Araştırma Makalesi ● *Research Article*

Does More Globalization Mean More Tax Revenue?: Long-run Evidence From Turkey

Küreselleşme Daha Yüksek Vergi Geliri Anlamına Mı Gelir?: Türkiye'den Uzun Dönem Kanıtı

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MAKALE BİLGİSİ	ÖZ
Makale Geçmişi: Başvuru tarihi: 23 Kasım 2021 Düzeltme tarihi: 30 Kasım 2021 Kabul tarihi: 23 Aralık 2021 Anahtar Kelimeler: Küreselleşme Vergi Gelirleri ARDL Metod Türkiye	Bu çalışmada 1972-2018 yıllık verileriyle ARDL yöntemi kullanılarak Türkiye'de küreselleşme ve vergi gelirleri arasındaki uzun dönemli ilişki incelenmiştir. Çalışmanın hipotezi; Türkiye'de uzun dönemde küreselleşme düzeyindeki daha yüksek değerlerin daha fazla vergi gelirine yol açacağını iddia etmektedir. ARDL sınır aralığı test yöntemi sonuçlarına göre küreselleşme ve vergi gelirleri değişkenleri eş-bütünleşik diğer bir ifadeyle bu değişkenlerin uzun dönemde birlikte hareket ettiği sonucuna ulaşılmıştır. Ek olarak, uzun dönem katsayılarının tahmin sonuçları, uzun dönemde Türkiye'de küreselleşme ve vergi gelirleri arasında istatistiksel olarak anlamlı ve pozitif bir ilişki olduğunu göstermektedir. Diğer bir ifadeyle, küreselleşmenin daha yüksek seviyeleri Türkiye'de daha çok vergi geliri toplanılması anlamına gelmektedir.
ARTICLE INFO	ABSTRACT
Article history: Received July: November 23, 2021 Received in revised form November 30, 2021 Accepted: December 23, 2021 Keywords: Globalization Tax Revenues ARDL Method Turkey	In this study, we investigate the long-run relationship between globalization and tax revenue in Turkey by using ARDL method and annual dataset spanning from 1972 to 2018. Our hypothesis claim that higher degree of globalization leads to collection of more tax revenue in Turkey in the long run. ARDL boundary test results disclose that globalization and tax revenue are co-integrated and thus they move together in the long run. Moreover, estimation results of long-run coefficients imply that there is a statistically significant positive relationship between globalization and tax revenue in Turkey in the long-run. In other words, higher degree of globalization means collection of more tax revenue in Turkey.

1. Introduction

Globalization effect has decreased the costs of the migrant between advanced countries due to many possible channels. The first path lies in common language effects of English at the world standards and the integration with the other advanced economies through globalization has generally continued to encourage international workers living abroad. The second path is internationally recognized diplomas and skills that provide to work abroad as a migrant from advanced economies to another by increasing their incomes. The third path are to get easy financial activities and international labor network through developments in the internet and to decrease the transportation costs. These developments have potentially lowered the cost of migrating and living abroad (Hellier, 2021: 385). In this regard, this

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globalization process in the world has created economic integrations among countries and regions at the same time. Moreover, the governments needed new tax policies to take advantages of global economic integrations or ties for their own national interests in the economic, social, and institutional fields (Khalatur, Trokhymets and Karamushka, 2020: 82). Therefore, globalization is expected to have a positive relationship with tax revenues due to the fact that an economy's economic activities rise as a result of economic integration which causes increased basis of tax assessment. For example, in Turkish economy, the transformation of tax policies has been motivated by liberalization process since 1980's because important changes for tax policies and applications within globalization process come with the national economy's integration into the world economy (Inneci and Karabulut, 2018: 272). On the other hand, another view expressed in the literature represents that globalization may lead to less tax revenues since many economies in the world have generally preferred the ways of attracting investments from abroad, especially developing countries where the demand for capital is the highest. For this purpose, they have transformed their national tax systems and provided tax incentives for the international investors to strengthen countries' global competitive power. That process has stably declined effective tax rates on profit and thus economies have experienced decreases in tax revenues (Lukovic, 2015: 118).

The literature on how globalization affects different variables in various fields, such as economic, social, and political aspects, includes many empirical studies. In this regard, the relationship between globalization and labor productivity are discussed by Kutan and Yigit (2009); McMillan, Rodrik and Verduzco-Gallo (2014); Oksak (2018). For example, Koyuncu and Unver (2018) investigated the short-run and long-run impact of globalization on labor productivity using the unbalanced panel data of 34 OECD economies for the period 2002-2012. From the panel cointegration test, it is found that there is statistically significant and positive association between globalization and labor productivity in short-run and long-run. In addition, Özen (2021) examines interactions between productivity, globalization, and rents for developing countries for the period 1991-2017. The paper found a unidirectional causality running from globalization to productivity while estimation results indicated that there is not a statistically significant impact of globalization on productivity level.

Recently, some papers have tried to explore the impact of globalization on corruption (Das and DiRienzo, 2009; Asongu, 2014; Badinger and Nindl, 2014). For example, in the case of African countries, Koyuncu and Unver (2017) tested the relationship between globalization and corruption over the period 2002-2012 by including four different globalization variables and two different corruption variables. They found that more globalization leads to less corruption level in an economy. In classifications of countries' income groups with cross section data for 127

countries, Lalountas, Manolas and Vavouras (2011) investigated the existence of any association between globalization and corruption. The results presented in this study indicated that globalization has a very significant role against corruption for middle- and high-income countries while the results are insignificant for low-income countries.

Due to the essential contribution to poverty, previous papers have largely studied the impact of globalization on poverty level (Figini and Santarelli, 2006; Majeed, 2012; Bergh and Nilsson, 2014; Özen and Koyuncu, 2020). According to these papers, globalization may be an important tool in reducing poverty because it helps governments to collect tax revenues through more economic and investment opportunities, higher salary raises for uneducated employees and enhancing flows of information arriving from abroad (Khan and Majeed, 2018: 152). For example, Salahuddin, Vink, Ralph and Gow (2020) investigated the effects of globalization on poverty by employing time series data for South Africa for the period 1991-2016. The paper's findings found that globalization decreases poverty.

The literature that explains the relationship between globalization and tax is growing. These studies have explained several dimensions of globalization in terms of tax rates, tax policies and tax revenues. For instance, Dreher (2006) argued whether globalization process has affected tax rates on labor, consumption, and capital in the OECD countries for the period 1970 to 2000. Their findings revealed that globalization had a statistically significant and positive impact of only tax rates on capital while tax rates on labor and consumption have been insignificantly influenced by globalization. In other words, with globalization in the OECD countries, tax competition among the countries increases. The findings imply that governments have reduced tax rates on capital to attract capital, which leads to higher tax payments from capital and thus higher tax revenues on capital. On the other hand, an important issue in the paper of Onaran, Boesch and Leibrecht (2012) is how globalization has affected implicit tax rates on labor income, capital income, and consumption. The findings reported that it is possible to link to higher implicit tax rates on labor income with globalization in the EU15 countries while it has a negative effect in terms of the implicit tax rates on consumption. In addition, Overesch and Rincke (2011) empirically tested the relationship between globalization and corporate tax rates using a panel dataset from 1983 to 2006 for selected 32 European countries. They suggest that high level of international tax competition through globalization could lead to the decline trend in corporate tax rates. Bretschger and and Hettich (2005) argue how the globalization affects capital tax rates as a mobile factor relative to immobile factors such as labor taxes for the 12 OECD countries for the period 1967-1996. Their empirical results indicate that higher globalization tends to cause less capital tax rates. In their view, this nexus suggest that globalization has a negative and a statistically significant impact on capital tax rates because tax

competition leads to governments to reduce tax rates on mobile assets in the globalized world.

This study is various from former contributions in few perspectives. For example, in this study, our purpose is to investigate the long-run linkage between globalization and tax revenues. Our sample is rather larger than other contributions based on the ARDL approach, thus adopting the annual dataset over 1972-2018 in Turkey. The rest of study is organized as follows. Section 2 introduce the data and methodology. Section 3 presents empirical results, and in Section 4, we conclude the study with some policy implications.

2. Data and Methodology

In this study, we examine the long-run association between globalization and tax revenue in Turkey by utilizing an annual dataset running from 1972 to 2018. Tax revenue (TAX) in our model is represented by percentage share of tax revenue in GDP and TAX data were gathered from WDI of World Bank. The data on globalization (GLOBAL) were obtained from KOF globalization index of Zurich Technology Institute. Countries with higher degree of globalization can achieve to collect more tax revenue owing to the fact that they might have more liberalized trade opportunities and markets, which enhance trade volume and number of transactions in the relevant country, as a result of globalization. Based on this argument, our hypothesis claims that higher degree of globalization enhances tax revenues in Turkey in the long run. In order to test this hypothesis, we conducted long-run analyses in the light of ARDL approach.

To find out if two series (i.e., TAX and GLOBAL) move together in the long run, we performed ARDL boundary test. Therefore, we constructed and estimated the following ARDL model:

$$\Delta TAX_t = \beta_0 + \sum_{i=1}^{p} \delta_i \Delta TAX_{t-i} + \sum_{i=0}^{q} \phi_i \Delta GLOBAL_{t-i} + \gamma_0 TAX_{t-1} + \gamma_1 GLOBAL_{t-1} + \varepsilon_t \ldots \ldots ..(1)$$

As can be seen from Equation 1 above, γ_0 and γ_1 notations shows the long-run coefficients; δ_i and ϕ_i notations stand for short-run coefficients; Δ notation represents first degree difference operator; β_0 notation is intercept term of the model, and ε_t notation is white noise error term of the model.

In ARDL approach, the null hypothesis asserts that there is no co-integration between TAX and GLOBAL variables (i.e., $H_0 : \gamma_0 = \gamma_1 = 0$). On the contrary to the null hypothesis, the alternative hypothesis claims that there is co-integration between TAX and GLOBAL variables (i.e., $H_1 : \gamma_0 \neq \gamma_1 \neq 0$). If the F-statistic value of ARDL

boundary test exceeds the upper limit at a particular significance level, then we conclude that TAX and GLOBAL variables are co-integrated. Conversely, if the F-statistic value cannot exceed lower limit at a particular significance level, then we infer that TAX and GLOBAL variables are not co-integrated. Finally, if F-statistic value is somewhere between the lower and upper limits then we cannot make any inference on co-integration.

Following the ARDL boundary test, we estimated the error correction model below in order to get both short and long-run coefficients:

$$TAX_t = \alpha_0 + \sum_{i=1}^{p} \delta_i \Delta TAX_{t-i} + \sum_{i=0}^{q} \phi_i \Delta GLOBAL_{t-i} + \eta ECM_{t-1} + \varepsilon_t \ldots \ldots \ldots \ldots \ldots \ldots \ldots (2)$$

δ_i and ϕ_i notations in Equation 2 above stand for the dynamic coefficients bringing the model to the balance in the long-run; represents error correction term; η notation shows the speed of adjustment at which the series return back to long-run path in response to a shock taken place in short-run. The coefficient of speed of adjustment should be statistically significant and possess a negative sign.

3. Empirical Results

Since ARDL boundary test for co-integration does not allow integration level higher that two, firstly stationarity status of the variables must be checked. For that purpose, Phillips-Perron (PP) unit root test is performed to find out if series are stationary. Reported test results are based on three different models, namely none, constant, and constant and trend. The null hypothesis of the PP unit root test asserts that relevant variable has a unit root (i.e., it is non-stationary) whereas the alternative hypothesis of the PP unit root test asserts that relevant variable does not have a unit root (i.e., it is stationary). Table 1 reports the results of PP unit root test.

Table 1: Phillips-Perron Unit Root Test Results

Variable	Model	Test Statistic (P-value)
TAX	None	*0.027596(0.6849)*
	Constant	*-1.774335(0.3866)*
	Constant&Trend	*-1.826175(0.6704)*
Δ TAX	None	*-6.981995(0.0000)*
	Constant	*-7.015970(0.0000)*
	Constant&Trend	*-7.164656(0.0000)*
GLOBAL	None	*3.540003(0.9998)*
	Constant	*-0.672845(0.8437)*
	Constant&Trend	*-1.690941(0.7400)*
Δ GLOBAL	None	*-5.175996(0.0000)*
	Constant	*-6.283769(0.0000)*
	Constant&Trend	*-6.232398(0.0000)*

As indicated by the findings of PP unit root test stemming from three distinct models in Table 1, both TAX and GLOBAL variables have unit roots at levels hence they are not stationary at levels. On the other hand, both TAX and GLOBAL variables do not have unit roots at first differences hence they are stationary at first differences. Unit root test results disclose that both TAX and GLOBAL variables are integrated order one (i.e., I (1)) which complies with the integration level requirement of ARDL boundary test. Hence, we can conduct ARDL boundary test to check the co-integration association between TAX and GLOBAL variables.

Akaike information criterion is utilized to figure out the optimal lag lengths for the model expressed in Equation 1.

Table 2 below displays the results for optimal lag selection for the model. Out of twenty models, ARDL (3, 2) was selected as the optimal model and our analyses will rely on this model.

Table 3 reports ARDL bound test results for the model given in Equation 1. F-statistic value of 4.809129 in Table 3 exceeds the upper bound critical value at 10% significance level and thus we can infer that there is a long-run relationship between TAX and GLOBAL variables (i.e., they are co-integrated).

Table 2: Lag Selection

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
8	-33.186907	**3.294953**	3.684993	3.403133	0.802479	ARDL(3, 2)
13	-34.682276	3.334582	3.675867	3.429240	0.789746	ARDL(2, 2)
18	-35.807891	3.344631	3.637161	3.425767	0.782043	ARDL(1, 2)
7	-32.992886	3.359431	3.798226	3.481134	0.793367	ARDL(3, 3)
3	-33.059055	3.364724	3.803520	3.486428	0.792270	ARDL(4, 2)
12	-34.409388	3.392751	3.782791	3.500932	0.782186	ARDL(2, 3)
17	-35.741978	3.419358	3.760643	3.514016	0.771145	ARDL(1, 3)
6	-32.766317	3.421305	3.908856	3.556531	0.783550	ARDL(3, 4)
11	-33.837469	3.426998	3.865793	3.548701	0.778923	ARDL(2, 4)
2	-32.904965	3.432397	3.919948	3.567623	0.781136	ARDL(4, 3)
16	-35.202212	3.456177	3.846217	3.564358	0.767923	ARDL(1, 4)
1	-32.620448	3.489636	4.025941	3.638384	0.770780	ARDL(4, 4)
10	-37.642917	3.491433	3.783964	3.572569	0.747579	ARDL(3, 0)
9	-37.640901	3.571272	3.912557	3.665930	0.733598	ARDL(3, 1)
5	-37.642782	3.571423	3.912708	3.666081	0.733558	ARDL(4, 0)
15	-40.453948	3.636316	3.880091	3.703929	0.699728	ARDL(2, 0)
4	-37.640855	3.651268	4.041309	3.759449	0.717929	ARDL(4, 1)
20	-41.936291	3.674903	3.869923	3.728994	0.678021	ARDL(1, 0)
14	-40.323034	3.705843	3.998373	3.786978	0.687217	ARDL(2, 1)
19	-41.870976	3.749678	3.993453	3.817291	0.663684	ARDL(1, 1)

Table 3: ARDL Bounds Test Results

F-statistic *4.809129*	**Critical Values**	
Significance	$I(0)$ *Bound*	$I(1)$ *Bound*
10%	4.05	4.49
5%	4.68	5.15
2.5%	5.3	5.83
1%	6.1	6.73

We reported long-run coefficient estimation findings in Table 4 and the results show that TAX and GLOBAL variables are positively related in the long-run in Turkey. This finding is in parallel to the co-integration test results depicted in Table 3. Based on this finding, we can state that as the degree of globalization increases, tax revenue collected by the government in Turkey augments as well.

**Table 4:** Long-run Coefficients of ARDL (3,2) Models

Variable	*Coefficient*	*t-statistic*	*Prob.*
GLOBAL	1.357945	1.976033	0.0621
TREND	-1.034875	-1.834148	0.0816

Both estimation results of short-run coefficients and diagnostic test results are displayed in Table 5. According to the estimation results from Table 5, short-run coefficients of TAX variable in ARDL (3,2) model are statistically significant and take the negative sign at all lags while short-run coefficients of GLOBAL variable in ARDL (3,2) model are statistically significant and take the negative sign at just first lag. The coefficient of ECM term has, as expected, the negative sign and is statistically significant at 1% significance level. We also performed several diagnostic tests to check problems of autocorrelation, heteroskedasticity, non-normality, and model misspecification. As to the diagnostic test findings, ARDL (3,2) model does not contain any problem in terms of autocorrelation, heteroscedasticity, non-normality, and model specification.

Table 5: Short-run & Diagnostic Results of ARDL (3,2) Model

	Coefficient	*t-Statistic*	*Prob.*
ΔTAX_{t-1}	-0.375974	-2.156048	0.0434
ΔTAX_{t-2}	-0.325192	-1.781189	0.0901
$\Delta GLOBAL$	0.150113	0.842411	0.4095
$\Delta GLOBAL_{t-1}$	-0.722420	-3.397274	0.0029
C	-10.227835	-3.858472	0.0010
ECM_{t-1}	-0.302695	-3.983733	0.0007

ECM = TAX - (1.3579*GLOBAL-1.0349*TREND)

Diagnostic Tests	
Tests	Test Value (Prob.)
Breusch-Godfrey Serial Correlation LM Test	0.273413 *(0.7639)*
Breusch-Pagan-Godfrey Heteroskedasticity Test	1.792788 *(0.1445)*
Ramsey RESET Test	0.005236 *(0.9431)*
Jarque-Bera Test	*1.291522 (0.524263)*

Cusum-square test in Figure 1 supports the stability of ARDL (3,2) model.

Figure 1: Cusum-square Test
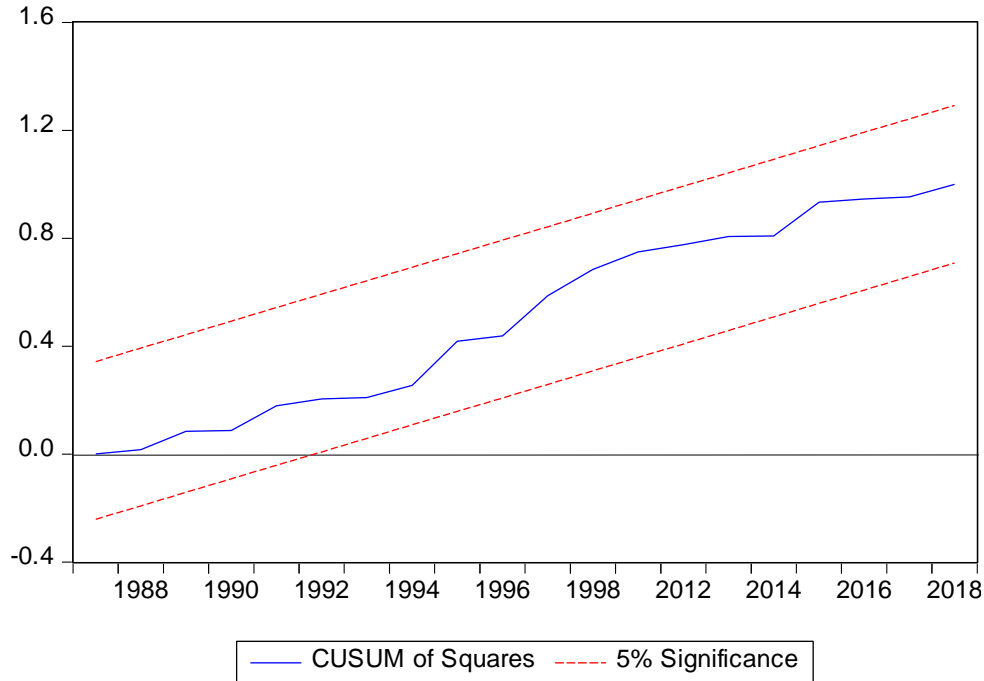
4. Conclusion

Globalization may induce to collection of more tax revenue by liberalizing trade and markets, which enhance trade volume and number of transactions in the relevant country. In the light of this argument, we check the validity of our hypothesis asserting that higher degree of globalization leads to accumulation of more tax revenue in Turkey in the long run. This hypothesis was tested by performing long-run analyses in the light of ARDL approach. The annual dataset utilized in analyses cover the years spanning from 1972 to 2018.

ARDL boundary test results reveal that globalization and tax revenues are co-integrated and thus they move together in the long run. Estimation results of long-run coefficients indicate that there is a statistically significant positive association between globalization and tax revenues in Turkey in the long-run. Therefore, higher degree of

globalization means collection of more tax revenue in Turkey. Since the tax revenue is the largest component of the Turkish government's budget for funding government spending, Turkish government should support policies increasing degree of globalization to be able to accumulate more tax revenue.

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