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Empiric Evidences On The Relationship Between Tax Revenues and Income Distribution Inequality: Kónya Panel Causality Test [1*]

Temel GÜRDAL
Prof. Dr., Sakarya University,
Faculty of Political Sciences, Department of Finance
tgurdal@sakarya.edu.tr
Orcid ID: https://orcid.org/0000-0001-6304-9766

Veysel İNAL
Ress. Assist. Dr., Sakarya University,
Faculty of Political Sciences, Department of Finance
veyselinal@sakarya.edu.tr
Orcid ID: https://orcid.org/0000-0002-1143-4184

Kadriye İZGİ ŞAHPAZ
Ress. Assist. Dr., Sakarya University,
Faculty of Political Sciences, Department of Finance
kadriyeizgi@sakarya.edu.tr
Orcid ID: https://orcid.org/0000-0002-2766-5921

Abstract

The purpose of the study is to determine whether tax revenues have any effect on income distribution. Taxes have a social purposes besides their economic purposes. In line with these purposes, it also aimed to reduce the inequality in income distribution through policy. This situation, which is expressed as secondary income distribution, is an application that can be encountered in almost every country in the world. Kónya (2006) Panel causality analysis was preferred as a method in the study that examined the 1991-2016 period of 16 OECD countries whose datasets are accessible. The data used in the study was derived from the OECD database and SWIID database that calculated by Frederic Solt in 2009. The results revealed the corrective effect of taxes on income distribution inequality in some countries for the sample group. While taxes in France and Luxembourg reduced income distribution inequality, the decrease in income

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distribution inequality in Italy resulted in a positive impact on tax revenues. As the most important reason for this situation is that the tax policies of the countries may be different from each other.

Anahtar Kelimeler: Tax, Income Distribution Inequality, Panel Causality.

Vergi Gelirleri ve Gelir Dağılımı Eşitsizliği Arasındaki İlişki Üzerine Ampirik Kanıtlar: Konya Panel Nedensellik Testi

Öz

Çalışmanın amacı vergi gelirlerinin gelir dağılımı üzerinde herhangi bir etkisinin olup olmadığının belirlenmesidir. Vergilerin ekonomik amaçları dışında sosyal amacı da söz konusudur. Bu amaç doğrultusunda vergiler üzerinden yapılan politikalar ile gelir dağılımında eşitsizliğin azaltılması amaçlanmaktadır. İkincil gelir dağılımı olarak ifade edilen bu durum dünyanın hemen hemen her ülkesinde karşılaşılabilecek bir uygulamadır. Sağlıklı verilerine ulaşılabilen 16 OECD ülkesinin 1991-2016 döneminin incelendiği çalışmada yöntem olarak Konya (2006) Panel Nedensellik analizi tercih edilmiştir. Çalışmada kullanılan veriler OECD Stat veri tabanından ve 2009 yılında Frederic Solt'un hesapladığı SWIID veri setlerinden elde edilmiştir. Elde edilen sonuçlar örneklem grubundaki bazı ülkelerde vergilerin gelir dağılımı eşitsizliği üzerinde düzeltici etkisini ortaya koymuştur. Fransa ve Lüksemburg'da vergiler gelir dağılımı eşitsizliğini azaltırken, İtalya'da gelir dağılımı eşitsizliğinin azalması vergi gelirlerinin olumlu etkilenmesine neden olmuştur. Bu durumun en önemli sebebi olarak ülkelerin vergi politikalarının farklılık arz etmesi gösterilebilir.

Keywords: Vergi, Gelir Dağılımı Eşitsizliği, Panel Nedensellik.

INTRODUCTION

Income distribution refers to the division of income obtained in the country between individuals or factors of production. It has a structure that includes many factors with its political, social and economic aspects. The fact that the distribution of income cannot be done fairly depends on these factors and the factors that affect these factors. Even in the most developed countries, it is seen that income is not divided/distributed equally and some of the society has a higher

level of prosperity than the others (Avcı and Avcı, 2017: 76). Taxes are one of the most important instruments used to achieve justice in the distribution of income, which is one of the objectives of fiscal policies. Because of their flexible structure, taxes are a highly preferred policy tool. The shift away from the understanding of social state, especially as a result of the Neo-liberal policies that took effect in the post-1980 world, has led to an increase of injustices in the distribution of income. In this period, economic and social practices that improve income distribution before the neoliberal policies were replaced by the opposite practices. At the same time, tax policies have become even more important. Especially, changing the tax-based public finance system, reducing the tax burden on capital and applying a tax allocation theory, expanding informal business/economical practices and shrinking budget transfers were the factors that prevented the increase of imbalances in income distribution. As in the whole world, the liberal policies known as the 24 January decisions started to be implemented in our country have also increased imbalances in income distribution (Sevin, 2016: 14).

The OECD reports on this issue, which studies about the income distribution, suggest that taxes have a weak impact on ensuring fairness/balance in income distribution. In his study on the subject, Cingano (2014) stated that the difference between the richest and the poorest in many OECD countries has increased considerably over the last 30 years, and he also stated that the difference between the richest 10% and the poorest 10% of the population has been 8.5 times in the last period. While this difference is calculated as 7 times in 1980s, it is seen that the imbalance in income distribution increases day by day. In their research on selected OECD countries in the year 2017, Avcı and Avcı (2017) stated that the state's intervention in income distribution through transfers and taxes has improved income distribution to a degree, but the said improvement has failed to go beyond a point. In other words, the Gini coefficient has not changed much in the years after the intervention and has been fixed to 0.30 level, also cannot be lowered further down.

This study is aimed to determine the impact of taxation on income distribution on a country-by-country basis based on OECD reports and studies in the literature. For this purpose, an empirical analysis was conducted/employed for the selected 16 OECD countries with data compatibility. What makes our study different from the studies in the literature is the preference of the panel data analysis techniques in accordance with this by targeting the results on the basis of period range and the country whose sides are examined. The fact that empirical evidence on the subject will be presented and that these results are country-based increases our expectations in terms of filling the gap in the literature.

1. Literature Review

Current studies in the literature about the subject have revealed different results according to the data periods and the methods used. Different results were obtained in the time series and panel studies conducted according to the country or country groups studied.

In his article Albayrak (2011) investigated the effects of indirect tax policies applied to mitigate the effects of the crisis in Turkey for the period 2004-2009 in the special case of excise duty (in short EDT) and VAT (Value added tax) taxes. In this study, a comparative analysis which is rarely seen in the literature was employed. The period range examined was compared with 2004, which was the year of economic growth. In the study, the effect of fiscal policies on income distribution was examined through the concept of progressivity. Progressivity/progressive tax or public expenditure must fulfill two conditions. While the first condition calls for the distribution of any tax or transfer to move away from proportionality in favor of lower-income groups; according to the second condition, the distribution of income after tax (or public transfer/expenditure) is more egalitarian than the pre-tax distribution. In other words, the second condition expects the tax to have a positive impact on the distribution of income, in other words, focusing on the redistributive power of public policies. The empirical analysis of the study was derived from data sets from household budget surveys. Basically, s-Gini progressivity indices were used for the analysis, allowing sensitivity to income distribution to be included in the analysis, and tax-redistribution and redistribution indices using this framework were preferred for the analysis. The results of the analysis show that the excise duty (EDT) and VAT taxes, which are both the most important source of income and the most frequently used policy instruments in recent years, generally have negative influences for low-income groups. In other words, these taxes have a disruptive effect on income distribution and lower-income groups are more affected by this situation.

In their study, Wang et al., (2012), based on the widening of the gap between the rich and poor in most OECD countries over the past decade, they investigated whether or to what extent tax and social transfers contributed to this trend. In this context, the effects of changes in tax and social transfers on income distribution inequality were analyzed for 20 countries (Australia, Canada, Denmark, Finland, Germany, Israel, Netherlands, Norway, Sweden, Switzerland, United Kingdom and United States, Belgium, France, Ireland, Italy, Luxembourg, Mexico, Poland and Spain) during the 1985-2005 period. According to the survey data, an increase in household income distribution inequality has been observed recently in the countries (except Ireland). Although tax revenues (income and withholding tax) and social transfer systems appeared to be less effective after the mid-1990s,

the average increase in income distribution inequality was found to compensate two-thirds. As a result, tax policies in the mid-2000s were found to be more effective at reducing income distribution inequality than in the mid-1990s. It has been found that outreach programs are more effective than taxes in terms of reducing income distribution inequality in countries. In the case of outreach programs, pensions in the public sector were found to have the greatest impact on reducing income distribution inequality, even if they varied among countries. Some degree, social assistance, disability, and family benefits were also found to contribute to reducing income inequalities, albeit smaller.

Adam et al; (2015) analyzed the relationship between income inequalities and the relative tax burden on labor and capital incomes with cross-sectional dataset analysis for 75 developed and developing countries. The research focuses on the potential reverse causation relationship between income distribution inequality and tax structure, which means that a tax structure that brings greater tax burdens to capital than labor in accordance with the literature has a disruptive effect on income distribution inequality. The results of the analysis support the conclusion that the burden on capital taxes in countries with higher income distribution inequality is relatively higher than the burden on labor taxes. It has also been found that countries with low-income distribution equality tend to reduce the tax burden that falls on the workforce. This is in line with the theory in the study that the reason for the countries ' tax policies to focus on capital taxes relative to labor taxes is the preference of politicians who want to get the support of the median voter.

Bilgic (2015) examined the impact of income tax, corporate tax (direct taxes) and VAT (one of the indirect taxes) on the GINI coefficient using annual data covering the period 1990-2013 for Turkey in his study aimed at determining the effectiveness of tax rates in order to ensure fairness in income distribution. As a result of the study, it was found out that the relationship between indirect taxes and the GINI coefficient is insignificant, whereas a 1% increase in direct taxes reduces the GINI coefficient by 0.8%. This result has been proven through the model of the effectiveness of direct taxes for Turkey in achieving income fairness and has been interpreted as a tool of fiscal policy for ensuring fairness in income distribution as governments need to increase the effectiveness of direct taxes.

In his study, Delibas (2017) examined the relationship between income distribution and tax policies with the data of 27 OECD countries, including Turkey, for the period 2005-2011. The ratio of personal income, corporate, wealth and expenditure taxes to GDP, which represents tax policies, was used as independent while the GINI coefficient, which represents income distribution, was used as a dependent variable. The results of the study in which the panel data analysis method is preferred can be summarized as follows: i) statistical

relationship between personal income tax and GINI variable is significant. It has been empirically proven that a 1% increase in personal income taxes in the period examined will result in a 0.275% decrease in GINI coefficient and thus an improvement in income distribution. ii) the statistical relationship between wealth taxes and GINI variable was found to be insignificant. However, in the model of the study, it was found that wealth taxes had a regulatory effect on income distribution in accordance with expectations. iii) the relationship between expenditure taxes and income distribution is statistically significant and a 1% increase in expenditure taxes results in an increase of 0.432% on the GINI coefficient. Therefore, the effect of increases in spending taxes on income distribution is negative and the increase in spending taxes is determined to increase the injustice of income distribution. iv) Although the relationship between corporate income tax and income distribution was found to be insignificant, empirical conclusions were reached that the effect of corporate income tax on the GINI coefficient was increasing and therefore corporate income tax adversely affected the justice in income distribution. In the light of empirical evidence, the author has stated that there is a tax policy argument in line with the goal of correcting income distribution due to the flexibility and advantages that personal income taxes have. He stated that corporate income taxes should have certain features in order to be used as an effective policy tool for the correction of the income distribution. These are the income groups of the corporate shareholders, if they are members of the higher income groups and if the possibility of reflecting the tax is limited, corporate income taxes can be used as a policy tool to effectively regulate the distribution of income by using increased rate tariffs. The author stated that wealth taxes are the most effective policy tool, but the expected yield cannot be obtained. In order to prevent this, he pointed out that the deficiencies, glitches, and inaccuracies in the application should be remedied and the importance of reducing exemption-exceptions and taking value-based bases into consideration.

Martorano (2018) investigated whether changes in taxation that have been ongoing since 2000 for 18 Latin American countries in the period 1990-2015 encouraged the reduction of income distribution inequality. In particular, the tax changes were examined based on the expectation that the increase in the share of direct taxes relative to indirect taxes within tax revenues would both encourage the progress of the tax system and contribute to the reduction of income distribution inequality. In the research, the disparity in disposable income is dependent variable; the independent variable is the data sets related to taxation as income taxes, project and capital gains, property taxes, property and service taxes, international trade taxes and other indirect taxes, with the distinction of direct and indirect taxes. According to the preliminary estimation results, the tax / GDP ratio did not have a statistically significant effect on the GINI coefficient. However, it was found that the coefficients were negative in accordance with the

expectation and the analysis turned into a statistically significant shape after the inclusion of the country's constant effects in the analysis in order to capture structural differences between the countries. In addition, the share of direct taxes on GDP, the contribution of direct taxes to total tax revenue, the effects of direct taxes on the GINI coefficient of direct taxes on the share of direct taxes were seen as negative and statistically significant in the models examined separately and it was concluded that recent changes in tax composition played a key role in reducing income distribution inequality in Latin America during 1990-2015. The result confirms that the contribution of the increase in the share of direct taxes in line with the expectations of similar studies supports the advancement of taxation and income equality in Latin America.

In their study, Tayyare and Sayaner (2018) investigated the effects of taxes, public expenditures, public borrowing and Corporate Quality Factor on income distribution in Turkey between 1990 and 2016 with the least-squares method. In the study, Gini coefficient, which represents inequalities in income distribution, was taken as dependent variable, public expenditures, taxes, and borrowing and institutional quality variables were taken as independent variables and a multiple regression model was established. According to the results of the analysis, it is seen that the 1 unit increase in public expenditures reduces the income distribution by 0.16 units, the 1 unit increase in taxes reduces the income distribution by 0.14 units, the 1 unit increase in the borrowing variable increases the income distribution by 0.05 units, and the 1 unit increase in corporate quality factor reduces the income distribution by 0.04. Given the consequences between tax revenues and income distribution inequality in terms of our study, we can state that taxes reduce income distribution inequality.

Demirgil (2018) analyzed the existence of the long-term relationship between GINI coefficient and income distribution using Turkey's 1980-2014 period annual data with Autoregressive Distributed Lag Bound Test (ARDL) approach by distinguishing indirect and direct taxes. According to the results of the analysis, a cointegration relationship was found between the series and it has been determined that a 1% increase in the indirect tax rate increased GINI coefficient by 0.10%, and a 1% increase in direct tax rate decreased GINI coefficient by 0.05%. In this study, a negative relationship between direct taxes and GINI coefficient, and a positive relationship between indirect taxes and Gini coefficient was determined, and this is interpreted as the increase in direct taxes decreases the income distribution inequality and the increase in indirect taxes increases the income distribution inequality.

When the studies are examined in general, it can be emphasized that taxes are a fiscal policy tool that can be used at the point of establishing justice in the distribution of income. Although the regulatory impact of income distribution

differs from country to country, it is obvious that it has made a positive contribution at this point. Studies and the results obtained to support these statements.

2. DATASET

In the study, annual data from 16 OECD countries (Germany, Australia, Austria, Belgium, France, the Netherlands, Spain, Italy, Japan, Canada, Luxembourg, Norway, Poland, Portugal, Sweden, Turkey) has been used. The period and sample groups examined in the study were determined according to the data compliance of the countries. The relationship between tax revenues and income distribution was examined in the study using data from the period 1990-2016. The data set for tax revenues was derived from the OECD database, while the income distribution representation variable GINI coefficients were derived from SWIID version 8.0 created by Solt (2009). Tax revenue is defined as income collected from income and profit taxes, Social Security premiums, taxes on goods and services, payroll taxes, taxes on property, and other taxes. Total tax revenue as a percentage of GDP shows a country's share of production collected by the state with taxes. It can be considered a measure of the degree to which the government controls the resources of the economy. The tax burden is measured by the total tax revenues received as a percentage of GDP. This indicator is state-owned (all levels of government) and measured as per million US dollars and percentage of GDP. There is a limitation on data showing fairness (justice) in income distribution. The Gini coefficient is a variable that is very difficult to obtain both in terms of cross-section and time series. The reason for this is that in many countries, these calculations are often unable to be done because of the high cost of calculation. Although the Gini values for recent years can be found, the data for the past is very difficult to find. For this reason, in order to obtain a consistent Gini coefficient data set between the periods we examined, a number of studies focused on the estimated Gini coefficient values and preferred data set created by Frederic Solt in 2009 based on other existing data sets and published under the name Standardized World Income Inequality Database (SWIID). This new data set, which has some superiority over other data sets, has been frequently used in Applied Studies in recent years by many researchers instead of other data sets. Therefore, the Gini values in “SWIID Version 8.0” created by Solt (2009) were used in our research in terms of being up to date, not having a data set that offers a wider number of observations, but also being preferred by many researchers.

3. ECONOMETRIC METHODOLOGY

This part of the study will include empirical analysis and findings using annual data for the determined country group and period range.

3.1. Cross-Sectional Dependence Test

Whether there is cross-sectional dependence in panel data analysis, is a consideration that should be determined when analyzing. Recently developed tests are tests that are sensitive to cross-sectional dependence. Analysis that does not take into account cross-sectional dependence is called as 1st generation panel data analysis, while the analysis that takes into account the cross-sectional dependence is called 2nd generation unit root analysis.

The cross-sectional dependence refers to the presence of correlation between error terms calculated for units such as each country/region of the panel data model, etc. (Tatoglu, 2013: 9). In other words, the cross-sectional dependence can also be defined as the fact that the section units are dependent on each other, or that a shock to the variable of one of the units shows the same effect in the same variable of another unit.

Different tests have been developed to test the cross-sectional dependence. These are LM tests developed by Breusch and Pagan (1980), LM and CD developed by Pesaran (2004), and LM tests developed by Baltagi, Feng, and Kao (2012). In this study, with the help of these four tests, it was analyzed whether there was cross-sectional dependence. The hypotheses of these tests are;

H0: No cross-sectional dependence

H1: There is cross-sectional dependence

If the calculated test statistics are greater than the critical values or if the probability values of the test statistics are less than 10% and 5%, the zero hypotheses cannot be accepted in the variables, meaning that “there is a cross-sectional dependence in the variables”. In this case, it would be more accurate to use analyses that take into account cross-sectional dependence (Oncel et al.,2018: 410).

3.2. Delta Test

Analysis such as panel coherence and panel causality, where the coefficients are homogeneous or not in the Panel data, and which will be used in later stages, just as in cross-sectional dependence, work on the condition that the coefficients are homogeneous or heterogeneous. Homogeneity indicates that the slope coefficients calculated for units such as βi are equal to the slope coefficient that is β, which is a single slope coefficient, whereas in heterogeneity, at least one of the units βi is different from β, that calculated for all countries/ regions. Pesaran and Yamagata (2008) have developed two statistics to test homogeneity. These are $\tilde{\Delta}$ and $\widetilde{\Delta_{adj}}$ statistics. The Test’s hypotheses are;

H0: Slope coefficients are homogenous

H1: Slope coefficients are not homogenous

If the calculated test statistics are greater than the critical values or if the probability values of the test statistics are less than 10% and 5%, the zero hypothesis cannot be accepted in the variables, meaning that "the slope coefficients are not homogeneous" (Oncel et al., 2018: 409).

3.3. Kónya Panel Causality Test

Panel causality testing, which is based on seemingly unrelated regression (SUR) and Wald tests (acquired into literature by Konya (2006)) with country-specific bootstrap critical values, has many advantages. Pesaran et al.(1999) stated that failure to take into account cross-sectional dependence and heterogeneity in causality tests would result in misleading and inconsistent parameters being reached. The Kónya causality test also allows the testing of Granger causality for each cross-section in the panel, as it is not based on the assumption of panel homogeneity. In addition, it also allows for the appearance of extra information provided by panel data, as it allows for simultaneous relationships between cross-sections. The basis of this panel causality is based on the seemingly unrelated regression (SUR) estimators developed by Zellner (1962). In contrast to the panel causality tests found in the literature, in Kónya panel causality test, bootstrapped critical values calculated for each cross-section unit is used. Cross-sectional dependence assumption is loosened by the estimator and critical values used. One of the important advantages of the test is that the unit root and co-integration states of the series are not important. In other words, the unit can be analyzed with series that have unit root and non-cointegrated (Kónya, 2006: 982).

In panel data analysis, while the cross-sectional dependence is observed, SUR (System unrelated regression) estimators give more effective results than OLS (Ordinary least squares) estimators. In this case, the use of the Kónya panel causality test is important for achieving more reliable results (Aydin, 2016: 8).

The equation system to be used for the Kónya panel causality test is as follows (Kónya, 2006).

$$Y_{1,t} = \alpha_{1,1} + \sum_{i=1}^{ly_1} \beta_{1,1,i} Y_{1,t-i} + \sum_{i=1}^{lx_1} \delta_{1,1,i} X_{1,t-i} + \varepsilon_{1,1,t}$$

$$Y_{2,t} = \alpha_{1,2} + \sum_{i=1}^{ly_1} \beta_{1,2,i} Y_{2,t-i} + \sum_{i=1}^{lx_1} \delta_{1,2,i} X_{2,t-i} + \varepsilon_{1,2,t}$$

$$\vdots$$

$$Y_{N,t} = \alpha_{1,N} + \sum_{i=1}^{ly_1} \beta_{1,N,i} Y_{N,t-i} + \sum_{i=1}^{lx_1} \delta_{1,N,i} X_{N,t-i} + \varepsilon_{1,N,t}$$

$$X_{1,t} = \alpha_{2,1} + \sum_{i=1}^{ly_2} \beta_{2,1,i} Y_{1,t-i} + \sum_{i=1}^{lx_2} \delta_{2,1,i} X_{1,t-i} + \varepsilon_{2,1,t}$$

$$X_{2,t} = \alpha_{2,2} + \sum_{i=1}^{ly_2} \beta_{2,2,i} Y_{2,t-i} + \sum_{i=1}^{lx_2} \delta_{2,2,i} X_{2,t-i} + \varepsilon_{2,2,t}$$

$$\vdots$$

$$X_{N,t} = \alpha_{2,N} + \sum_{i=1}^{ly_2} \beta_{2,N,i} Y_{N,t-i} + \sum_{i=1}^{lx_2} \delta_{2,N,i} X_{N,t-i} + \varepsilon_{2,N,t}$$

"l" denotes the appropriate lag length determined by the Akaike information criteria, N is the number of cross-sectional units(j=1,.., N), and t is the time dimension (T =1,.., t) (Kónya, 2006: 982-983). The Wald test statistics are calculated for the Kónya panel causality test and do not require a common basic hypothesis for all cross-section units. This is because special critical values are calculated for each cross-section unit.

In this system, if δ1, ji is not equal to zero for all units, while β2,ji is equal to zero for all units, there is a one-way Granger causality from X to Y. If both the variables δ1, ji and β2, ji are not equal to zero, there is a two-way causality between X and Y, while the variables δ1, ji and β2,ji there is no causality between X and Y (Aydın, 2018).

3.4. Cross-Sectional Dependence Test Results

The findings of the cross-sectional dependence analyses are shown in this part of the study. First, Table 1 shows the results of the cross-sectional dependence test for tax revenues (TAX) and income distribution (GINI) variables. The zero hypotheses of the tests are rejected due to the fact that the test statistics calculated according to all cross-sectional dependence test results are statistically

significant. In other words, it is seen that both variables have cross-sectional dependence. In this case, the cross-sectional dependence should be taken into account in the analysis.

Table 1. Cross-Sectional Dependence Test Results

Models	**Model 1**		**Model 2**	
Test	**Test Statistics**	**Probability**	**Test Statistics**	**Probability**
Breusch-Pagan LM	32.43205*	0.000	113.6503*	0.000
Pesaran scaled LM	6.124756*	0.000	25.66784*	0.000
Bias-corrected scaled LM	6.876756*	0.000	25.34274*	0.000
Pesaran CD	2.214878*	0.000	2.321416*	0.000

***** indicates the rejection of the null hypothesis at the 1% significance level.

3.5. Delta Test Results

One of the prerequisites of the Kónya causality test is that the parameter coefficients of the models are different for each country. The delta test results to test this are shown in Table 2. Part 1 includes the results of the relationship from tax revenues to income distribution, while part 2 includes the results of relationship from the income distribution to tax revenues.

Table 2. Slope Homogeneity Tests Results

	Model 1 Results		**Model 2 Results**	
Test	**Test Statistics**	**Probability**	**Test Statistics**	**Probability**
$\tilde{\Delta}$	13.645 *	0.000	13.731 *	0.000
$\tilde{\Delta}_{adj}$	14.947 *	0.000	15.041 *	0.000

***** indicate the rejection of the null hypothesis at the 1% significance levels, respectively.

As shown in the table, according to delta test results, βi's of each country are not homogeneous. In other words, the coefficients of the countries are *heterogeneous.*

3.6. Kónya Panel Causality Test Results

In the empirical analysis, the relationships between the variables were examined by using Kónya panel causality test. The results are reported in Table 3, Table 4 and Table 5.

According to the results of the analysis, France and Luxembourg were the countries with causality towards the distribution of income from tax revenues, while Italy was the only country with causality towards tax revenues from income distribution. In other words, tax revenues in France and Luxembourg provide a positive contribution to the establishment of justice in the distribution of income, while in Italy a positive improvement in tax revenues is observed as justice is achieved in the distribution of income. In other countries in the sample group, there is no causality between tax revenues and income distribution. The results will have a more solid foundation when the tax compositions of the countries are examined. This should be taken into consideration in future studies. Within the scope of the limitation of the study, the tax compositions in the countries in which the relationship was found were examined and the analyses on this situation were made in the conclusion section.

Table 3. Kónya Panel Causality Test Results

		H_0: Tax Revenues are not the cause of Income Distribution.		
		Bootstrap Critical Values		
Countries	**Wald**	**%10**	**%5**	**%1**
Germany	4.4456	22.11263	31.80815	59.43526
Australia	1.4432	14.45546	21.85672	41.67021
Austria	17.611	19.58614	29.67525	59.72066
Belgium	7.0032	21.15533	31.96740	63.29611
France	**39.443****	22.85359	33.66204	64.85121
Netherlands	3.7654	21.98911	32.72513	60.72050
Spain	0.4983	20.35783	30.66485	56.69818
Italy	0.6874	18.13274	28.32086	61.95694
Japan	5.2671	19.33339	28.70647	52.84406
Canada	6.5231	20.14956	29.66387	56.78300
Luxembourg	**22.220****	11.93160	17.52251	31.85928
Norway	0.6754	18.41018	27.71587	52.82649
Poland	8.7212	21.61180	31.98544	61.59486
Portugal	0.8232	16.41511	24.52355	46.58966
Sweden	12.392	23.41884	34.09256	68.45082
Turkey	0.7324	23.40225	34.36703	62.94438

*, **, and *** indicate the null hypothesis (H_0) was rejected at a significance level of 1%, 5%, and 10%, respectively. Critical values were obtained with 10,000 bootstrap replications.

Table 4. Kónya Panel Causality Test Results

		H_0: Income Distribution is not the cause of Tax Revenues.		
		Bootstrap Critical Values		
Countries	**Wald**	**%10**	**%5**	**%1**
Germany	6.8619	14.86971	22.15859	42.05830
Australia	0.7434	12.89328	19.51247	42.92493
Austria	6.6775	21.29646	30.79110	60.55563
Belgium	0.2114	14.91558	22.38454	44.88504
France	12.300	14.77581	21.86290	42.21225
Netherlands	1.5416	20.70463	31.81971	65.32999
Spain	0.8836	20.39368	30.10383	62.27090
Italy	**19.513*****	14.57786	23.11498	44.66667
Japan	6.2393	14.46120	21.44855	42.94332
Canada	0.9478	17.71001	25.71644	52.64871
Luxembourg	2.7556	12.33444	18.37952	37.47656
Norway	4.9321	19.17608	27.99975	56.27098
Poland	1.2458	19.99612	29.47170	59.40201
Portugal	0.7487	20.05640	29.45766	57.09126
Sweden	0.3385	14.84749	21.93557	41.93834
Turkey	13.205	18.50036	27.34078	54.03984

*, **, and *** indicate the null hypothesis (H_0) was rejected at a significance level of 1%, 5%, and 10%, respectively. Critical values were obtained with 10,000 bootstrap replications.

Table 5. Kónya Panel Causality Test Results Summary Table

Countries	**Tax Revenues → Income Distribution**	**Income Distribution → Tax Revenues**
Germany	Not	Not
Australia	Not	Not
Austria	Not	Not
Belgium	Not	Not
France	**Available**	Not
Netherlands	Not	Not
Spain	Not	Not
Italy	Not	**Available**

Japan	Not	Not
Canada	Not	Not
Luxembourg	**Available**	Not
Norway	Not	Not
Poland	Not	Not
Portugal	Not	Not
Sweden	Not	Not
Turkey	Not	Not

"→" expresses the direction of causality.

CONCLUSIONS

The injustices in the ever-increasing distribution of income pose a major problem in today's world. Many social and political problems brought about by economic problems have become the situation in which countries spend a great deal of time solving them. The growing gap between the richest and the poorest has led to increasing unrest in society. Income inequality, which has increased more than in previous periods that has been demonstrated both by international organizations and by scientific studies, is the most important task of the states to eliminate. Politicians try to combat with this situation with the fiscal policies they put into practice and the fiscal policy tools they use in this direction. It is further reinforced by the fact that this struggle is an inescapable fact, that a distribution of income left to the market system would certainly not be fair. In a system where there is no intervention by the state, which is referred to as the" primary income distribution", the establishment of justice will not be possible. Therefore, injustices can be resolved in the division where the state actively intervenes and is expressed as secondary income distribution.

In our study, the relationship between tax revenues and inequality in income distribution was investigated for selected OECD countries in 1990-2016 with the help of representative variables. In the study where the Kónya (2006) panel causality test was used, relations were revealed on a country-by-country basis. The countries where there is causality from tax revenues towards income distribution are France and Luxembourg, while in Italy causality from income distribution towards tax revenues is concerned. When the tax compositions of these countries are examined, France is a country where tax-related issues can be easily discussed by the public. Chaumont, a French bureaucrat and the father of the idea of Value Added Tax, stated in his 2014 work that the French were passionately committed to the tax. Although it has a complex tax structure, efficiency has been achieved in tax collection in France (Besel and Gurdal, 2014: 194). In the country where tax expenditure reports are regularly prepared and

made legal obligation, these processes are carried out in an integrated manner with the budget (Ferhatoglu, 2005: 88). Take-away foods, some pharmaceutical and pharmaceutical products, books, private television channels, water supply, real estate transactions, farm products, animal nutrition products and so on. It is expected that the tax system will have a positive effect on the inequality in income distribution in the country where discounted tax rates of 10% are applied, for which there are tax cuts in basic food products and for the disabled, and tax incentives are applied in the first home purchases. Empirical findings obtained in our study support this situation. In the country where direct taxation, which plays a more effective role in ensuring justice on inequality in income distribution, is also placed on a solid ground, the adoption of practices aimed at regulating inequality in income distribution in direct taxes such as Income Tax and Corporate Tax is an indicator that taxes are used as an effective tool in regulating income distribution.

Luxembourg, another country that has been concluded that tax revenues positively affect the distribution of income, can, in fact, be cited as an exceptional country. The country, which has an extremely robust economy, ranks first in per capita national income according to IMF and World Bank data. Luxembourg, which is one of the smallest countries in Europe, is known as a tax haven. In this country where large capital companies make tax agreements, it can be stated as a normal situation that there is no shortage of income distribution. Tax policies in practice also serve to maintain the balance of income distribution. In Italy, it is concluded that there is causality from income distribution to tax revenues. This result indicates that the decrease in the imbalances in income distribution has a positive effect on tax revenues. While the GINI coefficient, which refers to the situation in the income distribution in Italy, is around 0.3, the fact that this figure does not move upwards means that the imbalance in the income distribution does not increase. Looking at tax revenues, the data will be seen to have a trend towards growth.

When the empirical findings obtained in our study are compared with the tax structures of the countries in general, it is seen that consistent results are obtained. Tax policies, especially those implemented in France, have been seen to be effective in regulating income distribution. Tax reductions in basic living needs provide a great advantage for low incomes. In the policies implemented in tax types concerning high-income groups, the effect of these policies on economic life is minimized. With the tax exemption and exemption applications, it is aimed not to adversely affect the enterprises and entrepreneurs in corporate and income tax applications. For example, the fact that income up to 9,710 euros is not taxed and the capital gains taxes will be gradually reduced from 33% to 25% in 2022 (Global Trade, 2019) are indicative of economic justice while aiming justice in income distribution. The fact that the tax system applied in France by other

countries can be applied meticulously or that the countries adopt policies in line with their own economic structures is important in order to ensure justice in income distribution.

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