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## THE EFFECT OF TAXES ON INCOME DISTRIBUTION: AN ANALYSIS FOR TURKEY AND OTHER SELECTED OECD COUNTRIES

Betul HAYRULLAHOGLU<sup>1</sup>

Osman TUZUN<sup>2</sup>

1 Res. Assist. Dr., Usak University, Faculty of Economics and Administrative Sciences, Department of Public Finance, Usak-Turkey, [betul.hayrullahoglu@usak.edu.tr](mailto:betul.hayrullahoglu@usak.edu.tr)

2 Res. Assist. Dr., Usak University, Faculty of Economics and Administrative Sciences, Department of Economy, Usak- Turkey, [osman.tuzun@usak.edu.tr](mailto:osman.tuzun@usak.edu.tr)

### Abstract

Equal distribution of income is important for social peace and economic stabilization. However, income is not distributed equally in any country and the governments try to provide the fairest distribution of income by intervening with various instruments. As an economic instrument, taxation is one of the most direct way to keep inequality in check and reduce poverty in the short term.

This study aims to investigate the effect of taxes on income distribution. In this context, to what extent the change in the share of total tax revenues in the Gross Domestic Product affects the gini coefficient in Turkey and other selected OECD Countries between 2002 and 2019 is analyzed by using Panel ARDL (Auto Regressive Distributed Lag) model. As a result of the analysis, it is concluded that an increase in the share of tax revenues in GDP decreases the Gini index by 0.17.

**Keywords:** *Tax Income, Income Distribution, Gini Index.*

## 1. INTRODUCTION

Increasing the social welfare of individuals is possible with as much equal distribution of income as possible. However, the equal distribution of income is not possible in any country by itself. Therefore, the governments must ensure equality in income distribution by intervening with economic instruments. One of the most important of these economic instruments is taxation.

After Wagner expressed his views drawing attention to the close relationship between social fairness and justice of taxation, reducing inequalities in income distribution has become one of the main objectives of taxation policy (Caliskan, 2010, p. 95). For this reason, countries have begun to regulate their tax systems to ensure more fairness. Therefore, they tried to decrease the share of indirect taxes and increase the share of direct taxes in their tax systems.

One of the most used methods to measure fairness in income distribution is the Gini index that is developed by the Italian statistician Corrado Gini (Demirgil, 2018, p. 119). “The Gini index measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution” (The World Bank, 2020). As the Gini coefficient approaches zero, the inequality decreases and increases as it approaches one.

Although the extent to which tax types or indirect and direct taxes affect income distribution has been discussed in the literature, there is no study that addresses the correlation between total tax revenues and income distribution as a whole. Therefore, in this study we investigated to what extent the share of total tax revenues in Gross Domestic Product (GDP) affects the income distribution mainly in Turkey and in other selected OECD countries between the years 2002-2019.

Following the literature, we explained the relation between taxation and income distribution. In the following chapters, we discussed methods and findings.

## 2. LITERATURE REVIEW

There are various studies in the literature examining the effects of taxes on income distribution. Some of these studies conducted empirically in the literature as below:

In the paper, Prasad (2008) has looked to what extent taxes and social transfers are effective in redistribution of income for the six Latin America countries. He has found that a

redistribution with direct taxes affect 0.6 percent decline in the Gini coefficient. On the other hand, a redistribution with direct taxes increase the Gini coefficient approximately 0.5 points.

Bargain (2009), has analyzed how tax benefits affect income distribution in the UK over 1998-2001. He has found that the extensions of the income support and the family tax credit seem to be the most effective redistributive policies.

Fuest et al. (2009), have examined how disposable income inequality is affected by different components of the tax and transfer systems in EU member countries. According to their findings, taxes and social contributions are the most important factors to reduce income inequality.

Sameti and Rafie (2010) have analyzed the economic growth and income distribution effects of taxes on economic growth and income distribution in Iran and some selected East Asian countries for the period 1990-2006. They have argued that the impact of indirect taxes on inequality and growth is unimportant. However, direct taxes have positive and important effects on economic growth and Gini index.

Vazquez et al. (2012) have analyzed effects of taxation and public expenditure policies in income distribution for 150 countries between 1970 and 2009. They have argued that progressive personal income taxes and corporate income taxes decrease income inequality. On the other hand, indirect taxes such as consumption taxes have a negative impact on the Gini index.

Duncan and Peter (2012) have analyzed the effect of progressive tax systems on income inequality for wide scale countries between 1981 and 2005. They have found that progressivity reduces observed inequality of income, but at the same time has a significantly smaller impact on actual inequality.

Cevik and Correa-Caro (2015), have investigated the main features of income inequality in China and BRIC+ countries with a concentrate on the redistributive effect of fiscal policy between 1980 and 2013. They have argued that public expenditures and taxes have contrary effects on inequality of income. While public expenditures appear to have a worsening impact, taxation policies improve income distribution.

Balseven and Tugcu (2017), have examined the effect of fiscal policy on income distribution in 30 developed and 17 developing countries between 1990 and 2014. In consequence of their survey, they have found that tax revenues have a positive impact on income inequalities in developing countries.

Demirgil (2018), has investigated the relation between taxes and income distribution in Turkey between 1980-2014 by using Autoregressive Distributed Lag Bound Test (ARDL) bound testing approach. According to his findings, an increase of 1% in the indirect tax rate increased the Gini index as 0.10% and a 1% increase in the direct tax rate decreased the Gini index as 0.05%.

Oboh and Eromonsele (2018), have examined the effect of taxation policy on income inequality in Nigeria. They have used a time series data for 34 years for the period 1980-2014. According to results, indirect taxes have negative effects on income inequality in Nigeria. Conversely, direct taxes are very useful for income equality in Nigeria.

Kanca and Bayrak (2019), have examined whether indirect and direct taxes have any effects on the income distribution. They have used data for 36 OECD countries for the period 1990-2017 by using panel data analysis. They have found that the increase in both indirect and direct taxes have negative effects on income distribution.

Eser and Genc (2019), have tested the impact of income and wealth taxes on income distribution was employed in the OECD countries for the period of 1990-2017. In consequence of the panel regressions estimations, they have argued that taxes on income and wealth have an affirmative effect on the income distribution.

Kilinc Savrul and Taskin (2020), have investigated the effects of different types of taxes on income distribution in Turkey by Kernel Regression Method. According to their findings; indirect taxes increased the Gini index by %28.1, while direct taxes reduced the Gini index by %14.1.

### **3. THE RELATION BETWEEN TAXATION AND INCOME DISTRIBUTION**

There are two possible ways to increase the living standards of individuals. The first of these is to increase the productivity of individuals by increasing their knowledge and skill levels with a better education. The second is the redistribution of income in favor of lower earners by using various instruments (Aktan and Vural, 2002, p. 5).

As an economic term, the income distribution means the distribution of national income. The income distribution is defined in various ways such as; geographical income distribution, sectoral income distribution, functional income distribution and personal income distribution. However, when the subject is the degree of equality or inequality of the distribution of national income, personal income distribution is considered (Turk, 2005, p. 313-317). In this respect, what is meant by income distribution in the study is personal income distribution.

Personal income distribution shows how income is distributed among individuals or households. The aim here is to show how much share each individual gets from the total income (Kirmanoglu, 2013, p. 204).

It is important to ensure fairness in personal income distribution. First of all, fair distribution of income ensures social peace. Redistribution of income in favor of low-income earners increases social welfare. A fairer distribution of personal income increases equality of opportunity and thus increases the income earning opportunities and living standards of the low income groups. Finally, ensuring the fairness in personal income distribution has positive effects on economic stability (Aktan and Vural, 2002, p. 5).

There are various methods to measure fairness in income distribution. The most common of these methods are the Lorenz curve developed by the US economist Max Otto Lorenz and the Gini index developed by the Italian statistician Corrado Gini (Demirgil, 2018, p. 119).

“The Gini index is based on the comparison of cumulative proportions of the population against cumulative proportions of income they receive” (OECD, 2020a). “The Gini index measures the extent to which the income distribution among individuals or households within an economy deviates from a perfectly equal distribution” (The World Bank, 2020).

“The Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the lowest income owner. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line” (The World Bank, 2020). Thus a Gini index ranges between 0 in the case of perfect equality and 1 in the case of perfect inequality (OECD, 2020a).

The income is not exactly distributed equally in any country. Although there are some differences, the aim is to ensure that everyone has an income level that will provide a decent living standard and to prevent large income differences (Akdogan, 2011, p. 490-491). However, when the change in the Gini index over the years is examined, it is seen that income inequality has increased (The World Bank, 2020).

The income distribution has substantially impaired with starting the process of change, especially in the period after 1980 in Turkey. After 1980, changes in tax policies, contractionary policies brought into unionism systems, rapid population growth, unemployment, inflation and economic crisis have created a negative impact on income distribution in Turkey. The development plans included matters aimed at solving the income distribution problems and the

governments implemented some policies to reduce the unfair distribution of income. However, these policies did not produce the desired results (Demirgil, 2018, p. 122).

Table 1 shows the distribution of income in Turkey in the last 10 years.

**Table 1.** Distribution of Annual Equivalised Household Disposable Income by Order of 20 Percent Groups, 2010-2019

Years	Population Groups					Gini Coefficient	P80 / P20 Ratio*	P90/P10 Ratio**
	First 20% (Lowest)	Second 20%	Third 20%	Fourth %20	Fifth 20% (Highest)			
2010	5,8	10,6	15,3	21,9	46,4	0,402	8,0	13,9
2011	5,8	10,6	15,2	21,7	46,7	0,404	8,0	14,4
2012	5,9	10,6	15,3	21,7	46,6	0,402	8,0	14,2
2013	6,1	10,7	15,2	21,4	46,6	0,400	7,7	13,6
2014	6,2	10,9	15,3	21,7	45,9	0,391	7,4	12,6
2015	6,1	10,7	15,2	21,5	46,5	0,397	7,6	13,3
2016	6,2	10,6	15,0	21,1	47,2	0,404	7,7	13,6
2017	6,3	10,7	14,8	20,9	47,4	0,405	7,5	13,4
2018	6,1	10,6	14,8	20,9	47,6	0,408	7,8	13,7
2019	6,2	10,9	15,2	21,4	46,3	0,395	7,4	13,0

Source: Turkish Statistical Institute, 2020.

\* The ratio of the income of the 20% with the highest share to the income of the 20% of the lowest share

\*\* The ratio of the income of the 10% with the highest share to the income of the 10% of the lowest share

According to the Table 1, the share of the 20% group with the highest income is around 46% in Turkey. The 20% group with the lowest income has 5-6% of the income. When looking at the Gini index, an improvement of 0.013 is striking in 2019 compared to the previous year.

For fighting against the growing income inequality, governments have two effective economic instruments: Public spending and taxes (Yuce, 2002, p. 12). Taxation and income transfers to the poorest part of society are the most direct way to keep inequality in check and reduce poorness in the short term (Bourguignon, 2018, p. 22). Since the taxes paid by every income group in the society and the public services they benefit from are not equal, the national income is redistributed through taxes and public expenditures (Turk, 2005, p. 324).

Policy practitioners use taxes for a variety of purposes; they can raise revenue for the government, provide incentives or disincentives for certain activities and correct market failures. They also use taxes for distributing income and helping to reduce inequality (Prasad, 2008, p. 6). Because the social purpose of the taxation policy is to ensure the distribution of income and wealth that cannot be achieved adequately with the expenditure policy in favor of low-income people (Yuce, 2002, p. 13).

Although it varies depending on the structure and technical characteristics of the taxes, the indirect or direct features of the taxes have different effects. There is a consensus that if the taxes are indirect, the low income earners, if the taxes are direct, the high income earners bear the tax burden (Akdogan, 2011, p. 491).

What determines the effects of taxes on income distribution is their reflectability (Altay, 2015, p. 156). The negative impact of indirect taxes on income distribution arises through the reflection. Because a significant part of the consumption taxes is reflected on the consumers depending on the supply and demand conditions of the market mechanism (Sener, 2014, p. 322).

Consumption taxes generally increase the inequality in income distribution since they do not take into account the personal situation of the taxpayers. In addition, the marginal consumption tendency of the consumers in the low income group is more than the consumers in the upper income group. Therefore, the distribution of income is distorted against low income earners as they tax a higher proportion of their income (Aktan and Vural, 2002, p. 11). Direct taxes, on the other hand, can create redistributor effects on income due to the progressive tariff structure, discounts, exemptions and the possibility of being personalized in varying sizes according to tax types (Akdogan, 2011, p. 491).

The majority of direct taxes in total tax revenues reduces the unfairness in income distribution by showing a kind of transfer from high-income earners to middle and low-income earners (Demirgil, 2018, p. 121). Therefore, in a tax system it is desirable that the share of direct taxes is higher than indirect taxes to ensure fairness. Table 2 shows the share of direct and indirect taxes in Turkey and in other OECD countries.

**Table 2.** Percentages of Direct - Indirect Taxes in Turkey and Other OECD Countries (%)

Years	Percentages of Direct - Indirect Taxes in Turkey		Percentages of Direct - Indirect Taxes in OECD Countries	
	Indirect Taxes	Direct Taxes	Indirect Taxes	Direct Taxes
1960	61%	39%	39%	61%
1970	62%	38%	33%	64%
1980	37%	63%	33%	67%
1990	48%	52%	33%	67%
2000	59%	41%	33%	67%
2010	68%	32%	34%	66%
2011	68%	32%	34%	66%
2012	67%	33%	34%	66%
2013	69%	31%	33%	67%
2014	68%	32%	33%	67%
2015	69%	31%	33%	67%

2016	67%	33%	33%	67%
2017	67%	33%	33%	67%
2018	63%	37%	33%	67%
2019	61%	39%	--	--

**Source:** Demirgil, 2018, p. 121; OECD, 2012, p. 104; OECD, 2013, p. 99; OECD, 2014, p. 93; OECD, 2015, p. 89; OECD, 2016, p. 103; OECD, 2017, p. 53; OECD, 2018, p. 64, 66; OECD, 2019, p. 63, 65; OECD, 2020b, p. 63; Republic of Turkey Ministry of Treasury and Finance, 2020.

Table 2 shows that, the share of indirect taxes is higher than direct taxes until the 1980s, in Turkey. This situation, which reversed in favor of direct taxes after 1980, has deteriorated since the 2000s. It is obvious that the share of indirect and direct taxes in OECD countries are opposite to the situation in Turkey. Because the share of indirect taxes in OECD member countries is much lower than direct taxes.

#### 4. THE DATA

In this study, we use annual unbalanced panel data for selected OECD countries for the period 2002-2019. Due to the data limitations in selected countries, we chose 2002 as the starting period. We have obtained the data from the database of the World Bank (<https://databank.worldbank.org>). The data set used in the study is as follows:

- GINI: GINI index (World Bank estimate)
- INF: Inflation Rate, consumer prices (annual %)
- TAX: Tax revenue (% of GDP)
- GDP\_PC: GDP per capita (constant LCU)
- UNEMP: Unemployment Rate, total (% of total labor force) (modeled ILO estimate)

In Table 3, we demonstrate the descriptive statistics. All the variables but the TAX have not a normal distribution, positive skewness value and leptokurtic distribution functions.

**Table 3.** Descriptive Statistics of the Variables

	GINI	INF	TAX	GDP_PC	UNEMP
Mean	32.34524	2.887803	20.79146	857012.9	8.452688
Median	31.90000	2.116042	21.46018	37150.25	7.722000
Maximum	55.50000	44.96412	36.50029	17192802	27.46600
Minimum	23.70000	-4.478103	9.183122	8048.795	2.251000
Std. Dev.	5.524206	3.734118	5.415548	2796315	4.216790
Skewness	1.425746	4.635281	-0.144742	4.422553	1.773489
Kurtosis	6.329930	43.12264	2.786342	22.98440	7.158615
Jarque-Bera	336.3403	29675.96	2.265384	8358.212	522.8149
Probability	0.000000	0.000000	0.322165	0.000000	0.000000
Sum	13585.00	1212.877	8732.415	3.60E+08	3550.129
Sum Sq. Dev.	12786.56	5842.384	12288.50	3.28E+15	7450.373
Observations	420	420	420	420	420



## 5. UNIT ROOT TESTS

Before the main estimates, we conduct the panel unit root tests. Panel ARDL approach considers the different integration degrees unless the order 2. For that reason, we need to perform the panel unit root tests to show whether the variables are stationary or not.

We perform the tests developed by Levin et al. (2002), Im et al. (2003), and Fisher ADF-Fisher PP proposed by Maddala and Wu (1999), and by Choi (2001). The entire tests but the LLC assume individual parameters (heterogeneity). The LLC test assumes the non-heterogeneity. The null hypothesis of the tests refers to “non-stationary”. Rejection of the null hypothesis means stationary process. We put the unit root results into the table 4. Gini is stationary according to LLC and Fisher-PP tests; however, it is non-stationary to the IPS and Fisher-ADF tests. INF, TAX, GDP\_PC, and UNEMP are stationary to the all tests.

**Table 4.** Panel Unit Root Tests

Variables	Levin, Lin & Chu (LLC)		Im, Pesaran & Shin (IPS)		Fisher-ADF		Fisher-PP	
	Level Prob.	First Difference Prob.	Level Prob.	First Difference Prob.	Level Prob.	First Difference Prob.	Level Prob.	First Difference Prob.
GINI	0.022**	-	0.6465	0.000***	0.3175	0.000***	0.000***	-
INF	0.000***	-	0.000***	-	0.000***	-	0.000***	-
TAX	0.000***	-	0.000***	-	0.002***	-	0.000***	-
GDP_PC	0.000***	-	0.000***	-	0.001***	-	0.000***	-
UNEMP	0.000***	-	0.000***	-	0.001***	-	0.000***	-

## 6. PANEL ARDL MODEL

We use a panel error correction model called Panel Autoregressive Distributed Lag (Panel ARDL) approach developed by Pesaran and Shin (1999) and Pesaran et al. (1999). Panel ARDL allows to estimate short and long run simultaneously and heterogeneity of the coefficients regardless of integration degree (Pesaran and Shin, 1999: 7-9).

Equation 1 and equation 2 show the long run and short run Panel ARDL (p,q) model respectively:

$$GINI_{it} = \alpha_i + \sum_{j=1}^p b_{1ij} GINI_{it-j} + \sum_{j=0}^p b_{2ij} INF_{it-j} + \sum_{j=0}^p b_{3ij} TAX_{it-j} + \sum_{j=0}^p b_{4ij} GDP\_PC_{it-j} + \sum_{j=0}^p b_{5ij} UNEMP_{it-j} + u_{it}$$

$$\begin{aligned}
 \Delta GINI_{it} = & \alpha_i + \sum_{j=1}^p b_{1ij} \Delta GINI_{it-j} \\
 & + \sum_{j=0}^p b_{2ij} \Delta INF_{it-j} \\
 & + \sum_{j=0}^p b_{3ij} \Delta TAX_{it-j} + \sum_{j=0}^p b_{4ij} \Delta GDP\_PC_{it-j} + \sum_{j=0}^p b_{5ij} \Delta UNEMP_{it-j} + \omega GINI_{it-j} + \varphi INF_{it-j} \\
 & + \theta TAX_{it-j} + \delta GDP\_PC_{it-j} + \vartheta GDP\_PC_{it-j} + u_{it}
 \end{aligned}
 \tag{1}$$

Where  $\Delta$  shows the difference operator,  $\omega$  is the error correction coefficient. Equation (1) includes the levels of the variables. The coefficients in Equation 1 are long-term coefficients. Equation (2) shows the short-term coefficients. The negative and statistically significant error correction coefficient indicates the long-term relationship between the Gini index and other independent variables.

There are two types of estimator in the Panel ARDL approach. One is the Mean Group (MG) Regression and the second one is Pooled Mean Group (PMG) Regression. MG estimator has no restriction on the parameters. MG derives long-term parameters on the average of individual ARDL model parameters. Unlike the MG estimator, PMG estimator allows long-term homogeneity and short-run heterogeneity in parameters (Pesaran et. al., 1999: 621). In addition, Pesaran et al. (1999) states that Hausman test can be considered in the selection of regression between MG and PMG.

## 7. PANEL ARDL RESULTS

We perform the Panel ARDL approach to find out how the tax revenue affects the income inequality (Gini index). On the other hand, we considered inflation, unemployment, and GDP per capita for the reason that they can affect the Gini index either.

**Table 5.** Panel ARDL Model (PMG)

Dep. Var.:Gini	Coefficients	Std. Err.	z	P> z
Long Run (Error Correction)				
INF	0.1424177***	0.045730	3.11	0.002
TAX	-0.170004***	0.056119	-3.03	0.002
GDP_PC	-7.42e-07**	2.99e-07	-2.48	0.013
UNEMP	0.190671***	0.017933	10.63	0.000
Short Run				

Ec	-0.4310152***	0.05348	-8.06	0.000
INF  D1	0.0019143**	0.04584	0.04	0.967
TAX  D1	0.1360415**	0.06159	2.21	0.027
GDP_PC D1	0.0000963	0.00018	0.53	0.597
UNP D1	0.1249266	0.07662	1.63	0.103
Constant	14.77618***	1.90169	7.77	0.000
Hausman Test	1.28 [0.7345] H <sub>0</sub> : Difference in coefficients not systematic/PMG			

PMG: Pooled Mean Group Regression. \*\*\* and \*\* indicate significance level of 1 % and 5 % respectively. AIC is used in the selecting optimal lag length.

We demonstrate the Panel ARDL results on the table 5. The results are based on the PMG estimator. According to the Hausman test PMG is the efficient estimator (with the rejection of the null hypothesis). In the long-run estimates, we see significant long-run parameters of the independent variables. An increase in the inflation rate and unemployment rate increase the Gini index by 0.14 and 0.19 respectively. That means that a rising in the inflation and unemployment rates aggravate income inequality in the selected OECD countries. Unemployment rate has the biggest impact. An increase in the Tax revenue (% of GDP) decreases the Gini index by -0.17. In OECD countries, we consider this result as an expected one due to the fact that the tax revenues consist of direct tax revenues mostly. Finally, GDP per capita has a decreasing effect on Gini index but this effect is extremely small. The results show that inflation and unemployment policies are important for income inequality in the OECD countries. However, tax revenue (% of GDP) also has a determining effect on Gini index. It indicates that tax policy contributes to equal sharing of income.

In the short run, the findings show that only the parameter of the tax revenue (% of GDP) is significant. This result indicates that the tax policy can be more efficient than the others can in the short run for income inequality. Furthermore, the error correction coefficient is negative and statistically significant. This result provides an evidence of convergence of the short-run to long-run.

## 8. CONCLUSION

Governments have various economic instruments to redistribute income that is not evenly distributed. One of the most important of these instruments is taxes.

This study examined to what extent the increase in the share of tax revenues in GDP affects the Gini index. According to the findings, as tax revenues increase, a more equal income

distribution is approached. The most important reason for this is that the share of direct taxes in the tax systems of most of the OECD member countries considered is higher than indirect taxes.

Among the other variables, the increase in inflation and unemployment rates increases the Gini index. In other words, the inequality in income distribution increases with the rise in these variables.

Finally, the increase in per capita GDP provides an increase in equality in income distribution. However, this effect is quite small. The negative impacts of inflation and unemployment variables are greater.

The results show that inflation and unemployment rates have bigger negative effects than the positive effect of GDP per capita in OECD countries. However, tax revenue (% of GDP) also has a determining effect on Gini index. It indicates that tax policy contributes to equal sharing of income both in the short run and in the long run. For that reason, the tax policy can be more efficient than the others can for income inequality.

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