it is natural and acceptable for the short-term effect to be volatile, as the effects of investments in human capital emerge in the long-term.

Finally, a 1% increase in tax revenues causes an increase of 0.10% in growth. However, a 1% increase in the 1-period delay of tax revenues causes 0.02% decrease in GDP. Reason for this is: increasing tax revenues in the crisis period may not have increased the growth performances very much, but increasing tax revenues in the following periods causes both a decrease in disposable income and a decrease in savings. Decrease in savings leads to a decrease in investment potential. Consequently of all these, the increase in tax revenues may cause a decrease in GDP in the following period.

CONCLUSION

In the economic growth literature, the relationship between tax revenues and economic growth has been extensively investigated and various conclusions have been reached about the effect of tax revenues on the growth rate. In this thesis, economic crisis factor was integrated into the analysis and how the tax revenue changes affect economic growth during the periods of crises was examined by considering the important financial crises that occurred after 1980s in Turkey.

The Turkish economy has undergone three major crises after 1980s, in 1994, 2001, and 2008, respectively. Each crisis has been followed by a series of measures, which transformed the institutional structure of the economy to a great extent. We set it our goal to understand how tax revenue-economic growth relationship is influenced by the institutional transformation in Turkey during and after each crisis. In order to be able to measure the response by the economy's growth rate, we used the time series analysis technique in the study.

Main hypothesis of our study is that economic crises affect the level of tax revenues and lead to a change in the growth rate. We drew on the Mankiw, Romer and Weil (MRW) growth model in the study. We adopted the MRW model as our base because it is the expanded version of the basic growth (Solow) model. In addition, we added tax revenues and dummy variables to the model, which are not included in the MRW model.

In the research, three different models were created in order to analyze the relationship between crisis, tax revenues and growth. The first of these models (Model I) is the one in which the 1994 crisis is examined. After running the regression, we found that there is a significant long-term relationship between GDP and capital stock, labor and tax revenues. Capital stock and tax revenues affect growth positively. We determined that the most effective variable in this model is the capital stock. Besides, we calculated that the deviation from a given short-term equilibrium will disappear after 0.79 years and the long-term equilibrium will restore. We also calculated that a one-period delay of the increase in tax revenues negatively affects GDP in the short run.

Second model (Model II) included in the analysis is the model in which we examine the 2001 crisis. After the regression analysis was conducted was determined that there is a positive and significant long-term relationship between GDP and the capital stock, labor, human capital, and tax revenues. The variables have a positive impact on growth. On the other hand concluded that deviation from a short-term equilibrium will disappear after 1 year and reach the long-term equilibrium. At the same time, we found that a one-period delay in the increase in tax revenues negatively impacts GDP in the short run.

Lastly, Model III in the study is the model in which the 2008 global financial crisis is included. When our regression analysis results are evaluated, it has been determined that there is a positive and significant long-term relationship between GDP and capital stock, labor and tax revenues in Model III. In addition, has been determined that deviation from short-term balance will improve after approximately 0,68 years and reach long-term equilibrium. In the short-term analysis results, as in the other two models: we found that a one-period delay in the increase in tax revenues negatively impacts GDP in the short run. In the short-term analysis results, as in the other two models: we found that a one-period delay in the increase in tax revenues negatively impacts GDP in the short run.

When the regression analysis results of all three models are evaluated, determined that the effects of national and international crises on tax revenues and growth are positive and significant. In Model I and Model II of 1994 and 2001 national crises, a positive relationship was determined between tax revenues and GDP in the long run and it was determined that the time to reach equilibrium in case of deviation from equilibrium in the economy is not very long. In addition, the econometric analysis results of Model III, which includes the 2008 global crisis, are also similar to national crises. In Model III, a positive and significant relationship was found between tax revenues and GDP in the long run. On the other hand, the common result obtained in all three models is that the increase in tax revenues has a positive effect on GDP, while a one-period delay affects GDP negatively in the short run.

In the context of these results, when the post-crisis tax revenues and GDP indicators are examined together, importance of the relationship between tax revenues and growth emerges. Because crises change the level of tax revenues and this change has a positive effect on economic growth in the long run during national and international crisis periods. In the short run, has been determined that the increase in the one-term lag of data revenues in all three models affects GDP negatively. This situation reveals that the markets adapt to the increases in taxes after a while.

In this thesis analysis that the economic crisis will affect the level of tax revenues and cause a change in economic growth has been carried out with tax revenue figures between 1985 and 2015. However, is possible to apply econometric tests by using different series to represent these variables, taking into account different periods and creating different models. If the variables to be used and the series belonging to them are different, different findings from the findings obtained in this study may be reached, as well as stronger results supporting the findings obtained in the study. In addition, is thought that investigating the relationship between tax revenues-growth and tax revenues-crisis bilaterally will be beneficial for future studies.

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APPENDIX

1.Data

Yillar	rgdpna	rnna	emp	hc	taxes	lnrgdpna	lnrnna	lnemp	Intaxes
1985	494046,47	1384582	15,46264	1,70	1,67E+08	13,11038	14,14091	2,738426	18,9345
1986	528705,19	1447751	16,18182	1,72	1,98E+08	13,17819	14,18552	2,783888	19,1038
1987	578849,06	1569609	16,90976	1,74	2,28E+08	13,2688	14,26634	2,827891	19,2439
1988	591122,69	1681232	17,64684	1,76	2,07E+08	13,28978	14,33504	2,870557	19,1501
1989	592610,25	1791995	18,04006	1,78	2,38E+08	13,29229	14,39884	2,892595	19,2883
1990	647458,19	1927611	17,73917	1,80	3,26E+08	13,38081	14,47179	2,875775	19,6039
1991	653456,88	2054773	18,45911	1,81	3,39E+08	13,39003	14,53568	2,915558	19,6423
1992	692561,63	2187731	18,52493	1,82	3,6E+08	13,44815	14,59838	2,919117	19,7014
1993	748257,63	2370347	17,57106	1,83	4,08E+08	13,5255	14,67855	2,866253	19,8273
1994	707435,19	2494708	18,94999	1,84	3,28E+08	13,4694	14,72968	2,941803	19,6093
1995	758308,38	2633948	19,40966	1,85	3,8E+08	13,53885	14,78399	2,965771	19,7569
1996	811430,31	2800502	19,91108	1,88	4,31E+08	13,60655	14,84531	2,991276	19,8812
1997	872521,31	2994962	19,83241	1,91	4,77E+08	13,67914	14,91244	2,987317	19,9834
1998	899498,44	3158581	20,33533	1,94	5,32E+08	13,70959	14,96563	3,01236	20,0926
1999	870146,31	3266062	20,56672	1,97	5,2E+08	13,67642	14,9991	3,023674	20,0696
2000	930475,69	3429467	20,0926	2,00	6,03E+08	13,74345	15,04792	3,000351	20,2181
2001	876973,25	3493476	20,01252	2,02	4,49E+08	13,68423	15,06641	2,996358	19,9221
2002	933518,00	3602913	19,85468	2,04	5,39E+08	13,74672	15,09725	2,98844	20,1055
2003	987318,56	3765195	19,66734	2,06	7,49E+08	13,80275	15,14131	2,978959	20,4336
2004	1084035,63	4023996	19,57111	2,08	9,2E+08	13,8962	15,20779	2,974055	20,6397
2005	1181515,50	4341695	20,06699	2,10	1,11E+09	13,98231	15,28378	2,999076	20,8312
2006	1263607,00	4707135	20,44686	2,13	1,29E+09	14,04948	15,36459	3,017829	20,9761
2007	1327337,13	5073961	20,76623	2,15	1,55E+09	14,09869	15,43963	3,033328	21,1631
2008	1338155,38	5397748	21,22535	2,17	1,66E+09	14,1068	15,50149	3,055196	21,2312
2009	1273614,00	5583884	21,26008	2,19	1,45E+09	14,05737	15,5354	3,056831	21,0928
2010	1380942,88	5864575	22,58152	2,21	1,76E+09	14,13828	15,58444	3,117132	21,2903
2011	1535609,75	6262001	24,07617	2,25	1,85E+09	14,24444	15,65001	3,181222	21,3389
2012	1609142,50	6653205	24,79815	2,28	1,89E+09	14,29121	15,71061	3,210769	21,3575
2013	1745691,38	7124775	25,523	2,31	2,03E+09	14,37266	15,77909	3,23958	21,4319
2014	1831923,63	7612427	25,931	2,34	1,9E+09	14,42088	15,84529	3,255439	21,3653
2015	1943386,63	8153165	26,62	2,38	1,77E+09	14,47994	15,91392	3,281663	21,2936

2. Model I Econometric Analysis Results

Dependent Variable: LOGRGDPNA
 Method: ARDL
 Date: 10/09/22 Time: 17:08
 Sample (adjusted): 1989 2015
 Included observations: 27 after adjustments
 Maximum dependent lags: 3 (Automatic selection)
 Model selection method: Schwarz criterion (SIC)
 Dynamic regressors (4 lags, automatic): LOGRNNA LOGEMP HC
 LOGTAXES
 Fixed regressors: D1 C
 Number of models evaluated: 1875
 Selected Model: ARDL(3, 3, 3, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOGRGDPNA(-1)	-0.258326	0.061869	-4.175389	0.0140
LOGRGDPNA(-2)	0.199911	0.085313	2.343265	0.0791
LOGRGDPNA(-3)	-0.202749	0.036780	-5.512440	0.0053
LOGRNNA	2.701161	0.068726	39.30337	0.0000
LOGRNNA(-1)	-0.322487	0.237356	-1.358664	0.2458
LOGRNNA(-2)	-2.483250	0.364705	-6.808922	0.0024
LOGRNNA(-3)	0.785373	0.225205	3.487373	0.0252
LOGEMP	0.091486	0.030527	2.996912	0.0401
LOGEMP(-1)	-0.111987	0.059110	-1.894555	0.1311
LOGEMP(-2)	0.209978	0.040153	5.229460	0.0064
LOGEMP(-3)	0.231858	0.031585	7.340742	0.0018
HC	1.472227	0.210424	6.996473	0.0022
HC(-1)	-2.527140	0.323430	-7.813573	0.0014
HC(-2)	1.953547	0.228653	8.543726	0.0010
HC(-3)	-0.169886	0.339820	-0.499929	0.6434
HC(-4)	-0.658519	0.219780	-2.996270	0.0401
LOGTAXES	0.063282	0.006417	9.861705	0.0006
LOGTAXES(-1)	-0.062947	0.007828	-8.040962	0.0013
LOGTAXES(-2)	0.028874	0.007563	3.817913	0.0188
LOGTAXES(-3)	0.045975	0.008862	5.188072	0.0066
LOGTAXES(-4)	0.017130	0.004837	3.541746	0.0240
D1	-0.056828	0.008111	-7.006317	0.0022
C	3.643122	0.428454	8.502941	0.0010
R-squared	0.999997	Mean dependent var	13.84563	
Adjusted R-squared	0.999981	S.D. dependent var	0.345310	
S.E. of regression	0.001509	Akaike info criterion	-10.36034	
Sum squared resid	9.11E-06	Schwarz criterion	-9.256477	
Log likelihood	162.8646	Hannan-Quinn criter.	-10.03210	
F-statistic	61870.53	Durbin-Watson stat	2.644995	
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model

3. Model I ARDL Long Run Form and Bounds Test

ARDL Long Run Form and Bounds Test
 Dependent Variable: D(LOGRGDPNA)
 Selected Model: ARDL(3, 3, 3, 4, 4)
 Case 3: Unrestricted Constant and No Trend
 Date: 10/09/22 Time: 17:25
 Sample: 1985 2015
 Included observations: 27

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.643122	0.428454	8.502940	0.0010
LOGRGDPNA(-1)*	-1.261164	0.090834	-13.88422	0.0002
LOGRNNA(-1)	0.680797	0.053449	12.73726	0.0002
LOGEMP(-1)	0.421336	0.027870	15.11775	0.0001
HC(-1)	0.070228	0.065884	1.065944	0.3465
LOGTAXES(-1)	0.092313	0.011056	8.349691	0.0011
D(LOGRGDPNA(-1))	0.002838	0.064503	0.044000	0.9670
D(LOGRGDPNA(-2))	0.202749	0.036780	5.512440	0.0053
D(LOGRNNA)	2.701161	0.068726	39.30337	0.0000
D(LOGRNNA(-1))	1.697876	0.194977	8.708085	0.0010
D(LOGRNNA(-2))	-0.785373	0.225205	-3.487373	0.0252
D(LOGEMP)	0.091486	0.030527	2.996911	0.0401
D(LOGEMP(-1))	-0.441837	0.051723	-8.542352	0.0010
D(LOGEMP(-2))	-0.231858	0.031585	-7.340741	0.0018
D(HC)	1.472226	0.210424	6.996472	0.0022
D(HC(-1))	-1.125142	0.158245	-7.110131	0.0021
D(HC(-2))	0.828405	0.192660	4.299838	0.0126
D(HC(-3))	0.658519	0.219780	2.996269	0.0401
D(LOGTAXES)	0.063282	0.006417	9.861704	0.0006
D(LOGTAXES(-1))	-0.091979	0.010823	-8.498844	0.0011
D(LOGTAXES(-2))	-0.063105	0.010737	-5.877564	0.0042
D(LOGTAXES(-3))	-0.017130	0.004837	-3.541745	0.0240
D1	-0.056828	0.008111	-7.006316	0.0022

* p-value incompatible with t-Bounds distribution.

Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGRNNA	0.539816	0.017512	30.82584	0.0000
LOGEMP	0.334085	0.026697	12.51391	0.0002
HC	0.055685	0.049635	1.121905	0.3247
LOGTAXES	0.073197	0.010435	7.014280	0.0022

EC = LOGRGDPNA - (0.5398*LOGRNNA + 0.3341*LOGEMP + 0.0557*HC + 0.0732*LOGTAXES)

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-Statistic	128.6746	10%	2.45	3.52
k	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06
Finite Sample: n=35				
Actual Sample Size	27	10%	2.696	3.898
		5%	3.276	4.63
		1%	4.59	6.368
Finite Sample: n=30				
		10%	2.752	3.994
		5%	3.354	4.774
		1%	4.768	6.67
t-Bounds Test				
Null Hypothesis: No levels relationship				
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-13.88422	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6

4. Model I ARDL Error Correction Regression

ARDL Error Correction Regression
Dependent Variable: D(LOGRGDPNA)
Selected Model: ARDL(3, 3, 3, 4, 4)
Case 3: Unrestricted Constant and No Trend
Date: 10/09/22 Time: 17:34
Sample: 1985 2015
Included observations: 27

ECM Regression				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.643122	0.101734	35.81039	0.0000
D(LOGRGDPNA(-1))	0.002838	0.022404	0.126679	0.9053
D(LOGRGDPNA(-2))	0.202749	0.018059	11.22705	0.0004
D(LOGRNNA)	2.701161	0.032193	83.90475	0.0000
D(LOGRNNA(-1))	1.697876	0.116283	14.60129	0.0001
D(LOGRNNA(-2))	-0.785373	0.065577	-11.97644	0.0003
D(LOGEMP)	0.091486	0.013430	6.812130	0.0024

D(LOGEMP(-1))	-0.441837	0.022597	-19.55310	0.0000
D(LOGEMP(-2))	-0.231858	0.012336	-18.79457	0.0000
D(HC)	1.472226	0.080876	18.20351	0.0001
D(HC(-1))	-1.125142	0.090330	-12.45595	0.0002
D(HC(-2))	0.828405	0.099683	8.310428	0.0011
D(HC(-3))	0.658519	0.103445	6.365868	0.0031
D(LOGTAXES)	0.063282	0.003496	18.10118	0.0001
D(LOGTAXES(-1))	-0.091979	0.003337	-27.56549	0.0000
D(LOGTAXES(-2))	-0.063105	0.003971	-15.89033	0.0001
D(LOGTAXES(-3))	-0.017130	0.002131	-8.037554	0.0013
D1	-0.056828	0.003320	-17.11700	0.0001
CointEq(-1)*	-1.261164	0.035158	-35.87124	0.0000

R-squared	0.999842	Mean dependent var	0.044080
Adjusted R-squared	0.999487	S.D. dependent var	0.047134
S.E. of regression	0.001067	Akaike info criterion	-10.65663
Sum squared resid	9.11E-06	Schwarz criterion	-9.744749
Log likelihood	162.8646	Hannan-Quinn criter.	-10.38548
F-statistic	2817.454	Durbin-Watson stat	2.644995
Prob(F-statistic)	0.000000		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	128.6746	10%	2.45	3.52
k	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

t-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-35.87124	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6

5. Model II Econometric Analysis Results

Dependent Variable: LNRGDPNA
Method: ARDL
Date: 10/10/22 Time: 20:25
Sample (adjusted): 1989 2015
Included observations: 27 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Schwarz criterion (SIC)
Dynamic regressors (4 lags, automatic): LNRNNA LNEMP HC LNTAXES

Fixed regressors: D2 C
Number of models evaluated: 2500
Selected Model: ARDL(4, 3, 3, 4, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNRGDPNA(-1)	0.194321	0.078491	2.475716	0.0685
LNRGDPNA(-2)	-0.259496	0.050621	-5.126229	0.0069
LNRGDPNA(-3)	0.006848	0.021179	0.323312	0.7627
LNRGDPNA(-4)	0.063761	0.015821	4.030213	0.0157
LNRNNA	2.515175	0.082598	30.45096	0.0000
LNRNNA(-1)	-1.736063	0.234102	-7.415846	0.0018
LNRNNA(-2)	0.079207	0.246101	0.321849	0.7637
LNRNNA(-3)	-0.387495	0.156769	-2.471757	0.0688
LNEMP	-0.047318	0.021109	-2.241564	0.0885
LNEMP(-1)	0.232226	0.025773	9.010399	0.0008
LNEMP(-2)	-0.030384	0.026833	-1.132334	0.3208
LNEMP(-3)	0.324590	0.042596	7.620110	0.0016
HC	1.696863	0.266401	6.369581	0.0031
HC(-1)	-2.638892	0.379507	-6.953466	0.0022
HC(-2)	2.168699	0.229469	9.450965	0.0007
HC(-3)	-1.602688	0.298915	-5.361678	0.0058
HC(-4)	0.623088	0.194530	3.203043	0.0328
LNTAXES	0.119597	0.011604	10.30647	0.0005
LNTAXES(-1)	-0.108101	0.010326	-10.46888	0.0005
LNTAXES(-2)	0.054291	0.008236	6.592241	0.0027
LNTAXES(-3)	-0.007317	0.006323	-1.157067	0.3116
D2	0.028327	0.004778	5.928790	0.0041
C	3.323671	0.501593	6.626235	0.0027
R-squared	0.999997	Mean dependent var	13.84563	
Adjusted R-squared	0.999979	S.D. dependent var	0.345310	
S.E. of regression	0.001586	Akaike info criterion	-10.26147	
Sum squared resid	1.01E-05	Schwarz criterion	-9.157613	
Log likelihood	161.5299	Hannan-Quinn criter.	-9.933238	
F-statistic	56046.37	Durbin-Watson stat	3.642940	
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model selection.

6. Model II ARDL Long Run Form and Bounds Test

ARDL Long Run Form and Bounds Test
 Dependent Variable: D(LNRGDPNA)
 Selected Model: ARDL(4, 3, 3, 4, 3)
 Case 3: Unrestricted Constant and No Trend
 Date: 10/10/22 Time: 20:32
 Sample: 1985 2015
 Included observations: 27

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.323671	0.501593	6.626235	0.0027
LNRGDPNA(-1)*	-0.994566	0.114248	-8.705328	0.0010
LNRNNA(-1)	0.470824	0.072328	6.509618	0.0029
LNEMP(-1)	0.479114	0.034619	13.83948	0.0002
HC(-1)	0.247070	0.061488	4.018149	0.0159
LNTAXES(-1)	0.058470	0.009148	6.391411	0.0031
D(LNRGDPNA(-1))	0.188887	0.059244	3.188313	0.0333
D(LNRGDPNA(-2))	-0.070608	0.025358	-2.784499	0.0496
D(LNRGDPNA(-3))	-0.063761	0.015821	-4.030213	0.0157
D(LNRNNA)	2.515175	0.082598	30.45096	0.0000
D(LNRNNA(-1))	0.308287	0.180339	1.709488	0.1625
D(LNRNNA(-2))	0.387495	0.156769	2.471757	0.0688
D(LNEMP)	-0.047318	0.021109	-2.241564	0.0885
D(LNEMP(-1))	-0.294206	0.045987	-6.397656	0.0031
D(LNEMP(-2))	-0.324590	0.042596	-7.620110	0.0016
D(HC)	1.696863	0.266401	6.369581	0.0031
D(HC(-1))	-1.189099	0.177681	-6.692309	0.0026
D(HC(-2))	0.979600	0.206723	4.738700	0.0090
D(HC(-3))	-0.623088	0.194530	-3.203043	0.0328
D(LNTAXES)	0.119597	0.011604	10.30647	0.0005
D(LNTAXES(-1))	-0.046974	0.006986	-6.723822	0.0025
D(LNTAXES(-2))	0.007317	0.006323	1.157067	0.3116
D2	0.028327	0.004778	5.928790	0.0041

* p-value incompatible with t-Bounds distribution.

Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRNNA	0.473397	0.033151	14.28010	0.0001
LNEMP	0.481732	0.061427	7.842365	0.0014
HC	0.248420	0.045816	5.422089	0.0056
LNTAXES	0.058789	0.011381	5.165532	0.0067

EC = LNRGDPNA - (0.4734*LNRNNA + 0.4817*LNEMP + 0.2484*HC + 0.0588
 *LNTAXES)

7. Model II ARDL Error Correction Regression

ARDL Error Correction Regression

Dependent Variable: D(LNRGDPNA)

Selected Model: ARDL(4, 3, 3, 4, 3)

Case 3: Unrestricted Constant and No Trend

Date: 10/10/22 Time: 20:36

Sample: 1985 2015

Included observations: 27

ECM Regression				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.323671	0.100707	33.00347	0.0000
D(LNRGDPNA(-1))	0.188887	0.022222	8.499909	0.0011
D(LNRGDPNA(-2))	-0.070608	0.013671	-5.164793	0.0067
D(LNRGDPNA(-3))	-0.063761	0.008913	-7.153661	0.0020
D(LNRNNA)	2.515175	0.037788	66.55998	0.0000
D(LNRNNA(-1))	0.308287	0.096955	3.179703	0.0335
D(LNRNNA(-2))	0.387495	0.069238	5.596530	0.0050
D(LNEMP)	-0.047318	0.011537	-4.101435	0.0148
D(LNEMP(-1))	-0.294206	0.018547	-15.86231	0.0001
D(LNEMP(-2))	-0.324590	0.013744	-23.61718	0.0000
D(HC)	1.696863	0.092768	18.29149	0.0001
D(HC(-1))	-1.189099	0.091009	-13.06572	0.0002
D(HC(-2))	0.979600	0.097109	10.08760	0.0005
D(HC(-3))	-0.623088	0.083769	-7.438162	0.0017
D(LNTAXES)	0.119597	0.004209	28.41503	0.0000
D(LNTAXES(-1))	-0.046974	0.003181	-14.76539	0.0001
D(LNTAXES(-2))	0.007317	0.003000	2.438609	0.0713
D2	0.028327	0.002134	13.27690	0.0002
CointEq(-1)*	-0.994566	0.029818	-33.35423	0.0000
R-squared	0.999826	Mean dependent var		0.044080
Adjusted R-squared	0.999434	S.D. dependent var		0.047134
S.E. of regression	0.001121	Akaike info criterion		-10.55777
Sum squared resid	1.01E-05	Schwarz criterion		-9.645885
Log likelihood	161.5299	Hannan-Quinn criter.		-10.28662
F-statistic	2552.193	Durbin-Watson stat		3.642940
Prob(F-statistic)	0.000000			

* p-value incompatible with t-Bounds distribution.

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	111.2504	10%	2.45	3.52
k	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)

t-statistic	-33.35423	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6

8. Model III Econometric Analysis Results

Dependent Variable: LNRGDPNA

Method: ARDL

Date: 10/13/22 Time: 20:17

Sample (adjusted): 1989 2015

Included observations: 27 after adjustments

Maximum dependent lags: 3 (Automatic selection)

Model selection method: Schwarz criterion (SIC)

Dynamic regressors (4 lags, automatic): LNRNNA LNEMP HC LNTAXES

Fixed regressors: D3 D4 C

Number of models evaluated: 1875

Selected Model: ARDL(3, 4, 4, 4, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNRGDPNA(-1)	-0.368095	0.164999	-2.230885	0.1119
LNRGDPNA(-2)	-0.224257	0.084315	-2.659764	0.0764
LNRGDPNA(-3)	0.135878	0.111167	1.222279	0.3089
LNRNNA	2.476986	0.191194	12.95537	0.0010
LNRNNA(-1)	0.193675	0.742560	0.260821	0.8111
LNRNNA(-2)	-1.493762	0.538398	-2.774455	0.0693
LNRNNA(-3)	-0.917176	0.561106	-1.634586	0.2006
LNRNNA(-4)	0.633472	0.389055	1.628234	0.2020
LNEMP	-0.039338	0.034219	-1.149598	0.3336
LNEMP(-1)	0.401660	0.053036	7.573281	0.0048
LNEMP(-2)	0.184857	0.093668	1.973534	0.1430
LNEMP(-3)	0.161582	0.062694	2.577295	0.0820
LNEMP(-4)	-0.149295	0.056882	-2.624663	0.0787
HC	0.450394	0.441191	1.020861	0.3825
HC(-1)	-1.657833	0.684891	-2.420578	0.0941
HC(-2)	2.660103	0.484733	5.487764	0.0119
HC(-3)	-0.718904	0.671129	-1.071187	0.3626
HC(-4)	-0.674243	0.501684	-1.343958	0.2716
LNTAXES	0.103385	0.024129	4.284626	0.0234
LNTAXES(-1)	-0.078934	0.012689	-6.220697	0.0084
LNTAXES(-2)	0.026507	0.012618	2.100680	0.1265
D3	-0.001077	0.003898	-0.276315	0.8002
D4	-0.015476	0.004503	-3.436746	0.0413
C	3.564209	0.802244	4.442798	0.0212
R-squared	0.999993	Mean dependent var	13.84563	
Adjusted R-squared	0.999941	S.D. dependent var	0.345310	
S.E. of regression	0.002660	Akaike info criterion	-9.440506	
Sum squared resid	2.12E-05	Schwarz criterion	-8.288651	
Log likelihood	151.4468	Hannan-Quinn criter.	-9.097999	
F-statistic	19051.55	Durbin-Watson stat	3.263916	
Prob(F-statistic)	0.000001			

*Note: p-values and any subsequent tests do not account for model selection.

9. Model III ARDL Long Run Form and Bounds Test

ARDL Long Run Form and Bounds Test

Dependent Variable: D(LNRGDPNA)

Selected Model: ARDL(3, 4, 4, 4, 2)

Case 3: Unrestricted Constant and No Trend

Date: 10/13/22 Time: 20:25

Sample: 1985 2015

Included observations: 27

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.564210	0.802244	4.442798	0.0212
LNRGDPNA(-1)*	-1.456474	0.142669	-10.20873	0.0020
LNRNNA(-1)	0.893196	0.093746	9.527859	0.0025
LNEMP(-1)	0.559467	0.112421	4.976536	0.0156
HC(-1)	0.059517	0.150734	0.394846	0.7194
LNTAXES(-1)	0.050958	0.021244	2.398702	0.0960
D(LNRGDPNA(-1))	0.088380	0.136162	0.649075	0.5626
D(LNRGDPNA(-2))	-0.135878	0.111167	-1.222278	0.3089
D(LNRNNA)	2.476986	0.191194	12.95537	0.0010
D(LNRNNA(-1))	1.777465	0.546260	3.253879	0.0474
D(LNRNNA(-2))	0.283704	0.280959	1.009768	0.3870
D(LNRNNA(-3))	-0.633472	0.389055	-1.628234	0.2020
D(LNEMP)	-0.039338	0.034219	-1.149598	0.3336
D(LNEMP(-1))	-0.197144	0.106960	-1.843165	0.1625
D(LNEMP(-2))	-0.012287	0.079707	-0.154150	0.8873
D(LNEMP(-3))	0.149295	0.056882	2.624663	0.0787
D(HC)	0.450394	0.441191	1.020861	0.3825
D(HC(-1))	-1.266956	0.406356	-3.117846	0.0526
D(HC(-2))	1.393147	0.321364	4.335104	0.0226
D(HC(-3))	0.674242	0.501684	1.343958	0.2716
D(LNTAXES)	0.103385	0.024129	4.284625	0.0234
D(LNTAXES(-1))	-0.026507	0.012618	-2.100680	0.1265
D3	-0.001077	0.003898	-0.276314	0.8002
D4	-0.015476	0.004503	-3.436746	0.0413

* p-value incompatible with t-Bounds distribution.

Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRNNA	0.613259	0.038592	15.89073	0.0005
LNEMP	0.384124	0.073807	5.204425	0.0138
HC	0.040864	0.102459	0.398829	0.7167
LNTAXES	0.034988	0.014351	2.438059	0.0927

EC = LNRGDPNA - (0.6133*LNRNNA + 0.3841*LNEMP + 0.0409*HC + 0.0350
*LNTAXES)

F-Bounds Test

Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	25.44387	10%	2.45	3.52
k	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06
Finite Sample: n=35				
Actual Sample Size	27	10%	2.696	3.898
		5%	3.276	4.63
		1%	4.59	6.368
Finite Sample: n=30				
		10%	2.752	3.994
		5%	3.354	4.774
		1%	4.768	6.67
t-Bounds Test				
Null Hypothesis: No levels relationship				
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-10.20873	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6

10. Model III ARDL Error Correction Regression

ARDL Error Correction Regression
Dependent Variable: D(LNRGDPNA)
Selected Model: ARDL(3, 4, 4, 4, 2)
Case 3: Unrestricted Constant and No Trend
Date: 10/13/22 Time: 20:31
Sample: 1985 2015
Included observations: 27

ECM Regression				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.564209	0.206739	17.24016	0.0004
D(LNRGDPNA(-1))	0.088379	0.035145	2.514707	0.0866
D(LNRGDPNA(-2))	-0.135878	0.037262	-3.646502	0.0356
D(LNRNNA)	2.476986	0.065235	37.97023	0.0000
D(LNRNNA(-1))	1.777465	0.238618	7.449013	0.0050
D(LNRNNA(-2))	0.283704	0.167881	1.689913	0.1896
D(LNRNNA(-3))	-0.633472	0.118352	-5.352422	0.0128
D(LNEMP)	-0.039338	0.017497	-2.248291	0.1101
D(LNEMP(-1))	-0.197144	0.036837	-5.351747	0.0128
D(LNEMP(-2))	-0.012287	0.025938	-0.473688	0.6681

D(LNEMP(-3))	0.149295	0.021800	6.848470	0.0064
D(HC)	0.450394	0.166230	2.709469	0.0732
D(HC(-1))	-1.266956	0.180286	-7.027489	0.0059
D(HC(-2))	1.393147	0.144363	9.650306	0.0024
D(HC(-3))	0.674243	0.209315	3.221181	0.0485
D(LNTAXES)	0.103385	0.006488	15.93480	0.0005
D(LNTAXES(-1))	-0.026507	0.005621	-4.715665	0.0181
D3	-0.001077	0.002125	-0.506957	0.6471
D4	-0.015476	0.002250	-6.877855	0.0063
CointEq(-1)*	-1.456474	0.084535	-17.22920	0.0004

R-squared	0.999633	Mean dependent var	0.044080
Adjusted R-squared	0.998635	S.D. dependent var	0.047134
S.E. of regression	0.001741	Akaike info criterion	-9.736802
Sum squared resid	2.12E-05	Schwarz criterion	-8.776923
Log likelihood	151.4468	Hannan-Quinn criter.	-9.451380
F-statistic	1002.270	Durbin-Watson stat	3.263916
Prob(F-statistic)	0.000000		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	25.44387	10%	2.45	3.52
k	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-17.22920	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6