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Relationship Between Tax Accrual/ Correction Rate and Economic Growth

Vergi Tahakkuk/ Tahsil Oranı ve Ekonomik Büyüme İlişkisi

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Öz

Tax revenues are one of the main factors necessary for the continuation of the economic activities of the countries. Tax revenues are of vital importance for countries. Collection of all accrued taxes increases public revenues. However, not all accrued taxes can be collected. In the study, the relationship between the accrual/collection rate of taxes and economic growth was investigated using annual data for the period 1970-2020. ARDL Boundary Test is used to investigate the relationship between the variables. According to the results of the study, there is a significant long-term relationship between tax collection rates and economic growth. In addition, according to the results of the long-term coefficient equation, a positive and significant result was determined between the accrual/collection rate of taxes and economic growth.

Jel Codes: *C54, E62, H22, H30, O10*
Keywords: *Tax, Accrual, Collection, Economic Growth, ARDL Bounds Test*

Abstract

Vergi gelirleri ülkelerin ekonomik faaliyetlerinin devam etmesi için gerekli olan temel faktörlerden biridir. Vergi gelirleri ülkeler açısından hayati önem taşımaktadır. Tahakkuk eden vergilerin tamamının tahsil edilmesi kamu gelirlerini artırmaktadır. Ancak tahakkuk eden vergilerin tamamı tahsil edilememektedir. Çalışmada vergilerin tahakkuk/tahsil oranı ile ekonomik büyüme arasındaki ilişki 1970-2020 dönemi için yıllık veriler kullanılarak araştırılmıştır. Değişkenler arasındaki ilişkinin araştırılması için ise ARDL Sınır Testi kullanılmıştır. Çalışmanın sonucuna göre vergi tahsilat oranları ile ekonomik büyüme arasında uzun dönemli anlamlı bir ilişki söz konusudur. Ayrıca uzun dönem katsayı denklemi sonuçlarına göre vergilerin tahakkuk/tahsilat oranı ile ekonomik büyüme arasında pozitif ve anlamlı sonuç tespit edilmiştir.

Jel Kodları: *C54, E62, H22, H30, O10*
Anahtar Kelimeler: *Vergi, Tahakkuk, Tahsilat, Ekonomik Büyüme, ARDL Sınır Testi*

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1. Introduction

The state is obliged to obtain income to finance its expenditures in order to fulfill its duties. The revenues that the state and other public institutions collect from various sources by force, based on their sovereign power within the framework of the law and all the revenues obtained from aid and donations without the use of sovereign power are called public revenues. Public revenues consist of taxes, duties, fees, goodwill, and parafiscal revenues, fund revenues, emission and devaluation revenues, financial monopoly revenues, compulsory and non-compulsory borrowing, property and enterprise revenues, privatization revenues, and fines. In public finance terminology, when public revenues are mentioned, the first connotation is taxes. Taxation is the foremost of the sovereign rights of a state. The interest in tax has led many authors to make various tax definitions. Guston Jeze defines tax as "*Tax is a monetary obligation demanded from individuals, compelled, final and gratuitous in order to meet public expenses*" (Türk, 2002:11), while Gerloff defines tax as "*meeting public needs or other purposes of the public economy and it is the payments imposed on other economic units by public entities for the realization of social aims, obligatory and without any special compensation*" (Turhan, 1979: 27-28).

Taxation has substantial economic, social and political consequences. Supply and demand expansion or contraction can be realized through taxation. Taxation can also act as a transmission mechanism for the state to fulfill its social responsibilities. Based on the understanding of "*equal treatment for every citizen*", the state should transfer some of the tax it collects from the upper-income groups to the lower-income groups in order to provide basic public service needs to all income groups and to offer the opportunities that the upper-income groups have, especially to the citizens in the lower-income groups through taxation. Additionally, it is known that tax policy affects the growth rate and the general level of national income in various ways. For instance, growth policies can be implemented through public savings shaped after taxes. Taxes affect economic growth through the economic decisions of individuals and firms such as saving, consumption, and investment motivations and change in the resource distribution (Myles, 2009: 6). Also, a sound tax policy can encourage labor force participation and people working longer hours. According to Stiglitz (2000: 699), the positive effect created in the labor force through the accurate tax policies –called the income effect- will increase the national income, and in the short term, the participation rate and participation hours will increase which will additively mean more savings, investment as well as higher productivity and thus growth rate will increase. Finally, taxation can also affect investments in research and development and increase the productivity rate, which in doing so can affect the growth rate in the long run.

This close theme of the taxation and growth relationship has been a topic that has been frequently discussed in the literature for the last three decades. Econometric studies in the field mostly focus on the analysis of tax revenues/revenue losses, tax composition, distortionary taxes, tax types, and economic growth relationships. However, the empirical analysis of the relationship between either tax accrual or tax collection with growth has not been paid much attention in countries like Turkey where accrual and/or collection basis is accepted. In addition to this deficiency in the literature, the repetition of the importance given

to the growth-oriented tax within the framework of the tenth and eleventh development plans in Turkey, and the consideration of the ratio of the unpaid tax amount to the accrued tax as an indicator related to economic growth, especially in the Program for Increasing the Quality of Public Revenues, constitute the main motivations of this study. In this respect, the aim of this study is to reveal the relationship between tax accrual/collection rate and economic growth. The aforementioned tie is examined with the ARDL Boundary Test, using annual data for the period 1970-2020. In this context, the study consists of five sections. In the first section, the functions of tax are discussed. While the second section is about both the tax accrual and tax collection terms and the relationship between these concepts and economic growth, the third part includes studies that make a relationship between tax and growth, as well as a relatively small number of studies that investigate the relationship between accrual/collection rate and growth. In the fourth section the data set, methodology, and findings are introduced. Eventually, while the conclusion section draws the framework for the outputs of the study in general, the contributions are also explained within the scope of the related discussions.

2. Functions of Taxation

The monetary values that the state collects on the basis of the law without promising to provide a public service from its taxpayers in order to intervene in the economic and social life are defined as taxes in accordance with Article 73 of the 1982 Constitution. Magna Carta, which was imposed in 1215 with the insurrection of the house of commons against the homeless John, both shaped the rights and freedoms of individuals in taxation and drew the limits of the goods and services that the state could offer by using taxes (Magna Carta Libertatum Article 4-5). The understanding adopted here is based on the traditional economic perspective that dominated the period and the role of the state in a perfectly functioning market mechanism. Because, while the conditions of perfect competition as well as full employment are valid in the classical economy approach, it requires the tax to be collected as small as possible taxes could have distorting effects on the economic agents, consumers, and producers (Smith, 1776:362). Adam Smith (1776:828), the founder of the classical economic system, also claimed that taxes should be collected in a way that maximizes the benefit of the whole society, with the least discomfort, at the least cost, and taken voluntarily (1776:697) according to the ability to pay (1776:392-393). These principles put forward for taxation also gave clues about what the tax functions of the classics are supposed to be. He claims that taxes are collected to provide citizens with the necessities of life (1776: 690), to regulate equality (696), to provide an effective balance in production and consumption (1776: 698), to finance expensive wars and to ensure independence, and to pay their debts (1776: 706). The reasons are the factors that can be counted within the scope of the tax fiscal function.

The Great Depression was a period when it became clear that the Classical System was helpless in the face of conjuncture waves and this Depression, and that the crisis could not be resolved with classical explanations and prescriptions. Keynes (1936:15-17) stated that in an order where there is no state intervention, even when there are perfect competition conditions in the goods and factor markets, full employment balance cannot be achieved due to the insufficiency of effective demand, and the state should intervene in the economy

through valid fiscal policies. With the destruction of this understanding of tax neutrality by the Keynesian school and the emphasis on the economic and social purposes of tax as well as the fiscal purposes, the fundamental logic of taxation progressed, and extrafiscal functions such as distribution of some of the collected taxes to low-income people through transfer expenditures.

With the market failure, which is the main contribution of the Neo-Classical school, the development of the minimal role assigned to the state and the direction and completion of the market mechanism with public policies have led to the development of the weight of both the fiscal and extrafiscal functions of the tax. According to Ramsey (1927), every optimal tax plan within tax policies tries to produce results that maximize social welfare despite a number of constraints it encounters. Concordantly, the classification made by Richard Musgrave in his work "*The Theory of Public Finance: A Study in Public Economy*" in 1959 is a classic in dealing with the function of the state in the economy. These functions are listed as allocation, distribution, and stability functions, respectively. The allocation means the optimal allocation of resources to production, with the necessary policies and costs to securely achieve the desired results, while the distribution function describes the fair allocation of income and assets between the factors of production, and the stability function indicates the situations where prices do not have significantly differential fluctuations in general (Musgrave, 1959: 3-24).

In current effectual economic and public finance literature, the functions of tax can be listed as combating macroeconomic instability, ensuring economic growth and development, eliminating injustice in the distribution of income and wealth, ensuring efficiency in resource distribution, reducing regional and sectoral development disparities, protecting public health and the environment, and controlling the population (Şen and Sağbaş, 2016: 21). When the dispersed literature is collected in a systematic way, a brief summary can be made of fiscal and extrafiscal objectives. Public goods and services production and the solution of the scarcity problem are the fiscal functions of taxation, when extrafiscal functions can be abbreviated as the redistribution of income and the fair distribution of taxes. The problem of scarcity is defined as the main problem that needs to be solved based on the definition of economics by Robbins (1932), efficiency in resource allocation, efficiency in production and distribution, economic stability, and economic development and growth can be listed as other components of fiscal function. Since the main purpose of this study is to reveal the relationship between the finalization and payment of taxes in terms of growth, it is requisite to know what the functions of tax are in order to explain the approach from which the subject is approached.

3. Connection of Tax Accrual, Tax Collection, and Economic Growth

In Turkey, a taxation process begins with the taxable event, continues with the tax assessment, notice and accrual of the tax, and finally ends with the collection of the tax (Öncel et al, 2008: 87). According to Article 21 of the Tax Procedure Law; tax accrual is the stage where a tax that is levied and notified comes to a stage where it must be paid. In this stage, the tax debt comes automatically without the need for any other administrative action or savings (Ağar, 2009: 125). Article 23 of the same Law defines the collection of tax as payment in accordance with the law. In other words, the fact that the tax is legally payable does not mean that there will

be a direct increase in treasury revenues. Because the amount of accrued tax and the amount of tax collected differ from time to time. Therefore, only the collection stage is used to express that the payment has been made.

As the subject of this study is the rate of accrual and collection transactions, it is substantial to examine the accrual and collection phases in detail. The accrual process varies according to the tax date. Persons who are obliged to submit a declaration are processed with the accrual slip issued after the assessment process, and the fact that an obligor does not take the accrual slip voluntarily or against his will does not prevent the tax from accruing according to Articles 27 and 28 of the Tax Procedure Law (TPL-VUK). However, according to article 27 of the Law of Administrative Judgment Procedure (AJP -IYUK), the taxpayer may prevent the tax from being finalized with a stay of execution decision from the courts in the declarations filed with the objection. TPL articles 116-126 have offered different solutions, considering that tax errors may have different consequences for the taxpayer and the administration. If the taxpayer is right in the objection made regarding an error made during the assessment-accrual stage, the process ends and the transaction returns to the assessment stage, if the administration is right, the process continues, and the tax is deemed to have accrued. If a tax is levied by the administration ex officio, supplemental, or with the allocation of a transaction by the administration, then tax assessment and tax assessment transactions are separated from each other. Following the notification of the calculated tax to the relevant taxpayer, the taxpayers have the right to appeal or file a lawsuit within the rights granted by the relevant laws.

For the taxpayer who applies for an objection or a lawsuit, the accrual of the tax is suspended until the result is announced. In case the lawsuit or objection is concluded in favor of the taxpayer, the transaction will be as if it has never been allocated. On the other hand, if the lawsuit or objection is concluded against the taxpayer, the tax will be accrued. The important distinction here is that although the tax is incurred, it will not be finalized since there may be a right of objection to the District Administrative Court or appeal to the Council of State, which is only valid for case files over 9,000 TL for 2022 in tax courts with one judge. Nonetheless, in any case, since the tax is accrued and is ready to be paid by going to the tax collection stage if the court finds the taxpayer justified as a result, the paid amounts are returned with interest. Otherwise, the collection has already taken place. Videlicet, for the tax to be finalized, there should be no possibility of objection before the administrative or judicial organs. The tax collection phase can be done voluntarily, or it can also be done forcibly in accordance with the Law No. 6183 on the Procedure for the Collection of Public Receivables (PCPP-AAUTUHK).

The payment of an accrued tax, that is, its transformation into the collection, is one of the criteria that shows the willingness and ability of taxpayers in a country to pay (Kirchler et al, 2008: 217-218). The perceptions of taxpayers such as justice, equality, and the illusion of taxation are outside the scope of this research, and the analysis made by the administration with the collection process is important for this study. The tax culture in a country includes both the taxation culture and the tax payment culture (Nerre, 2001:12), and the most concrete indicator of the tax payment culture in terms of the administration is the accrual-collection transactions. The tax payment culture is the social reflection of the compliance of the taxpayers with the applied taxes. There are limitations to inspection in the implementation of

traditional coercive policies such as penalties to increase tax, and more voluntary compliance policies claimed to be more successful (Yurdadog and Tunçay, 2016: 807). Aktan et al (2006: 102) state that the concept of voluntary compliance with tax is also called "acceptance" in the literature, and at this stage, taxpayers have a positive attitude towards taxes. It is stated that they show approaches and willingly pay the taxes that fall on them. In a society with high tax awareness and morality, due to tax compliance, the workload of the administration will decrease as the taxpayers fulfill their tax responsibilities automatically, and with the decrease in the workload, the cost and time of tax collection will decrease, and it will enable the administration to work more efficiently. Since this study focuses on the perception of compliance from the accrual-collection transactions of the administration, the subject of why people pay taxes is also excluded from the study.

In addition, the collection of the accrued tax within the legal period (due) is an indicator of success for the administration, because effectiveness is an indicator of the extent to which an institution can achieve the goals it has set and the results it desired to achieve (INTOSAI, 2022:2). In Turkey, the Ministry of Treasury and Finance (MTF-HMB) takes into account the accrual/collection ratios in measuring efficiency. In budgeting, after grouping different costs in programs and drawing the boundaries of the cost calculation, outputs and inputs should be matched on efficiency and productivity. While it is possible to measure efficiency in many ways, it is believed that it will be easier to measure and compare the collection according to the revenue target set by the government due to the problems in terms of reliability. One method used to do this is by calculating the tax gap. The difference between the tax revenues that are theoretically planned to be collected and the tax actually collected is called the tax gap and a part of the tax gap is the difference between the tax accrued and the tax collected. (MTF, 2002: 48-95). According to Uçanok (2014:30), the collection deficit consists of taxes that are accrued but cannot be collected. For this reason, the accrual-collection ratio is also a representation of both the efficiency of the tax administration and the willingness of the taxpayers to pay, as it shows the taxes that are accrued but cannot be collected. It may also be the case that an accrued tax is not collected by the government, which is considered within the scope of tax expenditure. The state may waive some or all of its receivables through exemptions, exceptions, reductions, and amnesties. Whether the collection is abandoned by the state, or the tax deficit occurs due to the problems caused by the taxpayer and the administration, it will also have negative consequences in terms of economic growth, as the optimal result that will maximize social benefit is avoided. Therefore, it is necessary to approach the relationship between accrual and collection in terms of economic growth.

When the Constitution of the Republic of Turkey from a tax perspective is examined; it is clearly seen that Article 73 of the Constitution does not establish a relationship between taxes and economic growth. Yet, constitutionally, the sole purpose of fiscal policy is to ensure a fair and balanced distribution of the tax burden (Article 73 Paragraph 2). This reference to the social function of taxes in the second article expresses the implicit acceptance of taxes as criteria for the valuation of growth and development. Along with the growth-oriented taxation concept that emerged in the 1990s, Turkish administrations abandoned the purely supervisory approach to taxation and started to look at the issue from a multidimensional perspective. The Tenth and Eleventh Development Plans have reserved a special place for growth-oriented

taxation, the effects of the losses in tax revenue on growth have been evaluated, and the accrual-collection ratio as an indicator has been included in the Program for Increasing the Quality of Public Revenues.

In general, it can be said that there are both supportive and undermining relationships between taxes and economic growth exist. The increase in tax revenues depends on the growth of the economy, but on the other hand, the increase in taxes slows down economic growth (Songur ve Yüksel, 2018: 52). According to Yakita (2003, qtd. in Kuştepeli and Bilman) when the subject is evaluated in terms of the tax multiplier, which is theoretically included in the literature with a Keynesian view, it can be said that it has a contractionary effect on the economy due to the transfer of the capital needed by the productive sector to the public. On the other hand, as a result of the state's support for private sector investments through public funds, increases in interest rates due to increased savings encourage people to accumulate human capital, while a flat rate wage tax due to wholesale transfer increases economic growth. Additionally, Bleaney et al (2001) found that while deflective taxes have negative effects on growth, non-diverting taxes have no inhibitory effect. The fact that even though many studies deal with the taxation-growth relationship with a different dimension, the lack of consensus still makes the subject academically interesting. In this study, from the point of view of the administration, since tax revenues are the most important source of a state's revenues (Chigbu and Njoku, 2015), it is evaluated that the more the finalized taxes are paid, the higher the public revenue potential of that country will increase and this will support economic growth. Besides, it is thought that the efficiency of the administration in tax collection will reduce the tax costs of the administration and this will support economic growth. If the taxpayers' behavior towards taxation has deteriorated in a country, the expansion of the fiscal space will fail and there will be negative effects in terms of growth (Ünsal and Durucan, 2014:67). If the opposite is the case, that is, the accrual/collection ratio is high, it will mean a fiscal space that does not fail and encourage economic growth. The accrual/collection ratio is also related to economic growth, with Tanzi (1977)'s point of decrease in the real value of public income due to reasons such as inflation, depending on the length of time between accrual and collection. Because the higher the accrual/collection ratio means that the more accurate and effective timing on collection of taxes will be achieved and the revenue will not succumb to inflation but support economic growth. It is also known that effective implementation policies of governments support economic growth along with the increase in social trust (Knack and Keefer, 1995, Kaufman et al 2008).

4. Literature Review

The relationship between economic growth and tax is discussed through its various dimensions. The most frequent studies on the relationship between tax and growth in Turkey are those between tax types and tax revenues and economic growth. Some of the most cited studies in Turkey are shown in Table 1. These are chronologically Durukaya and Ceylan (2006), Kargı (2007), Yılmaz and Tezcan (2007), Temiz (2008), Kuştepeli and Bilman (2009), Göçer et al. (2010), Erdoğan et al (2013), Demir and Sever (2017), Karayılmazlar and Göde (2017), Dam and Ertekin (2018), Akıncı (2019) and Boğa (2020). Although they use different methods in almost all of the studies, a relationship between taxes and economic growth is determined

where the relationship contains a causality and although it is negative in the short run, there is generally a positive relationship in the long run.

Table 1: Selected Studies Investigating Economic Growth and Tax Relationships in Turkey

Reseacher/s	***Years***	***Methodology***	***Findings***
Durukan and Ceylan (2006)	1980-2004	Error correction model Granger causality test Engle-Granger cointegration	An one-way relationship between total tax revenues and the growth rate in the short run a two-way relationship in the long run.
Kargı (2007)	1987-2002	Dickey-Fuller Unit Root Granger casuality Error Correction Model	A negative relationship between tax revenues and economic growth.
Yılmaz and Tezcan (2007)	1980-2005	Augmented Dickey-Fuller Johansen-Juselius cointegration Granger casuality	A negative relationship between indirect taxes and growth, and a positive link between direct taxes and growth.
Mucuk and Alptekin (2008)	1975-2006	VAR Granger casuality	A long-run relationship between basic tax types and economic growth A one-way relationship from direct taxes to economic growth in the short run.
Temiz (2008)	1960-2006	Augmented Dickey-Fuller Johansen cointegration Granger casuality Error correction model	A bidirectional relationship between real GNP and total tax revenues in the long run, a unidirectional relationship to the growth rate of total tax revenues in the short run.
Kuştepeli and Bilman (2009)	1975-2004	Augmented Dickey-Fuller Engle-Granger cointegration Johansen cointegration	In the long run, as the ratio of taxes to national income increases, growth decreases.
Göçer et al. (2010)	1924-2009	Augmented Dickey-Fuller ARDL	A positive and significant relationship was found between direct and indirect

			taxes and economic growth in both the long and short run.
Erdoğan et al. (2013)	1998-2011	Vector Error Correction	Tax burden and economic growth have negative links In the long run, indirect taxes and in the short run direct taxes provide economic growth.
Demir and Sever (2017)	1980-2014	Panel Data Analysis	In the short term, both direct and indirect taxes affect growth negatively, while in the long term they have a low but positive effect.
Karayılmazlar and Göde (2017)	1965-2015	Vector Error Correction	The increase in tax revenues negatively affects economic growth.
Organ and Ergen (2017)	1980-2015	Pearson Boundary Test	Tax burden and economic growth have a co-integration and negative correlation in the long run
Çetin (2018)	1980-2014	Johansen Cointegration Error Correction Model	Direct taxes affect economic growth more than indirect taxes.
Dam and Ertekin (2018)	2005-2016	Augmented Dickey-Fuller ARDL	Cointegration detected A positive relationship between tax revenues and growth
Songur and Yüksel (2018)	1980-2015	Granger casuality Toda-Yamamoto and Breitung-Candelon Frequency Field causality	A long-term relationship and causality between tax revenues and economic growth.
Akıncı (2019)	2016-2018	Augmented Dickey-Fuller Ziwot Andrews unit root Maki cointegration	A long-term cointegration relationship between economic growth and tax revenues.
Boğa (2020)	1965-2018	ARDL and NARDL	The positive effects of tax revenues on economic growth are stronger than the positive effects created by tax reductions

Source: Designed by author

Also, there are two studies in Turkey that evaluate the accrual and collection within the framework of tax performance and deal with its relationship with economic growth. Rakıcı and Aydoğdu (2017) investigated the accrual/collection rate as a performance indicator showing the efficiency of the tax administration, evaluated according to the political, economic, and social changes in Turkey after 2000 with a comparative analysis, and claimed that this rate decreased in times of crisis and increased in times of stability, thus contributing to the economy. Köstekçi and Sandalcı (2020), similarly, determined a one-way causality relationship between the economic performance of the tax and the accrual/collection rate by employing Augmented Dickey-Fuller, Phillips Perron unit root tests, and time series analysis between 1985 and 2018.

The claim that this study will have an impact on economic growth based on tax effort and/or compliance is also important. Although there is no direct study on this in the literature, three main studies have been identified that deal with the relationship between the accrual-collection rate and growth in terms of tax effort. These are the studies of Akbulut (2017), Çalcalı (2017) and Çelikay (2016). While investigating the relationship between inflation and interest rates and tax effort, she took the accrual collection rate data between January and July 2006 and tested it with the Johansen cointegration test. Çalcalı (2017) analyzed the tax collection/accrual rate of the Eastern Black Sea Region Municipalities and its effects in the context of taxation efforts but found negative relationships between them. Çelikay (2016), on the other hand, evaluated the tax effort on the basis of provinces between 2004 and 2016, and determined TR 42 (Kocaeli, Sakarya, Düzce, Bolu, Yalova) as the place where the effort was highest. The actual tax burden in these places is above the potential. However, it has not clarified its effects on economic growth.

Although there is no study in the literature that deals with the accrual/collection ratio and economic growth as in this study, it has been pinned that there are two studies that make close analyzes and evaluations. Although Yenipazarlı (2009) took the collection/accrual rate as tax revenues under economic freedoms, it was determined that the collection - accrual rate between 1970 and 2006 was the factor that increase the economic freedom index that positively affect economic growth. Also, Çelikay (2018) handled the issue in terms of accrual/collection between the years 2005 and 2014, even though the author said that it was a tax burden. The author used the natural logarithmic forms of the ratios of these elements to GNP. It reveals that the provinces converge to each other structurally in the long term, and a 1% increase in the tax burden will decrease the economic growth rate by 0.6% in the short term and increase it by 0.9% in the long term.

5. Data, Methodology, and Findings

In this study, economic growth and tax accrual/collection rate data used to analyze the relationship between tax collections and economic growth are taken from the World Bank and Revenue Administration data repository, respectively.

Table 2: Descriptive Information on Variables

Variables	*Abr.*	*Period*	*Source*
Economic Development	BUY	1970-2020	World Bank
Accrual/Collection Rate	TTO	1970-2020	Republic of Turkey Revenue Administration

Source: Designed by authors

To run the analysis, the first Augmented Dickey-Fuller Unit Root Test is applied to the datasets. This test is a unit root test that reports stationarity, is used for serial correlation, can analyze more complex structures compared to the Dickey-Fuller test, and is the most frequently applied unit root test in the literature. Although it is an expanded and advanced model in terms of adding more variables to the system, it is similar to the Dickey-Fuller test in terms of keeping the structure of the formulation, null hypothesis, and all other factors the same. Equations 1 and 2 are used for the analysis (Taş et al, 2017: 270-271).

$$\Delta Y_t = \alpha_0 + \lambda Y_{t-1} + \mu_t \quad (1)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \lambda Y_{t-1} + \mu_t \quad (2)$$

It is the coefficient λ that is questioned in these established equations. The negative λ coefficient is interpreted as the conclusion that the series is stationary and it is appropriate to use it in the econometric model.

Table 3: ADF Test Results

Variable	Fixed Term Without Trend 1% 5% 10% (Test Statistics) [Probability Value]	Trend and Fixed term 1% 5% 10% (Test Statistics) [Probability Value]
BUY	-3,568308 -2,921175 -2,598551 (-6,773359) [0,0000]	-4,152511 -3,502373 -3,180699 (-6,698603) [0,0000]
TTO	-3,574446 -2,923780 -2,599925 (-2,282880) [0,01815]	-4,161144 -3,506374 -3,183002 (-2,229171) [0,4632]
DTTO	-3,571310 -2,922449 -2,599224 (-6,864245) [0,0000]	-4,156734 -3,504330 -3,181826 (-6,800902) [0,0000]

Source: Created by authors

According to the unit root test results given in Table 3, it has been concluded that the level values of the economic growth variable do not contain a unit root, that is, it is stationary in both the fixed term and trended and constant term models. In the variable of accrual collection rate of taxes, stationarity is determined in the fixed term model. However, it has been found that the level value is not stationary in the model that includes both the trend and the constant term in the level value. When the first difference of the tax accrual/collection rate variable is taken, it has been seen that it is stationary in both cases.

After the unit root analysis of the series is fulfilled, the ARDL Boundary Test is applied to the model number 3. In the ARDL Boundary Test, the equation numbered 4 is used (Pesaran et al: 2001). Since the dependent variable is stationary at the first-order difference ARDL Bounds Test approach has been chosen.

$$TTO = \beta_0 + \beta_1 BUY + \varepsilon_t \quad (3)$$

$$\Delta Y = \alpha_0 + \sum_{i=1}^{k} \alpha 1i\ \Delta Y_{t-1} + \sum_{i=1}^{m} \alpha 2i\ \Delta X_{t-1} + \alpha_1 Y_{t-1} + \alpha_2 X_{-1} + \varepsilon_t \quad (4)$$

The ARDL Limit test results obtained with the equation are given in tables 4, 5, and 6.

Table 4: Critial Values of ARDL Bound Test

Estimated Equality = > BUY = ƒ (TTO)		
F Test	23,09019	
Optimum Delay Length	1,0	
Significance Levels	Critical Values	
	Lower Limit (0)	Upper Limit (1)
%1	6,84	7,84
%2,5	5,77	6,68
%5	4,94	5,73
%10	4,04	4,78
Diagnostic Tests	Statistics	
R^2	0,08938	
Adjusted R^2	0,049786	
Durbin-Watson Test	1,959246	
F Test	2,257475	
Breusch-Godfrey LM	0,111587 (0,8947)	
Jargue-Bera Normality Test	4,225903 (0,120881)	
Ramsey Test	1,464472 (0,2325)	

Source: Created by authors

ARDL Limit Test values are given in Table 4. While interpreting the limit test, the lower and upper limit values, called 0 and 1, created within the test, and the calculated F statistical values are compared. If the F statistical value is less than 0, it is concluded that there is no cointegration relationship between the variables. If the f statistical value is between the 0 and 1 limits, a clear interpretation cannot be made since the 0 and 1 limits an unstable region

separately. If the calculated F statistical value is greater than the 1 limit, it can be said that there is a long-term cointegration relationship between the variables.

When Table 4 is examined, it is seen that the F statistical value is above the 1 limit. From this perspective, it is understood that there is a cointegration relationship between the variables in the established model. Also, when other diagnostic values are taken into account, it is seen that there is no model building error, which indicates that there is a normal distribution. The values of the ARDL Bounds Test regarding cointegration and long-run equality are also presented in Tables 5 and 6.

Table 5: ARDL Bound Test Coefficient Values

Cointegration Equation: TTO = $\beta_0 + \beta_1 BUY + \varepsilon_t$				
Variable	Coefficient	Standard Error	Test Statistics	Probability Value
BUY	0,174825	0,082279	2,124778	0,0390
C	-0,972276	0,141444	-7,334790	0,0000

Source: Created by authors

According to the cointegration equation, there is an econometrically significant relationship between economic growth and tax accrual/collection rates. The direction of this significant relationship is positive. In other words, there is a positive relationship between economic growth and tax accrual/collection.

Table 6: ARDL Bounds Test Long-Term Relationship Coefficient Values

Cointegration Equation: TTO = $\beta_0 + \beta_1 BUY + \varepsilon_t$				
Long Run Coefficients				
Variable	Coefficient	Standard Error	Test Statistics	Probability Value
BUY	0,168513	0,079597	2,117080	0,0397
C	-0,953686	0,479550	-1,988713	0,0527

Source: Created by authors

Similar results to the cointegration equation are also available in the long-term coefficient equation. There is a statistically significant relationship between economic growth and tax accrual/collection rates. Likewise, there is a positive relationship between economic growth and tax accrual/collection.

6. Conclusion

It is expected that the accrual/collection rates of taxes will tend to increase with the increase in the income level of the citizens. Thus, the relationship between tax accrual/collection rate and economic growth is investigated in this study. To conduct the research, unit root test is carried out with the Augmented Dickey-Fuller Unit Root test on the annual data between 1970 and 2020 at the beginning. Even though the economic growth variable is detected to be stationary at the level values, it is observed that the tax accrual/collection rate contained a unit root at the level value. However, , the unit root is eliminated it is figured that after taking the first-degree difference of the tax collection rates, that is, the problem disappeared. After the unit root test has been performed on the variables, the ARDL bounds test is applied to determine the relationship between them. Since the dependent variable must be first-order stationary in order to use the ARDL bound test, the tax collection rate is established as the dependent variable. Immediately afterwards, the ARDL limit test is applied. Application results indicate that the F statistical value calculated within the scope of the test is found to be above the I limit values and the existence of a long-term relationship between tax accrual/collection rate and economic growth is identified. Also, long-run equation coefficients are calculated for the direction and severity of the relationship. As expected, a positive relationship is determined.

The significant positive relationship between tax accrual/collection rate and economic growth is important in terms of tax policies to be implemented. The positive effect of these two ratios on each other means that effective and efficient tax control and policies will support economic growth policies. As the collection of taxes increases, the spending and investment power of the public also increases. When approached from both aspects, it is clear that economic growth will be positively affected. As a result of the increase in the tax accrual/collection rate and the channeling of the increased public revenues to investments, the economy will grow by investing. Each additional investment will lead to an escalation in both employment and production. Since expanded production is also a component of economic growth, an increase in the tax collection rate will support economic growth through public investments.

If the increase in the tax accrual/collection rate is not channeled to investment expenditures and is channeled to different public expenditures rather than investment expenditures, there will be a revival of domestic demand. Indeed, the increase in domestic demand will cause economic amelioration as well. The revival in demand triggered by the economic recovery and increased public expenditures leads in augmentation in production. As mentioned before, as production positively affects growth, the accrual/collection rate will affect economic growth through raise in domestic demand.

While considered vice versa, economic growth can mean an increase in production in a country. The increase in production, on the other hand, means a tax increase depending on the increase in the tax subject and base in an expanding spectrum from the tax obtained from the sale of the materials used for production to the sale of the final product obtained as a result of the production. In this respect, the realization of economic growth means that all of the economic agents pay more taxes and/or increase the tax revenue potential of the

administration. Therefore, it would not be wrong to imply that the realization of economic growth may highly cause an increase in the tax accrual/collection rate.

When the result of the study is evaluated in general, there is a mutually positive relationship between tax accrual/collection rate and economic growth. Considering that this subject has not been studied before and has not been analyzed for Turkey, the findings of this study are both an important contribution to the literature and will shed light on tax policies in terms of its results. It is possible to achieve faster and more effective results as a result of the correct and consistent economic growth policies being implemented, supported by harmonious tax policies and audits. For this reason, it is important for the success of the policies that the policies to be implemented are compatible with each other by making multi-dimensional planning while planning the economic policies.

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