The effect of government social spending on income inequality in oecd: a panel data analysis

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THE EFFECT OF GOVERNMENT SOCIAL SPENDING ON INCOME INEQUALITY IN OECD: A PANEL DATA ANALYSIS

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Abstract

Income inequality is one of the issue which is most discussed and struggled for its solution throughout the history of economics. Since the 1990s, income inequality has increased in most of the OECD (The Organisation for Economic Co-operation and Development) countries as in the whole world. Government social spending is one of the most important means of directly regulating income inequality. This study investigated the effect of goverment social spending on income inequaltiy for 21 OECD countries by analyzing Panel Data. According to the findings obtained, government social spending affect income inequality positively. Income inequality decreases when the government social spending increase. It has been proved that government social spending was more effective than education expenditures in regulating income inequality. It is also understood that unemployment and population growth affected the income inequality negatively. Besides, there is a negative relationship between openness, education expenditures, elderly population, education participation and income inequality.

1. Introduction

Since the founders of economics Adam Smith and David Ricardo, there has been constant debate about how to share the post-production income fairly among the individuals. Today, income inequality has seen as one of the most critical economic problems of the world economy especially in developing countries. Income inequality which is a source of many social problems, has seen as the main cause of the political instabilities experienced in economies. For this reason, great efforts are being made to solve this problem all over the world. The most important of the economic policies used to solve such this important problem is government social spending. Because public social policies are policies that directly affect the poor. Every social state must provide a standard of living for its citizens that they deserve. Therefore, social spending is provided by the government under the social spending system.

While income inequality is at the head of the most important issues in the history of economic debate from the past to the present, the relationship between government social spending and income inequality is more up-to-date. A number of scientific studies have examined how economic issues such as growth, international trade, foreign capital investments, education and democracy affect income inequality. The scientific study investigating the effects of government social spending on income inequality is very limited in the literature. For this reason, one of the most important purposes of our study which examines the effects of government social spending on income inequality is to contribute to the literature and to enable other scientific studies to be carried out on this area. In addition, helping in the selection of economic policies is another important aim of this study according to the scientific results to be obtained.

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Econometric science has been used to analyze such an important economic and social problem and to achieve more effective scientific results. Panel data analysis was used in the study because both time and cross-sectional data (countries) would be used. In the analysis, the data of OECD countries between 2004 and 2011 are used.

In the study, the theoretical background of the effect of government social spending on income inequality was first given. In the next section, government social spending in the OECD countries has been evaluated from an overall point of view. Later, empirical studies in the literature investigating the effectiveness of government social spending on income inequality have been included. Subsequently, the relationship between income inequality and government social spending in OECD countries was presented econometrically using panel data analysis. In the conclusion section, evaluation of the findings and policy recommendations are offered.

2. Theoretical Framework Between Government Social Spending and Income Inequality

Social spending is applied in two ways (public or private). When the the financial flows are controlled by the government, social spending is called as public. For example; if sickness benefits are financed from social insurance system, sickness benefits are considered "public" but if employers directly pay the sickness benefits to employees, this is classified as private. Total public social expenditures cover all financial flows of public institutions for social purposes. Total net social expenditures also take into account the specific social expenditures. Government social spending is expenditures where resources are redistributed from high-income groups to low-income groups. (Mcmaken, 2015: 1)

Throughout history, government social spending have become one of the most effective methods of combating income inequality. (Önen, 2010: 64). Also today, government social spending is the most preferred practice by the state in struggle with poverty. (Altan, 2006: 152).

Most generally, government social spending can be applied into two ways: social insurance and social assistance system (Barr, 2004). The social assistance system is generally based on an income test developed to help low-income households. The main objective of the social insurance system is to protect the income against adverse risks such as unemployment, disability and illness or to redistribute the income throughout life cycle. (Danziger et al. 1981: 978).

The social assistance system affects income distribution positively since the financing of benefits is provided from all income groups. However, the continuous demand for these benefits affects negatively capital accumulation and economic efficiency. In the social insurance system, income inequality may increase if high income groups reflect the financing shares of system to low-income individuals through price mechanisms. Also low-income groups have to participate in financing, which reduces the positive impact of government social spending on income distribution in an economy in which indirect taxes are applied.

The government does not have to be necessarily organized while redistributing income through social spending from a rich to a poor. In the social insurance system, unemployment, disease or disability are more important than the individual's need for financial assistance. In order to talk about the equalizing effect of insurance benefits, social expenditures should be free of actuarial and should not be made to protect status and income. However, in most developed countries, the social security benefits of low-income groups are increasing significantly over the past years.

Accordingly, I expect a clear positive effect of government social spending on income inequality or redistributing income.

2.1. Overview The Government Social Spending in OECD

All over the world, government social spending is carried out to protect living conditions that provide sustained income, prevent poverty, economic inequality, social exclusion and marginalization (Lindert, 2002: 3). There are different applications in each country especially examples of in European countries are referenced in terms of institutionalization.

Government social spending is applied in three ways in the world; the first is benefits to just a specific social class such as for families who have children regardless of income. The second is social insurance such as unemployment insurance and pension. The other is the in-kind or cash benefits overendowed to those who are below the minimum income level according to the average income test and to certain groups (the disabled and the elderly) (Lindert, 2002: 4). However, individuals who have not passed the minimum subsistence level despite their working are excluded in developing countries (OECD, 2016: 11).

According to Figure 1 below; public social spending in 2016 is about 21% of GDP in 35 OECD countries. While France has the highest public social spending (32% of GDP), Finland has made public social spending of more than 30% of GDP. Belgium, Italy, Denmark, Austria, Sweden and Greece have made public social spending more than a quarter of their GDP. Non-EU countries such as Latvia, Turkey, Korea, Chile and Mexico have made public social spending of less than 15% of their GDP. Social expenditures which are lower than the OECD average in developing economies, tend to increase in recent years.

Figure 1: Public Social Spending of OECD
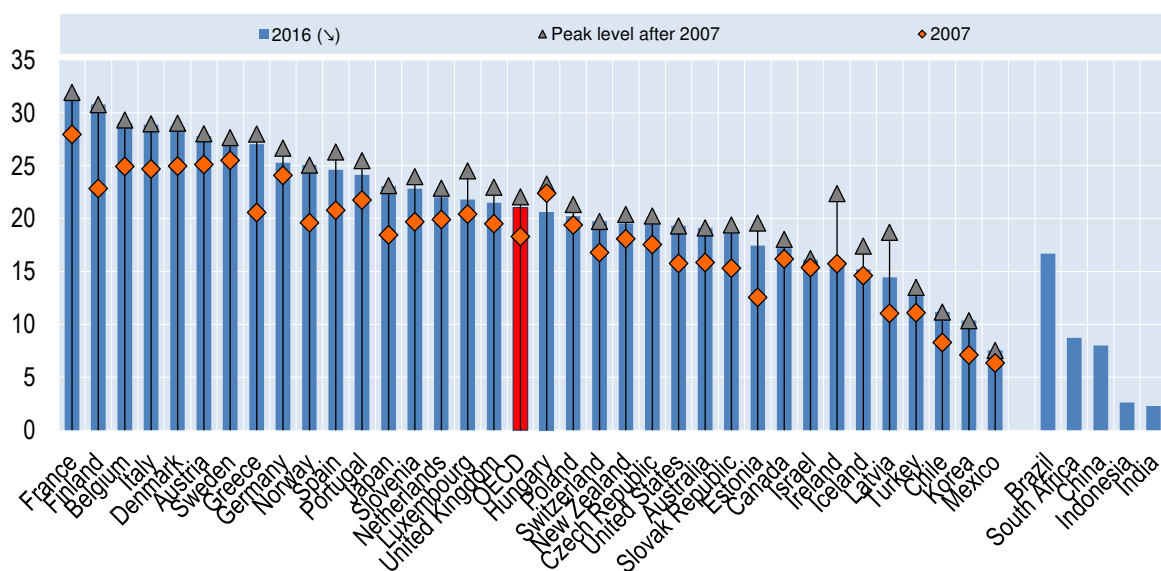
Source: The OECD Social Expenditure Database, 2016, OECD, (www.oecd.org/social/expenditure.htm)

In recent years, social spending has increased in OECD countries but has decreased in some developing countries. In Europe, the share of government social spending in household income is higher when compared to the USA and the UK. Generally, income inequality is lower in this country if the share of social benefits in income is high in a country. Therefore, income inequality in Northern

European countries is considerably less than in the USA. While gini coefficient (calculated by OECD for 2015 on disposable income after taxes and transfers) in the US is 0.39, it is 0.274 in Sweden, 0.303 in Netherlands, 0.266 in Belgium, 0.297 in France and 0.289 in Germany.

Government social spending reduced percentage of population facing the risk of poverty by 9 units in EU countries, 14 units in Poland and France and 5 units in Turkey (Guio, 2005: 4). Indeed, these results show the importance of the social policy that countries apply. The vast majority of scientific studies advocate that social assistance reduces poverty (OECD, 2016: 16).

The Revenu Minimum D'insertion (RMI) applied in France affects three million people considering their family. However government social spending's effect is not very big due to the low number of beneficiaries and the size of government social spending in some countries such as Turkey. (Bargain ve Doorley, 2009: 4). It is believed that government social spending decreased the individuals' will to work who are in employment.

According to many scientific studies, it is argued that the amount of government social spending and the availability of social benefits increase as the poverty and income inequality decrease but the will to work of the individuals decreases so unemployment increases (Ditch, 1999: 67). For example; there are many studies about RMI decreased especially women's will to work in France. Therefore, government social spending should include individuals absolutely can not be employed.

3. The Literature

When we look at the literature, Barro and Sala-i-Martin (1997) tried to explain the growth effects on personal welfare according to justice provided on income distribution by government social spending. In this framework, they argued that government social spending's role is very significant on securing the justice in the income distribution. Adelman ve Robinson (1988), Lindert ve Williamson (1985), Brenner, Kaelble ve Thomas (1991), Papanek ve Kyn (1986) are studies that show the government social spending will reduce income inequality in the literature.

Levine and Renelt have shown the correlation of growth with a large number of variables by regression analysis in their studies. They so many times used the growth rate of per capita GDP as a dependent variable in their analysis. (Levine ve Renelt, 1992: 942-963). This study argued that growth is a positive and strong correlation between stock investments in GDP and equity investments and the ratio of international trade to GDP. They used the Extreme Bounds Analysis that is a method of econometric analysis developed by Edward E. Leamer (1983).

The study that examined the effects of tax and public social spending policies on income distribution in developing countries has a significant impact on this area (Chu, Davoodi ve Gupta, 2000: 2-30). Pre-tax income distribution in developing countries is less unequal than industrial countries. Nevertheless, developing countries have not been able to use tax and transfer policies effectively to reduce income inequality. By the end of the 20th century, income inequality increased in many developing countries.

There are some question marks about the effects of financial and other economic policies on income distribution in developing countries;

➢ In terms of income distribution, how can these countries differ between themselves and from industrialized countries? Does income distribution become more unequal in these countries?

➢ What is the role of redistribution of tax, transfer and other expenditure policies?

According to the results obtained, there is a strong relationship between income distribution and many variables such as tax structure, secondary school enrolment rate, urbanization and inflation. A negative relationship was found between the ratio of direct taxes to indirect taxes and the Gini coefficient of secondary school enrollment education so it means that these variables affect income distribution positively.

The distributional effects of the tax regime become different not only by tax structure but also by the ratio of tax revenues to GDP. An increase in direct taxes relative to indirect taxes and an expansion in secondary school enrollment are reducing the Gini rate. It is emphasized that urbanization may have positive, negative and neutral effects. High inflation is also expressed to lead to high income inequality. It is claimed that inflation does not affect the Gini coefficient in the long run. It has been demonstrated in developing countries that tax-transfer programs can not be effectively used as a regulator of income distribution according to developed and industrialized countries.

Another study that investigated the effect of government social spending on income distribution by the panel data is a research by Li, Xie and Zou. (Li, Xie and Zou, 2000: 952). In their first model, there are only public spending such as income per capita and welfare, education, social security, health and infrastructure. Afterwards, they included openness, financial development, terms of trade shocks and population growth variables to model as independent variables. As a result of their analysis, they have empirically demonstrated that income taxes and government public spending reduce income inequality.

Gregorio and Lee have included government social spending to model while they are investigating the effect of education on income distribution after analysis they have reached the conclusion that government social spending has reduced income inequality (Gregorio ve Lee, 2002, 10-15).

In another study that tested assemble data from several different sources using panel data, the effects of income inequality and trust on government social spending were tried to be explained. (Schwabish, Smeeding ve Osberg, 2004, 5-23). According to the literature, the studies in this area have been collected under three headings; social capital-inequality, social spending-median voter models of inequality and social spending-economic growth. Political and social spending in political science were also added to these three topics. The results obtained from the literature review are as follows;

➢ Income inequality and poverty are different concepts

➢ The relationship between economic inequality and social spending is interdependent and therefore it is very important to choose income inequality measurement in order to better understand the effect of income inequality on social spending

➢ There may be differences in income redistribution models due to factors such as institutions and electoral mechanisms.

➢ The democratic countries where different policies have been applied in terms of social expenditures are discussed

Model; Social Spending = f {Income Inequality, Values, Growth, Institutions, Immigrants}

They have tested the model using the Ordinary Least Squares (OLS) method. They made their observations on 17 countries and obtained the data on inequality from the Luxemburg Income Study (LIS), social expenditure and growth data from the OECD Social Expenditure Database (SocEx), and the values data from the World Value Survey (WVS). The social expenditures they took as dependent

variables examined the data in two aspects: total social expenditures (elderly and noneelderly-cash) and the total expenditure on nonelderly residents. Inequality data cover income inequality, pre-or post tax and transfer poverty rates.

According to their analysis, they have explained that high income inequality reduces social spending. They have proved that the inequality between the middle class and the poor has a small and positive effect on the social spending, but the inequality between the last-class and middle-class has a large and negative effect on social spending.

When we look at the more recent literature, it examines the effects of public spending, education and institutions on income distribution in developed economies in the most important of the studies examining the effect of public spending on income distribution with panel data method. (Afonso, Schukrecht ve Tanzi, 2008: 7-30). This study has proved that; while social spending directly affect income distribution, high quality education, human capital and economic institutions indirectly affect.

In this study, firstly the determinants of income equality were emphasized. In any country and time, public expenditure policies and income distribution without government intervention through taxation are affected by the following factors;

➢ Heritage of material and financial wealth

➢ Human capital inheritance: includes family learning that is heritage of behaviors. Although it is controversial that genetic factors passing by inheritance are highly effective, personal communication, personal income and other valuable assets by inheritance determine the social capital of the individual

➢ Social norms and regulations; for example; when rich people marry with rich people or educated people marry with educated people

➢ Personal talent

➢ Past government policies

The government determines income distribution by tax and public spending also some regulatory policies. Regulatory policies are as follows;

➢ Check prices and revenues

➢ Identify hiring quotas by some personal categories

➢ Creating asset rights for patents and other types of intellectual assets

➢ Following anti-trust policies

The government may directly influence income distribution through taxes, expenditures and other public policies. The level and efficiency of taxation is the most important direct factor. The most important factor affecting income distribution after taxes are public expenditures. Another important factor affecting the distribution of income is the guarantees rule of law, justice and rapid access to justice and the society. When the rules of law are not fair or equal, the exploitation of people who are poor and non-income is easier. Afonso discussed the following indicators representing income distribution in his work;

➢ Gini Coefficient (which is widely used indicator)

➢ The Income Share Per Quintile: Expresses the share of 20% of the population from national income

➢ Poverty Rate: The ratio of people who have income and expenditure below a certain limit

➢ (These three indicators are more commonly used in panel data)

➢ Absolute Poverty Rate (It is the minimum level of consumption to sustain their lives physically)

➢ The Absolute Percentage of Population of the Poorest 20% Group

➢ Child Poverty

➢ Absolute Child Poverty

➢ Elderly Poverty

The above indicators are used by authors as dependent variables in the model. Transfers & subsidies, social spending, personal tax revenues, commercial openness, unemployment rates, national income per capita, junior high school enrollment rate, the quality of judiciary, bureaucracy index, private education expenditures, public education expenditures, public expenditures, property rights protection index were used as independent variables.

As a result, it has been analyzed empirically that government social spending have a significant impact on income inequality. It has proved that this effect is direct through taxes and social expenditures but indirect through human capital, institutions and income. It has proved that the public spending (excluding education expenditures), other than wage spending, has a great role in regulating income distribution. In addition, the effects of public expenditures devoid of education expenditures on income distribution were found to be weak.

In a study examining the effects of social transfer policies on poverty, it was attempted to systematically test allegations that high social transfers advocated by a very broad literature reduce poverty (Caminada, Goudsward ve Koster, 2010: 1-23). To that end, they developed and employed multiple linear regression models and performed several tests with the most recent data (LIS, OECD, and SOCX) for the period 1985–2005.

Four different models are used in the panel data used in this study. Poverty data from OECD were used as dependent variables in these models. Population over 65 (%), unemployment rates (% of total civilian labor force) and per capita GDP (dollars) are other independent variables used in the models.

In the first model gross total social expenditures, gross public social expenditures in the second model, both gross public social spending and gross private social spending in the third model, and total social spending other than health in the fourth model were tested with the other independent valuables for 22 OECD countries. A strong negative relationship was found between social expenditures and poverty. Aging and unemployment rates have an explanatory power, but this does not affect the relationship between social transfers and poverty.

In another study investigating the effects of taxation and public expenditure policies on income distribution, it was concluded that personal and corporate income taxes reduced income inequality but consumption and customs taxes increased. At the same time, high GDP rates on social welfare have resulted in positive effects of income distribution of education, health and household public expenditures

(Martinez-Vazquez, Moreno-Dodson ve Vulovic, 2012, 12-25). By means of unbalanced panel data analysis, developed, developing and transition 150 countries' data from 1970 to 2009 were estimated.

In another panel data study, the effects of social expenditures on the income inequality were investigated using data of 27 European Union countries from the 11-year period and economic development, economic freedom and the creation of the euro currency have been proven to cause more social spending (Molina-Morales, Amate-Fortes ve Guarnido-Rueda, 2014, 745-764). However, it has been shown that increasing income inequality does not cause any increase in social spending.

4. Data, Econometric Method and Evaluation of Findings

4.1 Data ve Methodology

Especially developed and developing OECD countries' data have been used but missing data have not been considered. Selected countries are Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Luxembourg, Poland, Portugal, Slovakia, Slovenia, Spain, Turkey, UK, USA. Since data for some periods are missing in the OECD database, only data from 2004-2011 has been included to the econometric model in order to reach more meaningful results. Econometric data analyzed using the Stata program.

According to the literature, Gini rates, per capita GDP and poverty rates represent income inequality in the vast majority of studies. Therefore, firstly the Gini ratios of the countries representing the income inequality were used in this study. Government social spending data in the database of OECD is used as a main independent variable in our econometric model. Government social spending with financial flows controlled by General Government as social insurance and social assistance in social policy. The main areas of social policy are: old age, victims, capacity-based benefits, health, family, active labor market programs, unemployment, housing and other social policy areas.

The government social spending in % GDP (SE) used as an main independent variable representing government social expenditures. The other independent variables are; opennes (OPEN = export+import / GDP), education directly affect the income inequality, population and unemployment. Education expenditures in % GDP (EDUC1) and secondary school enrollment rate (EDUC2) were represented the education in econometric model. And the other variables are; population ages 65 and above (% of total) (POP) and population growth rate (POPA) represented population, unemployment rate in the civilian labor force (UNEMP) represented unemployment.

Income Inequality = f(Social Spending, Foreign Trade, Education, Inflation, Population, Unemployment)

4.2 Model

Before the econometric tests, basic statistical values were obtained by calculating the natural logarithms of dependent and independent variables. According to these values, we checked whether the mean and median values of the variables are normally distributed or not. According to the skewness, kurtosis and Jarque-Bera values of the variables, variables outside GINI ratios are sharp and while the inflation and population variables are skewed negatively, the other variables are skewed positively.

As a result of the econometric analysis, it is aimed to explain the relationship between income inequality (dependent variable) and independent variables.

Model;

$$lnGINI_{it} = \alpha_i + \beta_{1i} \, lnSE_{it} + \beta_{2i} \, lnOPEN_{it} + \beta_{3i} \, lnEDUC_{1it} + \beta_{4i} \, lnEDUC_{2it} + \beta_{5i} \, lnPOP_{it} + \beta_{6i} \, lnUNEMP_{it}$$
$$+ \beta_{7i} \, lnPOPA_{it} + \mu_{it} \tag{1}$$

GINI: Gini Coefficient

SE: Government Social Spending in % GDP

OPEN: Opennes

EDUC1: Education Expenditures in % GDP

EDUC2: Secondary School Enrollment Rate

POP: Population Ages 65 and Above (% of total)

UNEMP: Unemployment Rate in the Civilian Labor Force

POPA: Population Growth Rate

α: Constant Coefficient

β: Independent variable coefficient

i: Countries

t: Time (Year)

In the econometric analysis, F, Pesaran CD LM, panel unit root, cointegration, causality tests will be used as econometric methods to test the long-run relationship between dependent and independent variables. The fixed effect model estimation method will be used to determine the direction and level of the relationship between the variables.

4.3. Test of Cross Sectional Dependency of Model

Investigating the cross sectional dependency between the series in the fixed effects panel data model is a crucial step in achieving accurate results. At the same time, it is very important to take this into account in the unit root and cointegration tests in order to make the analysis results more consistent.

In order to test for the correlation between the units in the model, tests were performed to test the correlation between the units in the fixed effect model. The Breusch-Pagan test was not used in our model because of N>T, Pesaran's CD, Friedman's FR and Frees' FRE tests were also carried out. According to the following test results; if the hypothesis of H_0 is rejected, it will be assumed that cross sectional dependency exists between units.

Hypotheses;

$H_0 : \rho = 0$ (There is no correlation between units)

$H_1 : |\rho| < 1$ (There is correlation between units, also cross sectional dependency)

When the results are examined, the null hypothesis expressed the independence of cross section is accepted relative to all three test results. Since the probability values in both Pesaran and Friedman tests are larger than the significance levels of 0.05 and 0.01, the H_0 hypothesis can not be rejected.

Table 1: Test Results of Cross Sectional Dependency

Tests	Statistical Values	Probability Values
Pesaran (CD)	-0.428	1.3313
Friedman (FR)	6.540	0.9979
Frees (FRE)	0.328	**Q-Distribution Critical Values** alpha = 0.10: 0.3169 alpha = 0.05: 0.4325 alpha = 0.01: 0.6605

Source: Stata

According to Frees test result, H_0 hypothesis is accepted because the calculated test statistic (0.328), is smaller than the critical values 0.05 (0.325) and 0.01 (0.6605) in confidence level. Hence, there is no cross sectional dependency in panel units. This means that there is no correlation between the units.

Cross sectional dependency tests give important ideas about the structure of unit root tests before the panel cointegration test. It is more meaningful to make unit root tests accepted cross sectional independency so that the predicted power of results can be high. Unit root tests that accept cross sectional independency are first-generation panel unit root tests.

4.4 Panel Unit Root Test

Since there is no correlation between the units, first-generation tests assuming there is no correlation will be used to determine the stability of the series of variables. Levin, Lin ve Chu-LLC (2002), Im, Peseran ve Shin-IPS (2003), Extended Dickey Fuller-ADF focused Fisher (Mandala, Wu 1999), Fisher Philips ve Perron-PP (Choi 2001) ve Breitung-BRG (2000) unit root tests were performed.

According to the unit root test results (Appendix 1); while the GINI variable is stationary in the fixed trendy model LLC and Fisher Philips and Perron (PP) tests, it is not stationary in Im, IPS and Breitung (BRG) tests. It is stationary all over the trendy-trendless models. Also it is stationary in all tests that are calculated by taking the first-order differences of the GINI variable in short there is no unit root in series.

The government social spending (SE) variable is stationary at both the fixed trendy and fixed trendless model LLC test and the fixed trendy model Breitung (BRG) test at the level. While it was not stationary at the test of fixed trendy Fisher Philips ve Perron (PP) model, it was stationary by taking the first-order differences of SE. According to Level I (1), it is again stationary in the LLC test.

While the OPEN variable is stationary only at the Levin, Lin and Chu (LLC) test in level fixed trendy model, it is stationary at all tests the fixed trendless model. By taking the first-order differences of OPEN, it is stationary at LLC ve Fisher Philips ve Perron (PP) tests.

The variable of EDUC1 does not have a unit root both in the level and when in all tests when its first-order difference is taken. The variable of EDUC2 is not stationary at all tests the fixed trendy model in the level, but it is stationary on the test of LLC fixed trendless model, Extended Dickey Fuller-ADF focused Fisher, Fisher Philips ve Perron (PP). By taking the first-order differences of it, it is

stationary on the test of Extended Dickey Fuller-ADF focused Fisher, Fisher Philips ve Perron (PP). The variable of POP is not stationary on the any test in the level, it is stationary according to result of LLC test when its first-order difference is taken. The variable of UNEMP is same with the variable of POP. While the variable of POPA is not stationary, it is stationary when its first-order difference is taken.

According to the result of the panel unit root tests, the nonstationary variables were stabilized using the first differences and the panel unit root tests were made again. As can be seen, although the variables are not stationary at their level, they have become stagnant by taking differences from the first order. For this reason, the hypothesis of "panel has unit root" is rejected. Otherwise, this hypothesis is accepted and the series is not stationary, there is a possibility that there is a long-term relationship between the variables.

4.5 Panel Cointegration Test

Variables used in the model have to be stable in the same order. It will be checked whether the error terms of the regression established by these variables are stable in the level values. If the error terms are stationary at level values, there is cointegration between variables.

Table 2: Cointegration Test Results

Newey-West automatic bandwidth selection and Bartlett kernel				
			t (statistic)	significance level (P)
ADF			-5.0919	0,0000
Residual variance			0.0045	
HAC variance			0.0049	
Augmented Dickey-Fuller Test Equation				
Variable	Katsayı	Std. Hata	T	(P)
RESID(-1)	-0.7462	0.0984	-7.5819	0.0000
D(RESID(-1))	0.1794	0.0744	2.4115	0.0174
R^2	0.3361	Mean dependent var	0.0008	
Winsorized R^2	0.3308	S.D. dependent var	0.0710	
Regresyonun Std. Hatası	0.0581	Akaike info criterion	-2.8382	
Error Sum Of Squares	0.4183	Schwarz criterion	-2.7932	
Loglikelihood	180.8058	Hannan-Quinncriter.	-2.8199	
Durbin-Watson statistic	2.1610			

Source: Stata

It has been attempted to establish a long-run relationship between levels of unit root and non-stationary variables with presence panel cointegration tests. When we look at the results of the tests of the Pedroni and Kao panel cointegration tests of the variables of the first-order differences, the variables considered are coeval because of the significance levels are less than 0.05 and that is, they can reach the equilibrium in the long run together. For this reason, the Ho hypothesis is rejected and there is cointegration between the variables. Furthermore, the existence of a long-run relationship between the variables can be mentioned according to the panel cointegration test findings.

4.6 Panel Causality Test

Whether or not there is a causal relationship between the variables involved in the panel data method, and if so, the direction of this relationship is determined by the Granger causality test. According to this test; H_0: variable of X is not the Granger cause of Y variable. If the level of significance is less than 0.01-0.05-0.10; the H_0 hypothesis is rejected. So, the X variable is the Granger cause of variable Y. If the level of significance is greater than 0.01-0.05-0.10; The H_0 hypothesis is accepted. So, the X variable is not the Granger cause of variable Y.

According to the results of the causality test, opennes is the cause of GINI and GINI is not the cause of opennes. Therefore, there is a one-way Granger causality between the two variables. Also, population growth rate and population growth rate are cause of education expenditures in % GDP. There is a one-way relationship between secondary school enrollment rate and education expenditures in % GDP. Unemployment is the cause of secondary school enrollment rate (EDUC2) as well as the secondary school enrollment rate is cause of unemployment. That is, there is a two-way Granger causality between the two variables. There is also a double-sided Granger causality between the population ages 65 and above (% of total) and the population growth rate. Causality relationships among other variables can also be seen in the table above. The government social spending in % GDP has not been cause of GINI.

Table 3: Granger Causality Test Results

Hypothesis	F-statistic	Significance Level (P)
OPEN is not the Granger cause of the GINI	8.8444	0.0034*
GINI is not the Granger cause of EDUC2	2.8034	0.0962***
SE is not Granger cause of OPEN	2.9847	0.0862***
EDUC2 is not the Granger cause of SE	3.0762	0.0816***
UNEMP is not the Granger cause of SE	10.0635	0.0018*
POPA is not the Granger cause of SE	9.1293	0.0030*
EDUC1 is not the Granger cause of OPEN	3.2110	0.0752***
OPEN is not the Granger cause of POP	3.3212	0.0705***
UNEMP, is not the Granger cause of OPEN	8.7575	0.0036*
EDUC2 is not the Granger cause of EDUC1	4.4216	0.0372**
EDUC is not the Granger cause of POP	3.0731	0.0817***
UNEMP is not the Granger cause of EDUC1	17.7832	0.0000*
POPA is not the Granger cause of EDUC1	3.5680	0.0609***
UNEMP is not the Granger cause of EDUC2	4.2434	0.0412**
EDUC2 is not the Granger cause of UNEMP	7.2138	0.0081*
POPA is not the Granger cause of POP	12.1724	0.0006*
POP is not the Granger cause of POPA	5.8649	0.0167**

Note: * Significant at level 0.01, ** Significant at level 0.05, ***Significant at level 0.10

4.7 Model Estimation and Basic Findings

Since the horizontal dimension of the model is limited to some of the OECD countries, so a more specific data set is used, the fixed effect model is preferred. When we look at the level of significance of the model in general; since the F-statistic value (0.0000) is smaller than significance level (P) (0.05), the model is totally meaningful.

The R-square value (0.2254) refers to the model's explanatory power. Therefore, the explanation power of the model is 23%, which is seen as normal in panel data analysis. According to the results, the minimum number of observations is 8, the maximum number of observations is 8, and the total number of observations is 168. This means that if the missing observation is dependent on dependent or independent variables, then the data for that year is totally reduced from the sample.

In the F test, the hypothesis ($H_0:\mu_i=0$) that all unit effects are equal to zero is tested. At the bottom of the result table is the established hypothesis, F statistic and probability value. The test statistic is tested against the degree of freedom ((N-1)=20, (N(T-1)-K)=134) F distribution table. In the direction

of these results, the H_0 hypothesis that the unit effects are equal to zero is rejected and it is understood that there are unit effects. The conventional model is not suitable and the model is generally meaningful. Since it is understood that the fixed parameter has a value with respect to the units, the model must be estimated with the fixed effect assumption.

When the significance of the coefficients is examined on the basis of variables; while the opennes, education expenditure in GDP and population ages 65 and above (% of total) variables are insignificant, the government social spending in % GDP, secondary school enrollment rate, unemployment rate in the civilian labor force and population growth rate are statistically significant. If the statistically significant variables are examined separately; while Gini coefficient are positively related to unemployment and population growth rate variables, it is negatively related to the government social spending in % GDP. In other words, when the government social spending in % GDP increases, Gini coefficient decrease and income inequality decreases. In general, government social spending in % GDP affects income distribution positively. 1% increase in government social spending in % GDP results in a decrease of 0.0015% in Gini coefficient, thus an improvement of 0.0015% in income inequality.

It has been found that there is a positive relationship between unemployment rate in the civilian labor force and population growth rate variables and Gini coefficient. In other words, as unemployment and population increase, Gini coeffcient also increase and therefore income inequality is deteriorating.

There was a negative relationship between openness, education expenditures in % GDP, the secondary school enrollment rate, the ratio of the population over 65 to the total population and Gini coefficient. That is, when these variables increase, the Gini coefficient decrease and income inequality decreases.

The 1-unit increase (decrease) in the unemployment rate in the civilian labor force results in an increase (decrease) of 0.0025 units in the Gini coefficient. An increase (decrease) of 1 unit in the population growth rate causes an increase (decrease) of 0.0035 units in Gini coeffcient. An increase (decrease) of 1 unit in the population growth rate causes an increase (decrease) of 0,0035 units in Gini coeffcient. The 1-unit increase (decrease) in education expenditures in % GDP causes a decrease (increase) of about 0.0015 units in Gini coeffcient.

When the effects of other independent variables on the Gini coeffcient are examined; an increase (decrease) of 1 unit in the opennes causes a decrease (increase) of 0,00007 units, 1-unit increase (decrease) in the secondary school enrollment rate causes decrease (increase) in 0.0008 units and also 1-unit increase in the population ages 65 and above (% of total) causes decrease (increase) in 0.0012 units.

Table 4: Fixed Effects Panel Analysis Results

Fixed-effects (within) regression
Groupvariable: id

R-sg: within = 0.2254
between = 0.4531   Number of obs = 168
overall = 0.4388   Number of groups = 21

Obspergroup : min = 8
avg = 8.0
max = 8

F(7,140) = 5.82
corr(u_i, Xb) = 0.3013   Prob> F = 0.0000

GINI	Coef.	Std. Err.	T	P> |t|	[%95 Conf.	Interval]
SE	-.001505	.000618	-2.43	0.016	-.0027223	-.0002787
OPEN	-.0000694	.0000909	-0.76	0.446	-.0002491	.0001103
EDUC1	-.0014648	.0037906	-0.39	0.700	-.0089591	.0060295
EDUC2	-.0008261	.0003504	-2.36	0.020	-.0015189	-.0001333
POP	-.0011625	.0019843	-0.59	0.559	-0050855	.0027606
UNEMP	.0024777	.0004537	5.46	0.000	.0015807	.0033746
POPA	.0034998	.0017012	2.06	0.042	.0001364	.0068632
_cons	.4324917	.0408515	10.59	0.000	.3517261	.5132573
sigma_u	.03549661					
sigma_e	.00968658					
Rho	.93069356	(fraction of variance due tou_i)				

F test that all u_i=0:   F(20, 140) = 76.69   Prob> F = 0.0000

According to the findings, the effect of government social spending in % GDP on income inequalty is more mathematically than the effect of education expenditures in % GDP on income inequality. Hence, government social spending is more influential than education expenditures in terms of regulating income inequality.

Lindert and Williamson (1985), Papanek and Kyn (1986), Adelman and Robinson (1988), Brenner, Kaelble and Thomas (1991), Levine and Renelt (1992), Chu, Davoodi and Gupta (2000), Gregorio and Lee (2002), Schwabish, Smeeding and Osberg (2004), Antoni, Schukrecht and Tanzi (2008), Caminada, Goudswardand Koster (2010) have found that government social spending positively affects income inequality and poverty as stated in the literature review, we have reached similar results.

As a result of the analysis, it was understood that the secondary school enrollment rate less affects income inequality positively according to the education expenditures in % GDP. It has been found that the development of education levels (education enrollment rates) and education expenditures

affect income inequality positively, such as Schultz (1965), Gregorio and Lee (2002), Sylwester (2002) and Keller (2010) in the literature.

It is known that openness effect on the income inequality both positively and negatively has been reached in previous studies. We have come to the conclusion that opnennes affects income inequality positively such as Calderon and Chong (2001), Chakrabarti (2000), Revueny and Li (2003), Falbemayer (2005) and Castrol (2011) in contrast to Calderon and Chong (2001), Chakrabarti (2000), Revueny and Li (2003), Falbemayer (2005) and Castrol (2011).

The economic significance of the results obtained according to the panel analysis is also appropriate. The statistical and economic significance of the variables included in the model obtained as a result of the literature survey is the same.

5. Conclusion

The problem of income inequality, one of the most important controversial issues in the world, is affecting more and more people every day. In order to avoid this problem, the states have provided a secondary distribution of income by interfering to the spontaneous primary income distribution in the market with some economic and social policies. Because of income inequalities, individuals can not meet basic needs such as subsistence, accommodation, health and education so poverty increases, and therefore social peace and tranquility are ruined.

While many structural factors such as population, labor force structure, inflation, growth, unregistered economy, wealth sharing and education are affecting the income inequality in a positive or negative way, financial, money, foreign trade, market, competition, investment, incentive, education, agriculture, social security and government social spending are also effective policies for direct redistribution of income to the poor.

Throughout the world, countries provide their citizens with living conditions suited to human dignity through social aid policies. Throughout history, government social spending in different forms in different countries has been one of the most effective social policies used to reduce poverty.

It has been investigated in this study to what extent government social spending affect income inequality and, if so, what level. For this, the long-term relationship between public social spending with education, population, unemployment, foreign trade and income inequality has been researched by panel analysis.

The effects of the ratio of public social spending to GDP, education expenditures in % GDP, the proportion of population over 65 years of age, population growth rate, outward openness rate, unemployment rate in civilian labor force and Gini rates in secondary education were investigated.

The effects of government social spending in % GDP, education spending in GDP, the population ages 65 and above (% of total), population growth rate, openness, unemployment rate in the civilian labor force, secondary school enrollment rate on Gini coefficient were investigated. Through the panel method, it was attempted to reach high-level findings by integrating the differences between the units and the periodical changes in the series and reducing the multiple linearity to the minimum.

According to the results of the panel analysis of fixed effects; the government social spending in % GDP, the secondary school enrollment rate, unemployment rate in the civilian labor force and population growth rate were statistically significant.

As the share of government social spending in GDP increases, the Gini rates decrease and income inequality decreases. Unemployment rate in the civilian labor force and population growth rate variables are positively correlated with Gini coefficient. Gini coefficient and income inequality increase when unemployment rate in the civilian labor force and population growth rate increase.

As a result, the impact of government social spending on income inequality is greater than the education expenditures in % GDP. Government social spending policies are more important than educational policies in reorganizing income distribution. Therefore, these results should be taken into account by the politicians when government social spending policies are implemented and the resources are separated.

In the framework of all these determinations, more efficient government social spending policies should be developed for the establishment of a fairer social structure due to a more balanced income distribution in underdeveloped countries. It should also be emphasized how much resources are allocated for social spending, which have a crucial place in the development of countries, as well as control over whether they reach their goal. Careful attention should be paid to the fact that those who truly deserve to be included in the social aid system.

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