



An Econometric Research on the Economic Effects of Tax Amnesties

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ABSTRACT

Nowadays, especially developing countries need different resources to meet their expenditures. In this context, the issue of tax amnesties maintains its place on the agenda both in the economic and political arena. The economic effects of tax amnesties are still discussed in the literature. In this study, the relationship between tax amnesties and some macroeconomic variables (tax revenues, inflation, growth) has been econometrically tested for Turkey for the period of 1980-2021. In the study, in which ARDL model was used, cointegration relationship was determined between tax amnesties, tax revenues, inflation and growth. In addition, it has been determined that tax amnesties have positive effects on growth and inflation through tax revenues in both the short and long run.

Keywords: Tax Amnesties, Tax Revenues, Tax Regulations, Main Macroeconomic Variables, ARDL Method

JEL Classifications: C50, E60, H20

1. INTRODUCTION

The economic and financial crises experienced in the world have created a radical change in the state mission, public sector expenditures have increased, and increasing public expenditures have disrupted the budget income-expenditure balance. One of the economic and financial tools used to solve social and economic problems and to correct the disturbed balance of income and expenses has been tax amnesty. However, in the public finance theory, the economic effects of tax amnesties have been discussed extensively in the literature, have been the subject of empirical and theoretical studies, and many analytical studies have been conducted indicating that this issue will affect the economy in various ways. Although there are strong analytical reasons why tax amnesties are one of the important financial/political variables affecting the economy, significant uncertainties still remain about the actual level of this impact. As a matter of fact, tax amnesties do not have a uniform structure and have socio-economic and political aspects. In the literature, different empirical and analytical studies

have been conducted on the economic effects of tax amnesties, focusing on the perspectives of proponents and opponents of amnesties. In addition to the financial dimension of tax amnesties, their impact/contribution to the economy through political conjunctural movements (elections, etc.) has been examined from direct and indirect perspectives and has become frequently discussed in both developed and developing country economies.

Tax amnesties are practices frequently used by governments for various reasons. On the other hand, although there is no full agreement in the literature on the definition of tax amnesties, different explanations can be found. According to Alm and Beck (1990), one of the leading studies on this subject, tax amnesty is a political tool that allows taxpayers to pay their unpaid taxes partially or completely without being subject to financial and penal sanctions and includes many economic, financial, social and political factors. According to Baer and Borgne (2008), tax amnesty is the regulation of past tax debts, including penalties and interest, within the scope of legal regulations of those who are

taxpayers within a certain period of time. According to Villalba (2017), tax amnesty is a temporary opportunity provided by the public sector to individuals or companies to pay unpaid taxes in previous periods. In another definition, tax amnesty is a tax, etc., that the public receives from a person(s) to meet public needs by using its rule-making power. It is the waiver of the sanctions imposed due to the collection of revenues and taxation duties not being fulfilled on time or incompletely fulfilled (Edizdoğan and Gümüş, 2013, p.99-100; Leonard and Zeckhauser, 1986). Tax amnesty is a very sensitive situation in the establishment of tax policy as an element of economic policy to ensure sufficient and stable income to meet public services, to ensure the effective use of resources in the economy, to correct income distribution and to combat macroeconomic instabilities (Savaş, 2018, p.338-339). Before granting tax amnesty, the purpose must be determined with great care and then the amnesty mechanism must be implemented. Namely; These amnesties may be for financial purposes, as well as for political (election investment), economic or technical-administrative (disruptions in the tax system, inadequacy and complexity of the system, etc.) purposes. Tax amnesty practices are generally implemented for economic and social purposes (natural disasters, economic crises, etc.). In addition, tax amnesties are a popular instrument during election periods (Şen and Sağbaş, 2020, p.269; Alm and Beck, 1993). As a result of the tax amnesty implemented by the public authority; While there may be a sudden increase in tax revenues, savings can be created in the public sector by easing the workload on tax administration. On the other hand, thanks to this practice, there may be an increase in voluntary tax compliance and willingness to pay taxes. By reducing informality, long-run income of the public sector can be increased (Andreoni, 1991; Heper and Dönmez, 2004).

According to the theory of political cyclical fluctuations, the most important/authoritative authority in the implementation of tax amnesties is the political authority, but the public authority can use tax amnesties as a financial tool for political purposes. Governments are increasingly turning to tax amnesties as part of their fiscal programs. This process may cause manipulations on macroeconomic variables. The vote maximization target of policy makers is among the factors effective in the implementation of tax amnesties. Motivated by political interests, governments may arrange tax amnesty in order to convince voters during election periods. Voters can shape their political preferences accordingly. Voters may be affected by some variables such as financial, socio-demographic, psychological and economic factors when determining their political direction. As a matter of fact, the votes of the individuals who make up the society are very important for politicians. From a political perspective, tax amnesties appear as political transformations with a tax dimension. Tax amnesty is a widely used mechanism in developed and developing countries, allowing taxpayers and/or voters to partially or completely get rid of their unpaid or unpaid debts due to voluntary or involuntary reasons. As a matter of fact, the political preferences of the voters are sometimes or often greatly affected by the policies determined in this manner, and the motivation of political interest affects the preferences of the voters and turns the financial instrument into an instrument used for political purposes (Pommerehne and Zweifel, 1991; Tabellini and Alesina, 1990, p.38-39; Dökmen and Ova, 2016).

It is possible to see different approaches in the literature on tax amnesty. Proponents of amnesty argue that the necessity of amnesty after periods of political and economic instability, the complexity of the tax-related legislation, the idea that tax crimes cause less trouble for society than other crimes, the necessity of amnesty in order to eliminate the polemics caused by tax audits and prevent tax evasion, the need for the tax administration and the judiciary to be effective. They put forward basic arguments such as reducing the workload, seeing tax amnesty as a part (tool) of income generation, and ensuring taxpayers' voluntary compliance with tax laws. On the other hand, those who are against amnesty: They defend the view that tax amnesty may negatively affect the principles of justice and equality, reduce voluntary tax compliance, tax crimes may be fictionalized and committed, may not alleviate the workload of the tax administration/judiciary, and may have negative effects on trust in tax laws and tax audit (Edizdoğan and Gümüş, 2013, p.104-109; Yurdadoğ and Coşkun Karadağ, 2017; Kellner, 2004). On the other hand, although tax amnesty laws seem to increase income as a solution in the short run, they may cause some negativities in the economic structure in the long run (Torgler et al., 2003, p.375-396; Savaşan, 2006).

Tax amnesties implemented in Turkey around the proclamation of the Republic occupied the financial, economic and political agenda. The first tax amnesty was implemented in 1924; This was followed by the amnesties of 1928, 1934, 1938, 1946, 1947, 1960 and other amnesties until today. Tax amnesty was applied for a total of 32 times in 90 years, from 1924 to 2013. However, the frequency of applying for tax amnesties increased after 1980. While 16 tax amnesties were applied for in the 55 years between 1924 and 1979 (Kaya, 2014, p.185), tax amnesty was applied 24 times in the 42 years between 1980 and 2022. This shows that tax amnesties have become an important policy tool in recent years. There were some structural changes in the Turkish economy after 1980. In this process, tax amnesty was frequently applied for reasons such as budget deformations, election economy and COVID-19 pandemic. In this context, the period after 1980 was considered for the model of the study.

When looking at the literature, it can be seen that the effects of tax amnesties on tax revenues are generally examined. Because this study aims to analyze the economic effects inflation, growth of tax amnesties, as well as their impact on tax revenues, with a different method (ARDL). Although the study differs from other studies in this aspect, it aims to fill this gap in the literature.

The remaining part of this study is planned as follows. In the first section, a summary presentation of national and international studies related to tax amnesties is given, respectively. In the 2nd section, the data set and econometric methods used in the study are explained, and in the 3rd section, the empirical evidence obtained as a result of these methods is presented. In the conclusion section, the empirical findings are discussed and policy recommendations are made.

2. LITERATURE REVIEW

The literature on the effects of tax amnesty focuses mostly on taxpayer attitudes and tax revenues. In addition, although

the subject of tax amnesty has been widely researched in the economics and finance literature, it is noteworthy that the number of econometric studies examining its economic effects is quite limited. In this part of the study, some of the empirical studies in the foreign and domestic literature focusing on tax amnesties are mentioned.

Alm and Beck (1993) examined the tax amnesty program implemented in 1985 in the Colorado region of the USA during the 1980-1990 period with time series analysis and found that the tax amnesty did not have any effect on tax revenues in the long run. Das-Gupta and Mookherjee (1996) investigated the impact of various tax amnesties made in India between 1965 and 1991 on tax revenues and concluded that the tax amnesty was largely anticipated by taxpayers and had a negative impact on tax revenues. Borgne (2006), on the other hand, conducted a research on the economic and political dynamics of tax amnesty in the USA between 1977 and 1998 using time series methodology and argued that the negative aspects of amnesty were more dominant and that taxpayers did not vote for politicians who resorted to tax amnesty during election periods. In their study, Luitel and Sobel (2007) applied the panel data technique with data from 37 states in the USA for the period 1980-2004 and examined the effect of tax amnesties on tax revenues. As a result of the research, they found that frequent repetition of tax amnesties has a lower income-raising effect in the short run, and in the long run, it causes a decrease in income as it makes tax compliance of taxpayers more difficult. Again, Alm et al. (2009), in their study on Russia, examined the period 1995:1-2000:12 with ARIMA and MARIMA methods and revealed that tax amnesties had a neutral effect on tax revenues. In their study, Lopez-Laborda and Rodrigo (2003) econometrically investigated the effects of tax amnesties issued in Spain between 1979 and 1998 on tax revenues and claimed that they had no effect in the short and/or long run. Fox and Murray (2011) empirically analyzed the effect of tax amnesty on tax revenue and concluded that tax amnesties lose their effect on income in the long run. In their study on the USA, Mikesell and Ross (2012) examined the period 1981-2012 with the LCM method and revealed that amnesties had a positive effect on tax revenues. In his study, Kilonzo (2012) tested the effects of tax amnesties on some macroeconomic variables in Kenya between 1995 and 2009 using the analysis of variance method. The study found that amnesties do not have an increasing effect on tax revenues and that there is a negative relationship between the interest rate. Again, in the study conducted by Saidimu (2009) on Kenya, it was stated that the applied tax amnesties positively affected tax compliance in the short and long run and significantly increased VAT revenues. In their study where they examined 50 states in the USA using panel data technique, Luitel and Tosun (2014) stated that the decrease in tax revenues and the increase in the unemployment rate had a significant share in the adaptation process to tax amnesties. Bayer et al. (2015) empirically examined the period 1981-2011 for the USA and put forward the idea that tax amnesties are a financial necessity for governments. İbrahim et al. (2017) examined 9 Asian countries and emphasized that governments should avoid long-run and very frequent tax amnesty programs. An alternative study conducted by Sa'adah (2018) in Indonesia found that tax amnesty policies can increase

government revenues in the long run. Mujahid and Siddiqui (2019) examined the effects of tax amnesty on the economy of 24 countries determined for the period 1990-2017. In the model established in this context, it was concluded that tax amnesties have a negative effect on tax revenues, a positive effect on foreign direct investments and an increasing effect on the unemployment rate. Parinduri et al. (2020) reviewed the relationship between tax amnesty and economic growth in Indonesia between 1984 and 2018 with the EKK method in their study and found findings that tax amnesty had a negative and insignificant effect on economic growth. In their study, Ogbonna and Victor (2021) investigated the impact of the tax amnesty program on economic development in Nigeria during the 1995-2018 period. In the study where ARDL analysis was applied, it was concluded that tax amnesties did not have a significant effect on GDP.

It is noteworthy that most of the studies on the Turkish economy are on a theoretical basis. However, empirical studies on the subject have been conducted, albeit in small numbers. Among these, Kara (2014) applied the multivariate regression method for the period 1985-2010, and the results showed that tax amnesties did not have a serious effect on tax revenues. In his study, Kaya (2014) investigated the impact of tax amnesties on tax revenues in Turkey by applying the SVAR technique, based on the years 1980-2013, and showed that tax amnesties first affected tax revenues in a decreasing way and then in an increasing way. Another evidence found in the study is that election periods have a greater impact on tax revenues than tax amnesties. Şanver (2018), in his econometric study of the period 1981-2017, determined that tax amnesties did not cause a significant increase in tax revenues and did not increase tax revenues steadily. Akbelen et al. (2018) examined the impact of tax amnesty practices on tax revenues in Turkey in the 1994-2016 period using the regression method in their study. In the established model, it was found that these amnesties did not have an effect on tax revenues, but on the other hand, they significantly affected the GDP and inflation rate variables. Bozdoğan and Şimşek (2018) examined the impact of tax amnesties on tax revenues in Turkey in the 1980-2014 time period using Vector Autoregressive (VAR) analysis, and according to the resulting data, they revealed that the effect of tax amnesties on tax revenues disappeared in the long run. Ekinci et al. (2019), in their study examining the period 1987-2018 with a Probit model, found empirical evidence that the likelihood of amnesty laws being enacted before general election years increased and that there was no relationship between local elections, economic crises and the enactment of amnesty laws. Güler (2020) examined the impact of tax amnesty regulations on tax revenues with "event" analysis using monthly collection/accrual indicators and found that the tax amnesties that came into force after 2010 in Turkey had a statistically significant impact on tax revenues, based on their 6 and 12-month effects. indicated that it did not have a significant effect. Ünsal and Ertürk (2020) used the interactive vector autoregressive (VAR) method in their study to examine the relationship between tax amnesties and elections and determined income and expenditure indicators. It has been revealed that the election and amnesty periods had a very minimal effect on tax revenue in the 2001:Q1-2019:Q1 period. In their study, Öz Yalaman and Kahraman (2021) examined the effects of tax amnesties enacted in Turkey between 1950 and 2017 on tax

attitude, informal economy, income distribution, indirect and direct tax revenues using the VAR technique. According to empirical findings, tax amnesties appear to have a reducing effect on tax attitude, hidden economy and indirect tax revenues; It has been observed that it has an increasing effect on income distribution and direct tax revenues. Sunar and Kırbaş (2022) analyzed the relationship between tax amnesty implemented in Turkey between 1980 and 2019 and preferred economic parameters with the Vector Autoregression Method (VAR). According to the results of the analysis; A statistically significant relationship emerged between the unemployment rate and the tax amnesty variable. Gözen and Temür (2022) examined the relationship between tax amnesties and tax revenues in their study. In the study conducted with VECM analysis for the years 1980-2016, it was determined that the effect of tax amnesties on tax revenues was relatively low. In his study, Karagöz (2022) examined the 1994-2019 period with some time series techniques and emphasized that the amnesty regulations did not provide the expected increasing effect on tax revenues after 1994.

3. DATA AND METHODOLOGY

In the study, tax revenues, inflation and gross domestic product (growth) variables specific to the Turkish economy were used. The “tax amnesty” variable was also included in the study as a dummy variable. An interaction variable was also added to the study. In econometrics, it is possible for qualitative independent variables to directly affect the dependent variable by changing the constant term of the regression equation, or to indirectly affect the dependent variable together with another qualitative or quantitative independent variable or variables. The new variable formed by multiplying the dummy variable created for any qualitative independent variable with another qualitative or quantitative variable is called the interaction variable (Yamak and Köseoğlu, 2006, p.414). Based on this, the interaction variable was created simply by multiplying tax revenues and tax amnesties. The definitions and symbols of the variables included in the analysis are shown in Table 1.

In Table 1, tax revenues/gdp ratio, with the variable tr; consumer price index, with inf variable; Gross domestic product is symbolized by the variable gro. Additionally, dummy variable ta is defined as 1 for the years in which tax amnesties were made, and 0 for the other years. tr*ta participated in the study as an interaction variable. In the study, reports of the Turkish Ministry of Treasury and Finance¹ were used in order to ensure harmony between the data. In addition, TURKSTAT and CBRT Electronic Data Distribution System² data were used when necessary. Continuous variables included in this study were evaluated as percentage (%). Due to the fact that the Turkish economy experienced a radical structural transformation process after 1980, tax amnesties were frequently used, and the idea that more consistent results could be obtained from the data, the period between 1980 and 2021 was tested in the study.

1 www.hmb.gov.tr, (Access: 23.01.2023)

2 www.tcmb.gov.tr, (Access: 23.01.2023); www.tuik.gov.tr, (Access: 23.01.2023)

Table 1: Abbreviations and definitions of variables

Data	Explanation
tr	Tax revenues/gdp (%)
inf	Annual percentage rate (%)
gro	Gross domestic product (% growth rate)
ta	Tax amnesty dummy variable (proxy)
tr*ta	Interaction variable

Before the ARDL analysis, the stationarity levels of the variables were subjected to the unit root test (Augmented Dickey-Fuller [ADF]).

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad (1)$$

In Equation (1), β_1 refers to the constant term and ε_t refers to the white noise error term. Here, delayed difference elements such as $\Delta Y_{t-i} = (Y_{t-i} - Y_{t-i-1})$, $\Delta Y_{t-i-1} = (Y_{t-i-1} - Y_{t-i-2})$ are used, but the amount of the delayed value is very important. The main point at this point is to add enough components to the model to make the error term sequentially independent. If a DF test is applied to such a model, it is called ADF test (Ulusoy et al., 2016, p.17-18). When it comes to non-stationary time series in econometric studies, their use may lead to unreliable results. Therefore, with the test in question, the spurious regression problem can be prevented by making the variables stationary (Dickey and Fuller, 1979, p.427-431; Sevüktekin and Çınar, 2017).

ARDL bounds test was used to determine the relationship between the variables examined in unit root tests. This method provides very reliable results about examining long and short run relationships. Pesaran et al. (2001) introduced to the literature, the bounds test method is a more dynamic system than other known cointegration (Engle-Granger and Johansen cointegration) techniques (Ulusoy et al., 2016). In the bounds test technique, the cointegration relationship between variables can be tested regardless of whether the variables are I(0), I(1) or mutually cointegrated. In other words, with the bounds test technique, it can be examined whether there is a cointegrated relationship between two variables, regardless of the level at which the series is stationary. Therefore, the bound test starts with estimating the following equation (2) (Yamak and Köseoğlu, 2006):

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 X_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-i} + \sum_{i=0}^m \theta_i \Delta X_{t-i} + u_t \quad (2)$$

In Model (2), Y, Investigating whether there is a cointegration relationship between the variables requires the solution of the null hypothesis ($H_0: \beta_1 = \beta_2 = 0$) with the F test. If the calculated F statistic is greater than the upper critical value, it is decided that there is a cointegrated relationship between the series; if it is smaller than the lower critical value, there is no cointegrated relationship. If the calculated F statistic falls between the lower and upper critical value, a definitive interpretation cannot be made and other co-integrated tests must be used (Tanrıöver and Yamak, 2015, p.192-193).

If there is a long-run relationship between the variables, the long-run equation is estimated with equation (3), and the error correction model is estimated with equation (4) (Pesaran et al., 2001, p.295):

$$Y_t = \beta_0 + \sum_{i=1}^m \alpha_i \Delta Y_{t-i} + \sum_{i=0}^m \theta_i \Delta X_{t-i} + u_t \quad (3)$$

$$\Delta Y_t = \beta_0 + \beta_1 EC_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-i} + \sum_{i=0}^m \theta_i \Delta X_{t-i} + u_t \quad (4)$$

In the above equation (4), m represents the most optimal delay lengths and the EC_{t-1} error correction term. The β_1 coefficient of the EC_{t-1} variable indicates how much of a deviation occurring in the short run will be balanced in the long run, and the magnitude of this coefficient is predicted to be between -1 and 0 (Barış Tüzemen and Yamak, 2019). In summary, Bounds test (ARDL) consists of two steps, and the 1st time it is focused on whether there is a cointegration relationship between the variables. Then, if there is a cointegration relationship between the variables, short and long run relationships are determined through the ARDL (Autoregressive Distributed Lag) technique (Pesaran et al., 2001, p.289-326).

4. RESULTS

It was estimated through the Augmented Dickey-Fuller unit root test whether the series used in the analysis contained unit roots or, in other words, whether the variables were stationary. The results obtained are given in Table 2.

According to Table 2, the tax revenue series (tr) was found to be stationary at the constant form level. However, all other variables (gro, inf) were found to be stationary at the first difference. The fact that the variables were found to be stationary at different levels allowed the use of the bounds test. In this context, Bound Testing Approach was applied to detect short and long-run relationships.

The first general model used in the study:

$$gro_t = a_0 + a_1 inf_t + a_2 tr_t + a_3 tr_t a_t + \epsilon_t \quad (5)$$

It is in the form. The general equality in Equation (5) was estimated in the bounds test approach by writing it as follows:

$$\Delta gro_t = \beta_0 + \sum_{i=1}^m \beta_{1i} \Delta gro_{t-i} + \sum_{i=0}^m \beta_{2i} \Delta inf_{t-i} + \sum_{i=1}^m \beta_{3i} \Delta tr_{t-i} + \beta_4 gro_{t-1} + \beta_5 inf_{t-1} + \beta_6 tr_{t-1} + \beta_7 tr_t a_{t-1} + u_t \quad (6)$$

Error correction model using equation (6):

$$\Delta gro_t = \beta_0 + \sum_{i=1}^m \beta_{1i} \Delta gro_{t-i} + \sum_{i=0}^m \beta_{2i} \Delta inf_{t-i} + \sum_{i=0}^m \beta_{3i} \Delta tr_{t-i} + \beta_4 ECT_{t-1} + \beta_5 tr_t a_{t-1} + u_t \quad (7)$$

It is estimated in the form.

Boundary test results are shown in Table 3. Lag lengths were determined using the “Akaike Information Criterion” and were determined as (1,0,1,3).

In the findings in Table 3; It is seen that the F statistics value found to determine the cointegration relationship is higher than

Table 2: Unit root test results

ADF unit root test results		
Variables	Constant	Constant+Trend
gro	0.200 (0)	-2.457 (0)
inf	-2.063 (1)	-1.016 (1)
tr	-4.739*** (1)	-2.125 (4)
dgro	-6.494*** (0)	-6.433*** (0)
dinf	-3.782*** (0)	-3.822*** (0)
dtr	-5.973*** (0)	-7.036*** (0)

*** sign indicates 1% significance level, d; It represents the difference operator. Values in parentheses are the optimal lag (delay) length. The maximum lag (delay) length is 9

Table 3: ARDL (1,0,1,3) bounds test results and diagnostic test statistics

gro⇒Dependent variable	coefficients	t statistic	Prob.
gro _{t-1}	0.738	6.586	0.000
inf	-0.084	-2.478	0.019
tr	0.183	2.121	0.042
tr _{t-1}	-0.092	-1.615	0.116
tr*ta	0.001	1.344	0.188
tr*ta _{t-1}	0.000	0.652	0.519
tr*ta _{t-2}	0.001	2.299	0.028
tr*ta _{t-3}	0.001	2.502	0.018
C	1.692	2.180	0.037
F- Statistics		4.40	
		Critical values	
	1%	3.65-4.66	
	5%	2.79-3.67	
	10%	2.37-3.20	
Long Run Coefficients			
C	1.692	2.180	0.037
gro _{t-1}	-0.261	-2.330	0.026
inf	-0.084	-2.478	0.019
tr _{t-1}	0.090	2.465	0.019
tr*ta _{t-1}	0.005	2.498	0.018
dtr	0.183	2.121	0.042
dtr*ta	0.001	1.344	0.188
dtr*ta _{t-1}	-0.003	-3.117	0.004
dtr*ta _{t-2}	-0.001	-2.502	0.018
Short run equation			
ECT _{t-1}	-0.261	-4.994	0.000
LM		1.63 (0.44)	
Breusch-Pagan-Godfrey		6.82 (0.55)	
CUSUM		stable	
CUSUMQ		stable	

the upper limit value of the table. For this reason, it was observed that there was a cointegration relationship between the growth rate and inflation, tax revenues and tax amnesties at the 5% significance level. On the other hand, the results confirm that the error correction parameter is negative and statistically significant. As can be seen, it is hoped that approximately 26% of the one-unit deviation that will occur in the short-run period will be covered after a period and the long-run balance will be approached. When the long-run equation is examined, it is observed that inflation is negative, tax revenues and tax amnesty are positive and statistically significant. That is, although there is a negative relationship between gro and inf, there is a positive relationship between gro and tr and tr*ta. It was determined that tr*ta positively affected gro in the long run at a 5% significance level. It can be said that these results meet economic expectations. On the other hand, frequent tax regulations can increase tax revenues. It can be said that this situation is an indirect factor that can positively affect growth.

Figure 1: CUSUM and CUSUMQ test results for general model 1

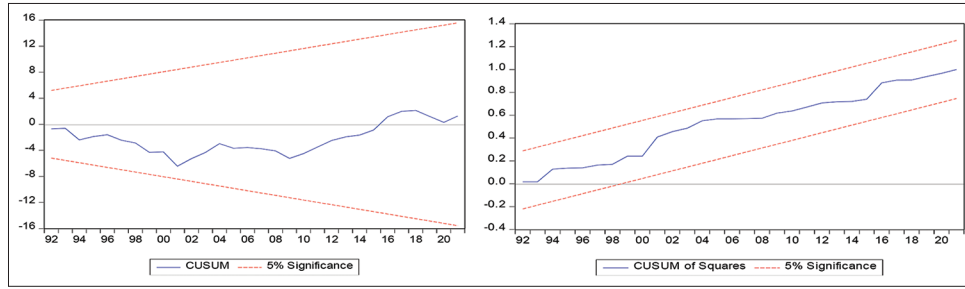


Figure 1 shows the CUSUM and CUSUMQ test results for the ARDL (1,0,1,3) model. Figure 1 shows that the model is stable. Tax amnesties have a positive effect on economic activity in the long run as well as in the short run. This effect occurs indirectly through tax revenues. This trend exists in both the short and long run.

The second general model used in the study is:

$$inf_t = a_0 + a_1 gro_t + a_2 tr_t + a_3 tr_*ta_t + \epsilon_t \tag{8}$$

It is in the form. Under the general equality bounds test above, it is established and estimated as follows:

$$\Delta inf_t = \beta_0 + \sum_{i=1}^m \beta_{1i} \Delta inf_{t-i} + \sum_{i=0}^m \beta_{2i} \Delta gro_{t-i} + \sum_{i=0}^m \beta_{3i} \Delta tr_{t-i} + \beta_4 gro_{t-1} + \beta_5 inf_{t-1} + \beta_6 tr_{t-1} + \beta_7 tr_*ta_{t-1} + u_t \tag{9}$$

The error correction model using equation (9) is:

$$\Delta inf_t = \beta_0 + \sum_{i=1}^m \beta_{1i} \Delta inf_{t-i} + \sum_{i=0}^m \beta_{2i} \Delta gro_{t-i} + \sum_{i=0}^m \beta_{3i} \Delta tr_{t-i} + \beta_4 ECT_{t-1} + \beta_5 tr_*ta_{t-1} + u_t \tag{10}$$

It is estimated as.

Since there were heteroscedasticity and autocorrelation problems in the model, the correction was made with the Newey-West method. Secondly, in the study, within the scope of Model 9, whether there is a long-run relationship between inflation, growth, tax revenues and tax amnesties was investigated with the ARDL bounds test approach. In Table 4, the test statistics, table critical values, and diagnostic test statistics for the limit test are reported.

Table 4 shows the long-run coefficients, error correction term and diagnostic test statistics. According to the F-statistic obtained, it was determined that there is a long-run relationship between inflation and economic growth, tax revenues and tax amnesties in Turkey, at least at a statistical level of 1%. After determining that there was a long-run relationship between the variables, long-run coefficients were obtained using the ARDL (1,4,2,1) model. In the long-run regression equation, all three coefficients in the inflation, tax revenue and tax amnesties variables were found to be statistically significant at the 1% level. Table 4 shows that tax amnesties have an increasing effect on inflation. Governments can increase tax revenues and provide cash flow to the treasury through tax amnesties. In this case, it may put pressure on inflation

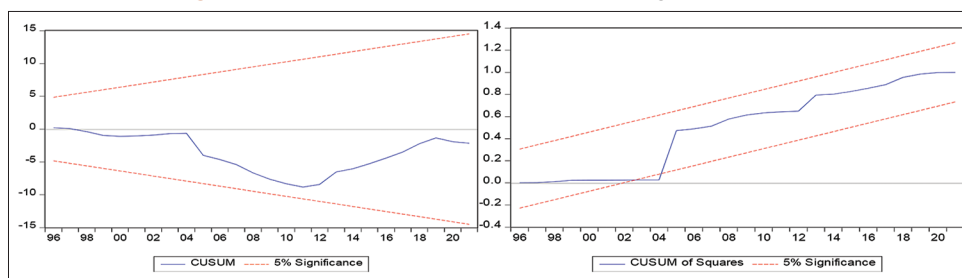
Table 4: ARDL (1,4,2,1) bounds test results and diagnostic test statistics

inf⇒Dependent variable	coefficients	t statistic	Prob.
inf _{t-1}	0.606	2.612	0.014
gro	-1.178	-2.983	0.006
gro _{t-1}	-0.884	-1.060	0.298
gro _{t-2}	0.783	1.483	0.150
gro _{t-3}	-0.393	-0.646	0.523
gro _{t-4}	1.051	1.911	0.067
tr	0.876	2.626	0.014
tr _{t-1}	0.091	0.307	0.760
tr _{t-2}	-0.605	-4.671	0.000
tr*ta	0.006	2.536	0.017
tr*ta _{t-1}	0.006	1.193	0.243
C	2.439	0.658	0.516
F- Statistics		5.38	
		critical values	
		1%	3.65-4.66
		5%	2.79-3.67
		10%	2.37-3.20
Long Run Coefficients			
C	2.439	0.851	0.402
inf _{t-1}	-0.393	-3.648	0.001
gro _{t-1}	-0.621	-1.602	0.121
tr _{t-1}	0.362	3.052	0.005
tr*ta _{t-1}	0.012	2.632	0.014
dgro	-1.178	-1.912	0.066
dgro _{t-1}	-1.441	-2.253	0.032
dgro _{t-2}	-0.658	-1.013	0.320
dgro _{t-3}	-1.051	-1.582	0.125
dtr	0.876	3.281	0.002
dtr _{t-1}	0.605	2.480	0.019
dtr*ta	0.006	2.058	0.049
Short run equation			
ECT _{t-1}	-0.393	-5.575	0.000
LM		2.89 (0.08)	
Breusch-Pagan-Godfrey		28.19 (0.00)	
CUSUM		stable	
CUSUMQ		stable	

by increasing public expenditures and therefore increasing total demand. Additionally, it can be seen in the table that the error correction term coefficient is negative and statistically significant at the 1% level. In this case, it is possible that approximately 39% of the deviation that will occur in the short run will be corrected after a period of time and approach the long-run balance.

Figure 2 presents the CUSUM and CUSUMQ test results of the ARDL (1,4,2,1) model for the variables.

CUSUM and CUSUMQ values were examined to test the consistency of long-run and short-run coefficients. The stability

Figure 2: CUSUM and CUSUMQ test results for general model 2

position of the ARDL (1,4,2,1) model is presented in Figure 2. As can be seen in the figure, the squares of the error terms and the squares of the cumulative error terms remain within the limits set at the 5% significance level. As can be observed from Figure 2, the model is a stable model.

5. CONCLUSION

The relationships between tax amnesties and economic variables are one of the important research topics that started in the past and continue today. Debates about the role and/or intervention of the public sector (political authority) in the economy are a long-standing issue. Recently, the relationships between tax amnesties and economic variables in both developed and underdeveloped countries have been investigated in many studies. In this context, it seems that one of the important policy tools of governments is tax amnesties. With this “instrument”, the government(s) can waive some of their receivables and transfer some of them to the treasury. On the other hand, although the reasons for tax amnesty differ between countries, it is undeniable that it is an important tool used to equalize fiscal deficits. Tax amnesties have a very sensitive position in the establishment of tax policy as an element of economic policy in ensuring the financing of public services, providing a sufficient amount of income, preventing tax losses and evasion, reducing informality, using resources effectively, correcting income distribution, and eliminating instabilities arising in macroeconomic variables. Whatever the reason, tax amnesty affects the social and economic structure and causes many studies on the subject.

In this study on the economic effects of tax amnesty in Turkey, annual data covering the period 1980-2021 were used. Pesaran bounds test approach was used to test the existence of a possible relationship between the relevant variables. According to ARDL limit test results; In both models used in the study, cointegration, co-integration, in other words, the existence of a long-run relationship was detected between the variables, and in the ARDL model findings, the short and long-run coefficients for the tax amnesty variable were positive in both models. This direct relationship between tax amnesty and tax revenue, growth and inflation; It shows that tax amnesty given at regular intervals in Turkey increases tax revenue, growth and inflation. This increase in growth is likely to lead to increased production, employment and income. The effect of tax amnesty on increasing the general level of prices should be viewed with caution.

As a result, increases in public expenditures, deteriorations in the budget, political concerns, etc. Tax amnesty may be applied due

to various factors. In this context, the use of tax amnesty for its intended purpose (without political interest and without frequent repetition); It can have an important role in establishing public balance, macroeconomic targets and social interests with precision. Tax amnesties can also be considered as a palliative solution to generate income in the short run. However, this situation should not be made periodic. The political will representing the public authority should avoid causing manipulation in macroeconomic variables while using tax amnesty as a financial instrument that forms a part of economic programs, and an argument used for economic purposes should not turn into an instrument used for political purposes by turning into a vote maximization target. Additionally, raising tax awareness in society can be said as a policy recommendation to eliminate Turkey’s domestic resource shortage. In short, it is considered that the central government should consider tax policy (tax amnesties, etc.) in terms of normative economics and establish it cautiously in a way that ensures macroeconomic balances in the national economy.

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