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Research Article

# Testing the Rodrik Hypothesis in Türkiye

Hamza ÇEŞTEPE<sup>1</sup> , Havanur ERGÜN TATAR<sup>2</sup> 

## ABSTRACT

In this study, the effect of globalization on government size is investigated for the period 1970-2019 in Türkiye. In the study, four different globalization indexes, namely general, social, political and economic, are used to represent the globalization variable. Four different models are created for each globalization index and Fractional Frequency Fourier ADF Test, RALS-ADL and RALS-EG2 cointegration tests are used as analysis methods. Model estimations are made with FOLS and DOLS methods. As a result of the analysis, the effect of economic globalization on government size is positive in all models. In other words, it is concluded that the compensation hypothesis is valid for Türkiye.

**Keywords:** Globalization, Government Size, Compensation Hypothesis, Efficiency Hypothesis, Türkiye.

**JEL Classification Codes:** C32, F62, H50

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## INTRODUCTION

The phenomenon of globalization not only provides trade, labor and capital mobility, but also contributes to the dissemination of information. However, globalization also facilitates funding diversification, technology transfer and product diversification, which leads to the creation of benefits such as greater efficiency and greater export markets access for domestic producers. However, in addition to these advantages, it also makes economies susceptible to supply shortages, currency fluctuations and income volatility that can result in difficult financial and economic crises (Katumba, 2013:1).

Increasing international trade and investment flows, financial liberalization and global interdependence have become the basic realities of countries at this point. In economic terms, globalization represents greater production factor mobility, greater integration with the world through foreign direct investment and increased trade (Adams & Sakyi, 2012). In order to examine the effects of globalization more comprehensively, the globalization measure is needed. At this point, Dreher's (2006) globalization index offers a significant advantage by bringing together various social, political and economic variables.

The phenomenon emphasized in the efficiency hypothesis is that governments have difficulties in collecting tax revenues and cannot easily manage budget deficits (Liberati, 2007). According to the hypothesis, the mobility on tax competition puts downward pressure on tax revenues, which may lead to a decrease in public expenditures.

Compensation and efficiency hypotheses are among the topics with important research areas in the literature. In particular, the relationship between globalization and public size, as of the period of intensification of openness, has been discussed in empirical studies for different countries, mostly with panel data analysis. However, the number of studies on Türkiye on this subject is few. This is one of the differences between the study and other studies in the literature. Another difference is in the analysis method applied. In this study, the subject is examined with current econometric analysis methods that were not used in previous studies.

In the econometric model, the ratio of public expenditures to GDP is considered an indicator of government size. To represent the globalization variable, four different globalization indexes, namely general, social, political and economic, are examined.

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Four different models are created to represent each globalization index. In the study, Fractional Frequency Fourier ADF Test, ADF and PP unit root tests are performed in unit root analysis. RALS-ADL and RALS-EG2 cointegration tests are conducted to analyze whether the variables are cointegrated in the long run.

The plan of the study is formed as follows. First, the conceptual framework related to globalization and public size is created and the development of the aforementioned sizes in Türkiye is revealed. In this context, compensation and efficiency hypotheses are also comparatively explained in detail. After the model and data sets are introduced in the empirical analysis, the results were evaluated statistically. Finally, the results are interpreted.

### **GLOBALIZATION-PUBLIC SIZE RELATIONSHIP AND TÜRKİYE**

Globalization is one of the important concepts that determine the future of countries. Increasing financial liberalization, investment flows and increases in international trade have turned the world into a global village. Accordingly, it has become an undeniable fact that no nation can exist alone. Under the pressure of international norms and profit-making interests, it is accepted that the responsibility of guaranteeing trade and compensating the citizens for any loss or negative impact that this trade may cause belongs to the governments (Olorunfemi & Alimi, 2020:2). At this point, the effect of globalization on government size differs. In other words, due to the intensification of competition day by day, discontent is increasing between and within countries. Because of these, people demand greater public interventions. On the other hand, globalization requires more deregulation and liberalization compared to global efficiency. This situation brings with it a smaller government size (Choi, 2010:1447).

There are three basic theories that explain the relationship between public expenditure and globalization. According to the first theory (Compensation Approach), globalization leads to a decrease in public expenditures. According to the latter (Efficiency Approach), globalization causes an increase in government spending. The third theory argues that although globalization may have minor effects on public spending, local factors are one of the more important determinants of public spending (Heimberger, 2021:352).

The globalization process affects the ability of the governments to maintain their social protection as in

previous years (Sanz & Velázquez, 2003:2). On the other hand, the fact that the economies of the countries are more open to the outside brings external risks for those living in the host country. By reducing external risks, countries can increase their demands for social security and welfare expenditures (Rodrik, 1998). Hence, we may expect a positive correlation between trade openness and the size of the government. Because in economies exposed to external risk, government expenditures play a risk-reducing role (Sanz & Velázquez, 2003:2).

Rodrik (1998), drew attention to the positive relationship between globalization and public spending. Because economies that are more exposed to external shocks demand social security and welfare expenditures to reduce the exposure of residents to external risk. In other words, the fact that residents are more exposed to external risks leads to an expansion of the government's role.

In the compensation hypothesis, it is assumed that public expenditures increase in order to reduce the risks brought by international trade; in the efficiency hypothesis, it is assumed that capital mobility increases caused by globalization will reduce public expenditures. At this point, the basic principle of the efficiency hypothesis is that governments have difficulties in collecting tax revenues and can hardly manage budget deficits in response to the increasing capital gap (Liberati, 2007). In the expanded version of the efficiency hypothesis, it is difficult to make precise predictions about the sorts of government expenditure that globalization will have a negative influence on. Globalization puts downward pressure on public expenditures. The most important reason for this situation is that the welfare state redistributive fiscal policies are almost attacked (Alesina & Perotti 1997).

Globalization generally has three dimensions: Economic, social and political. The fact that globalization has different dimensions has led to the emergence of different indices over the years. The KOF index is accepted as the best index since it includes the political and social dimensions of globalization (Topuz, 2016: 787). Researchers have tried to gather all dimensions of globalization in a single index. For this purpose, indices based on various criteria have been developed. In Table 1, the mentioned indices and the indicators discussed are presented collectively.

The KOF globalization index developed by Dreher (2006) provides more comprehensive information by combining various variables from economic, political and

**Table 1.** Globalization Indexes and Criteria

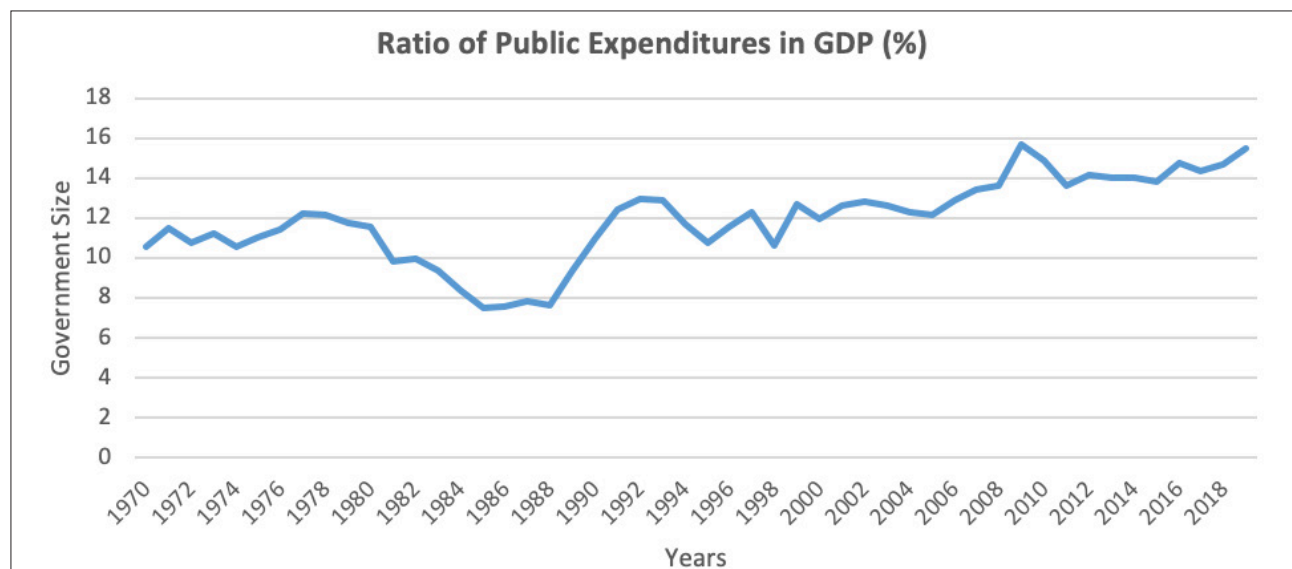
Index	Criteria												
	Years	Countries	Indicators	Economic Globalization				Social Globalization		Political Dimension	Negligible Weight	Geolocation	Environment
				Flow		Real Trade Flow	Restriction of trade and capital	Culture	Information and Communication				
				Foreign capital	DYY								
KFP	1971-2005	62	12	X	✓	✓	X	X	✓	✓	✓	X	X
KOF	1970-2008	158	25	✓	✓	✓	✓	✓	✓	✓	X	X	X
CSGR	1982-2004	62	16	✓	✓	✓	X	X	✓	✓	✓	✓	X
MGI	2000-2008	117	11	✓	✓	✓	X	X	✓	X	Same Weight	✓	✓
NGI	1995-2005	70	22	✓	✓	✓	X	✓	✓	X	X	✓	X
G-Index	2001	185	6	✓	✓	✓	X	X	✓	X	X	X	X

**Source:** Samimi et al., 2011, p.210

social fields. The KOF Globalization Index is calculated annually from 1970 to 2019. However, missing values are calculated using the linear interpolation method, since all data by countries and years are not available (KOF, 2022). Figure 1 shows the ratio of public expenditures to GDP for the period 1970-2019 in Türkiye. Accordingly, the year with the highest rate in question is 2009. The lowest year is 1985. Although there has been an increase and decrease in the size of the public over the years, the

period between 1988 and 1991 can be characterized as the period in which the highest increase is recorded.

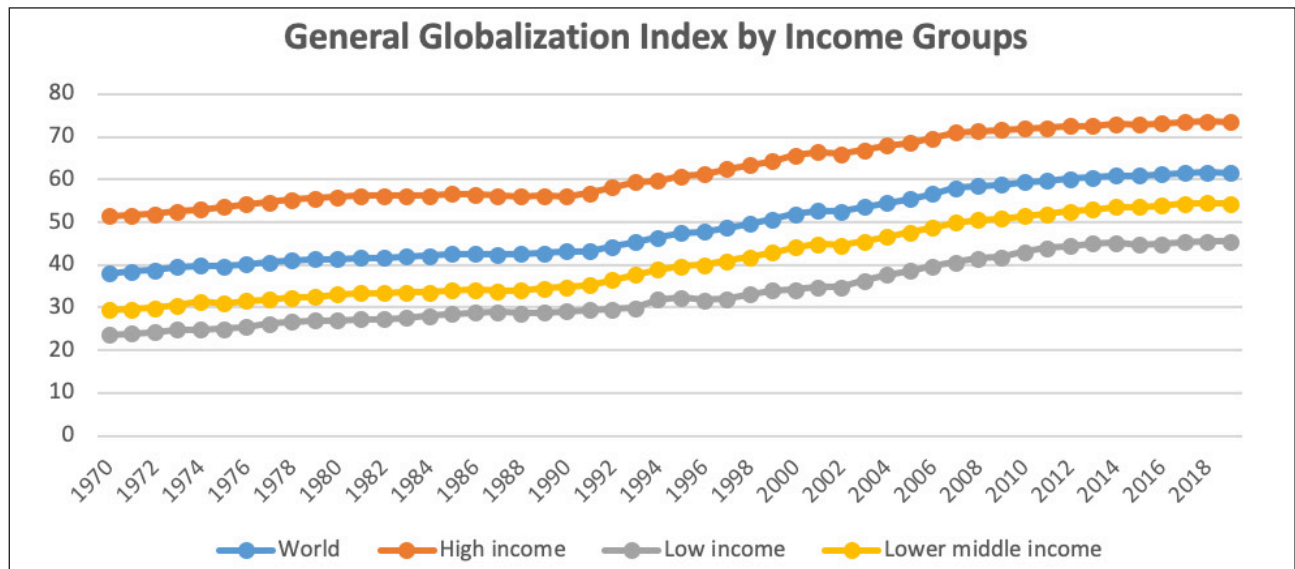
Figure 2 shows general globalization index according to different income groups. Accordingly, the general globalization index in the high-income group is well above the world average. It is seen that the level of globalization in countries has increased rapidly since 1990.



**Figure 1.** Ratio of Public Expenditures in GDP for the period 1970-2019 in Türkiye (%)

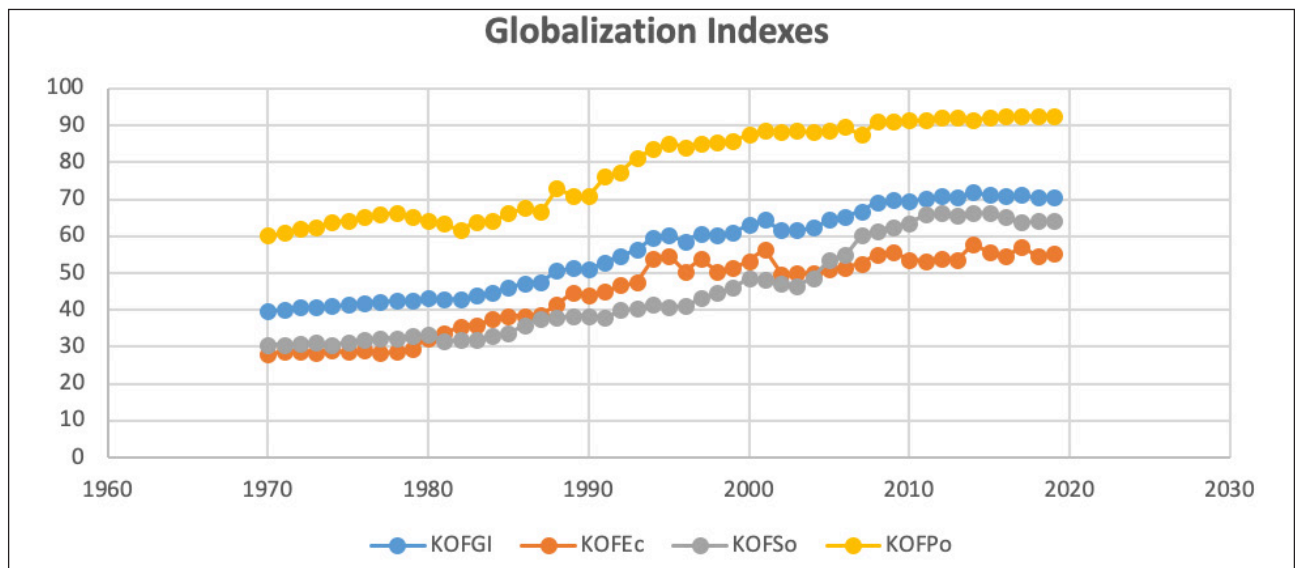
**Source:** Worldbank (2022).





**Figure 2.** General Globalization Index by Income Groups (1970-2019)

**Source:** KOF is created by the authors using data from <http://globalization.kof.ethz.ch>.



**Figure 3.** General, Economic, Social and Political Globalization Indexes for the period 1970-2019 in Turkiye

**Source:** KOF is created by the authors using data from <http://globalization.kof.ethz.ch>.

Figure 3 shows the general, economic, social and political globalization indexes for the period 1970-2019 in Turkiye. Accordingly, it is observed that the political globalization index has hovered above over the years. In addition, in general, all globalization index values have increased over the years.

**EMPIRICAL ANALYSIS**

Under the title of empirical analysis, first of all, detailed information about the model and data will be given. Then, cointegration analyzes will be included after descriptive statistics and stationarity analyses. Finally, the model will be estimated and the results will be evaluated statistically and theoretically.

**Data Set**

Table 2 presents the explanations of the variables.

Four different models are created in the study. The models in question are shown in the Table 3.

**Statistics and Stationarity Analysis**

Before making a cointegration analysis and model estimation, descriptive statistics and unit root analyzes of the variables are performed. Fractional Frequency Fourier ADF, ADF and PP tests are carried out to determine whether the series have unit roots. In Table 4, probability, Jarque-Bera, kurtosis, skewness, standard error, minimum, maximum, median and mean values of the series are reported.

**Table 2.** Explanation of Variables

Abbreviation of Variables	Names of Variables	Source of Variables	Period
gov	Public Expenditures Ratio in GDP	World Bank	1970-2019
kof	Globalization Index (GI)	KOF Swiss Economic Institute	1970-2019
kofsoc	Social (GI)		1970-2019
kofpol	Political (GI)		1970-2019
kofec	Economic (GI)		1970-2019

**Table 3.** Models Used in the Study

Model 1	$\ln g_t = \delta_0 + \delta_1 \ln kof_t + e_t$
Model 2	$\ln g_t = \alpha_0 + \alpha_1 \ln kofsoc_t + e_t$
Model 3	$\ln g_t = \beta_0 + \beta_1 \ln kofpol_t + e_t$
Model 4	$\ln g_t = \gamma_0 + \gamma_1 \ln kofec_t + e_t$

**Table 4.** Descriptive Statistics

	Ing	Inkofec	Inkof	Inkofpol	Inkofsoc
Average	1.068	1.637	1.739	1.889	1.637
Median	1.084	1.696	1.771	1.923	1.611
Maximum	1.194	1.761	1.856	1.966	1.821
Minimum	0.875	1.447	1.597	1.779	1.482
Standard Error	0.080	0.110	0.091	0.068	0.121
Distortion	-0.833	-0.637	-0.208	-0.279	0.297
Kurtosis	3.246	1.822	1.479	1.352	1.616
Jarque-Bera	5.917	6.277	5.180	6.302	4.722
Possibility	0.051	0.043	0.075	0.042	0.094

**Table 5.** Fourier ADF Test Results of Variables (Fractional Frequency)

Variables	Frequency	Min.SSR	F test Statistic	Appropriate Delay	FADF Test Statistic	%1	%5	%10
<i>Ing</i>	3.4	0.046	3.053	0	-1.165	-3.696	-3.020	-2.677
<i>Inkofec</i>	0.2	0.013	5.057	1	-3.057	-4.513	-3.895	-3.594
<i>Inkof</i>	0.5	0.002	6.012	1	-2.674	-4.528	-3.932	-3.636
<i>Inkofpol</i>	0.7	0.003	5.343	3	-3.114	-4.538	-3.942	-3.634
<i>Inkofsoc</i>	0.6	0.005	6.193	1	-2.980	-4.551	-3.942	-3.639

**Note:** \*\*\*, \*\*, \* denote 1%, 5% and 10% significance levels.

Traditionally used unit root tests fail to detect structural breaks. At this point, Fourier function unit root analysis provides the opportunity to analyze structural breaks (İltaş & Demirgüneş, 2020:979). Enders & Lee (2012) used the Fourier transform to allow smooth transitions in their work.

In the study of Omay (2015), the frequency value is between 0 and 2, while in the studies of Bozoklu, et al. (2020), this value ranges from 0 to 5. At this point, the critical values changing in the range of [0.1, 0.2, ..., 5] have been tabulated in the work of Bozoklu, et al. (2020). Here, the frequency value takes fractional values, not integers. For this reason, the test is called "fractional frequency".

**Table 6.** Unit Root Analysis Results of Variables

Variables	ADF	PP
Ing	-1.133 (0.695)	-1.424 (0.562)
$\Delta$ Ing	-6.489 (0.000)***	-6.551 (0.000) ***
Inkofec	-1.491 (0.529)	-1.519 (0.515)
$\Delta$ Inkofec	-7.774 (0.000) ***	-7.777 (0.000) ***
Inkof	-1.120 (0.700)	-1.096 (0.710)
$\Delta$ Inkof	-6.339 (0.000) ***	-6.348 (0.000) ***
Inkofpol	-1.180 (0.675)	-1.169 (0.680)
$\Delta$ Inkofpol	-7.897 (0.000) ***	-7.833 (0.000) ***
Inkofsoc	-0.038 (0.950)	-0.164 (0.935)
$\Delta$ Inkofsoc	-5.135 (0.000) ***	-5.135 (0.000) ***

**Note:** \*\*\* denotes significance at the 1% level.

For the significance of trigonometric terms, the study of Enders & Lee (2012) is used, for table values, the studies of Bozoklu, Yılanıcı & Fikir (2020) are used.

Table 5 shows the Fractional Frequency Fourier ADF test results. Accordingly, the significance of trigonometric terms are tested first. Here, it has been determined that the F-statistics values do not exceed the table critical values. At this point, based on the assumption that the series are linear, the ADF test is applied to the series. In order to present the results comparatively, the ADF test results are given together with the PP test results.

Table 6 shows the unit root test analysis results of the variables. According to the results, the variables become stationary after the first difference. At this point, it has been determined that the prerequisite of cointegration analysis is met.

### Cointegration Analysis

After demonstrating that the variables are stationary by difference, the existence of a cointegration relationship was tested with residuals augmented least squares (RALS) cointegration tests. The preference of these tests is based on three important reasons (Oh et al., 2019): First, in the

RALS cointegration test, information on errors that do not show normal distribution, which is not considered in the literature, is used. Second, RALS cointegration tests avoid power losses due to predetermined misidentification of a particular functional form. The third reason is that the use of RALS-based tests increases the explanatory power of the test due to non-normal distribution characteristics when non-normal distribution features are detected in the estimation process. Accordingly, the results of RALS-ADL and RALS-EG2 tests are reported together to present the results comparatively.

Lee et al. (2015) recommended the RALS-EG2 test, which is more powerful than the standard strong EG (Engle-Granger) test. For this, they proposed adding RALS terms to the model in the second stage. The terms to be added are as follows:

$$\hat{w}_t = \llbracket \hat{e}_t^2 - m_2, \hat{e}_t^3 - m_3 - 3m_2\hat{e}_t \rrbracket' \quad (1)$$

In the RALS-EG2 test, the notation to which the terms are added is as follows:

$$\Delta u_t = \gamma_1 + \gamma_2 u_{t-1} + \Delta x_t + \hat{w}_t + e_t \quad (2)$$

**Table 7.** RALS-EG2 Cointegration Test Results

Models	EG2 Test Results	RALS-EG2 Test Results	rho	1%	5%	10%
Model 1	-2.369	-2.855	0.966	-3.982	-3.386	-3.082
Model 2	-2.440	-3.287*	0.922	-3.892	-3.306	-2.986
Model 3	-2.125	-2.341	0.984	-3.982	-3.386	-3.082
Model 4	-1.875	-2.253	0.978	-3.982	-3.386	-3.082

**Note:** The studies of Lee et al., (2015) are used for critical values. \*\*\*, \*\*, \* indicate significance according to 1%, 5% and 10% of the table values, respectively.

Table 7 shows the RALS-EG2 cointegration test results. Accordingly, a cointegration relationship has been identified between social globalization and government size. However, no cointegration relationship is detected in model 1, model 3 and model 4.

The ADL cointegration test, which is introduced to the literature by Banerjee et al. (1998), is a one-step test, but considers the following model:

$$\Delta y_t = \alpha_1 + \alpha_2 y_{t-1} + \alpha_3 x_{t-1} + \alpha_4 \Delta x_t + u_t \quad (3)$$

In the equation above, there is the first difference of the dependent variable on the left side of the equation, and there is lagged value of the dependent and independent variables and the first difference of the independent variable on the right side of the equation. By adding RALS terms to the model in question, it is possible to make it more powerful.

The RALS terms to be added to the model are as follows (Lee et al, 2015:401):

$$\hat{w}_t = [[\hat{e}_t^2 - m_2, \hat{e}_t^3 - m_3 - 3m_2\hat{e}_t]]' \quad (4)$$

The model for the RALS-ADL test becomes the following:

$$\Delta y_t = \alpha_1 + \alpha_2 y_{t-1} + \alpha_3 x_{t-1} + \alpha_4 \Delta x_t + \hat{w}_t + u_t \quad (5)$$

Table 8 shows the RALS-ADL cointegration test results. The cointegration relationship is detected in model 1, model 2 and model 4.

If the RALS-ADL and RALS-EG2 results are different, the RALS-ADL test is considered a more powerful test (Salihoğlu & Hepsağ, 2021:52). Therefore, RALS-ADL test results are taken into account in terms of cointegration analysis results.

### Model Estimation

After determining the existence of the cointegration relationship, model estimation is started. The estimation results in question are shown in three separate tables.

The estimation results for model 1 are given in Table 9. Theoretically, the effect of general globalization on government size is positive.

The estimation results for model 2 are given in Table 10. Theoretically, the effect of social globalization on government size is positive.

Finally, Table 11 shows that the effect of economic globalization on state size is positive.

**Table 8.** RALS-ADL Cointegration Test Results

Models	ADL Test Results	Min AIC	RALS-ADL Test Results	rho	1%	5%	10%
Model 1	-2.950	-3.952	-2.950*	0.946	-3.793	-3.171	-2.846
Model 2	-3.643	-3.952	-3.852***	0.874	-3.793	-3.171	-2.846
Model 3	-2.445	-3.930	-2.861	0.963	-3.864	-3.252	-2.923
Model 4	-2.951	-3.963	-3.187**	0.946	-3.793	-3.171	-2.846

**Note:** The studies of Lee et al., (2015) are used for critical values. Table values show significance according to 1%, 5% and 10%. \*\*\*, \*\*, \* indicate significance according to 1%, 5% and 10% of the table values, respectively.

**Table 9.** Model 1 Estimation Results

FOLS Estimation Results				
FOLS Estimation Results	Variable	Standard Error	T-Statistics	Probability Value
Inkof	0.578***	0.160	3.601	0.000
C	0.074	0.280	0.265	0.791
DOLS Estimation Results				
DOLS Estimation Results	Variable	Standard Error	T-Statistics	Probability Value
Inkof	0.577***	0.161	3.573	0.000
C	0.087	0.284	0.308	0.758

**Note:** The symbols \*\*\*, \*\*, \* indicate significance according to 1%, 5% and 10%.

**Table 10.** Model 2 Estimation Results

FOLS Estimation Results				
FOLS Estimation Results	Variable	Standard Error	T-Statistics	Probability Value
Inkofsoc	0.489***	0.113	4.319	0.000
C	0.276	0.186	1.483	0.144
DOLS Estimation Results				
DOLS Estimation Results	Variable	Standard Error	T-Statistics	Probability Value
Inkofsoc	0.505***	0.121	4.177	0.000
C	0.253	0.198	1.281	0.207

**Note:** The symbols \*\*\*, \*\*, \* indicate significance according to 1%, 5% and 10%.

**Table 11.** Model 4 Estimation Results

FOLS Estimation Results				
FOLS Estimation Results	Variable	Standard Error	T-Statistics	Probability Value
Inkofec	0.357**	0.160	2.229	0.030
C	0.494	0.263	1.878	0.066
DOLS Estimation Results				
DOLS Estimation Results	Variable	Standard Error	T-Statistics	Probability Value
Inkofec	0.356**	0.171	2.078	0.043
C	0.496	0.284	1.742	0.088

**Note:** The symbols \*\*\*, \*\*, \* indicate significance according to 1%, 5% and 10%.

## CONCLUSION

Rodrik (1998) reveals that countries with more openness have larger governments. Because the citizens of the country demand a higher portion of government expenditures to reduce external risks. This study, as Rodrik has stated, has tried to empirically answer to empirically answer the question of whether globalization increases public expenditures in Türkiye or vice versa. Empirical analysis is carried out using four different models for the period 1970-2019. The reason for using four different models in the study is to clearly demonstrate the existence of the relationship between different globalization indices and government size. At this point, the effect of globalization on government size is examined in this study. In the first model, the general globalization index, in the second model, the social globalization index, in the third model, the political globalization index and in the last model, the effect of the economic globalization index on the government size are examined.

Fractional Frequency Fourier ADF Test, RALS-ADL and RALS-EG2 cointegration tests are used. Model

estimations are made with FOLS and DOLS methods. According to the empirical analysis results of the study, firstly, it is determined that the series are stationary at the first difference in unit root examinations made with appropriate tests. Then according to the RALS-ADL cointegration test results, a cointegration relationship is determined in model 1, model 2 and model 4. According to the results of the RALS-EG2 cointegration test, which is carried out to reveal the results comparatively, a cointegration relationship is detected only in model 2. At this point, since the RALS-ADL test is considered a more powerful test (Salihođlu & Hepsađ, 2021:52), the results of the RALS-ADL test are taken into account in terms of cointegration analysis results.

In model predictions, as in cointegration analysis, FOLS and DOLS estimation results are reported together to present the results comparatively. Accordingly, the effect of economic globalization on public size in model 1, model 2 and model 4 is found to be statistically significant according to both FOLS and DOLS estimation results. In addition, in all models, the effect of economic

globalization on public size is positive. In other words, the validity of the compensatory hypothesis in Turkiye is confirmed as a result of the study. This result can be interpreted as an increase in public expenditures in order to reduce the risks brought by international trade in Turkiye. In this context, considering the conclusion that economic globalization has increased public expenditures in Turkiye, necessary policies should be implemented to ensure that these expenditures are financed with solid resources.

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