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Research Article

THE EFFECT OF INFLATION ON INCOME DISTRIBUTION: PANEL DATA ANALYSIS ON OECD COUNTRIES ¹

Enflasyonun Gelir Dağılımı Üzerine Olan Etkisi: OECD Ülkeleri Üzerine Panel Veri Analizi²

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ABSTRACT

Inflation, which is one of the most fundamental macroeconomic problems of countries, also affects another important economic problem, income inequality. In this study, panel data analysis was conducted to measure the effect of inflation on income distribution. The model was estimated with macroeconomic data of 24 OECD countries with an annual frequency between 2009-2019. The Gini Coefficient was used to determine the income distribution in the study. In addition to inflation, which is one of the factors affecting income distribution, per capita income, unemployment and public expenditures are also included and used as independent variables. According to the estimation findings, a 1% increase in inflation increases the Gini Coefficient by 0.05%. In other words, increases in the general level of prices disrupt the income distribution. In addition, it was understood that a 1% increase in unemployment rate increased the Gini Coefficient by 0.14%, and a 1% increase in per capita income increased the Gini Coefficient by 0.03%. A 1% increase in public expenditures decreases the Gini Coefficient by 0.49%. Prediction findings are meaningful.

Keywords: Income Distribution, Inflation, Income Inequality, Macroeconomics, Panel Data

JEL Codes: D31, E31, D63, E02, C23

ÖZET

Ülkelerin en temel makroekonomik problemlerinden olan enflasyon, aynı zamanda bir diğer önemli ekonomik problem olan gelir eşitsizliğine de etki etmektedir. Bu çalışmada enflasyonun gelir dağılımı üzerindeki etkisini ölçmek amacıyla panel veri analizi yapılmıştır. 24 OECD ülkesinin 2009-2019 yılları arasındaki yıllık frekansa sahip makroekonomik veriler ile model tahmin edilmiştir. Çalışmada gelir dağılımını belirlemede Gini Katsayısı kullanılmıştır. Gelir dağılımına etki eden faktörlerden olan enflasyona ilaveten kişi başına düşen milli gelir, işsizlik ve kamu harcamalarına da yer verilmiş ve bağımsız değişken olarak kullanılmıştır. Tahmin bulgularına göre enflasyondaki %1'lik artış, Gini Katsayısını %0.05 artırmaktadır. Diğer bir deyişle, fiyatlar genel düzeyindeki artışlar gelir dağılımını bozmaktadır. Ayrıca işsizlik oranındaki %1'lik artışın Gini Katsayısını %0.14, kişi başına düşen gelirdeki %1'lik artışın ise gelir dağılımını %0.03 artırdığı anlaşılmıştır. Kamu harcamalarındaki %1'lik artış ise Gini Katsayısını %0.49 oranında azaltmaktadır. Tahmin bulguları anlamlıdır.

Anahtar Kelimeler: Gelir Dağılımı, Enflasyon, Gelir Eşitsizliği, Makroekonomi, Panel Veri

JEL Kodları: D31, E31, D63, E02, C23

1. INTRODUCTION

Inflation and income distribution, which are among the most fundamental macroeconomic problems of countries, are issues that many countries have not been able to fully resolve, even though they have been studied extensively. For this reason, it still maintains its importance and studies are being conducted on it. Many countries, including Turkey, that are not reasonable inflation rate for many years has been implementing

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This study is an extended version of the study that presented at GELİSİM – UWE 5th International Conference On Economics and Finance on May 26, 2021.

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Bu çalışma, 26 Mayıs 2021 tarihinde GELİŞİM - UWE 5. Uluslararası Ekonomi ve Finans Konferansı'nda sunulan çalışmanın genişletilmiş bir versiyonudur.

various policies in order to transport to a reasonable level. Although they may be successful in reducing inflation in some periods, the main problem is that their success in inflation cannot be sustained steadily. The central banks of the countries, together with their governments, have had to struggle for many years to solve the inflation problem. High inflation brings many problems with it. One of them is its effect on income distribution (Totonchi, 2011, p.459). How income is distributed is very important for societies to live in harmony. As income distribution affects social issues in society, it can also shape economic indicators. Although the increase in national income is an important positive development in some countries, which are defined as developed, it can be observed that this income is not distributed fairly, it separates the society economically, that is, it makes the rich richer and the poor poorer. This causes social problems in the society and an increase in unrest and chaos for the society. Poverty problem arises with the unequal distribution of income distribution. In societies where income is distributed more equitably, it is noticed that such problems are not seen, in other words, the problem of poverty and the social problems brought about by poverty are further reduced. (Stewart, 2000, p.1). Inflation is one of the factors that cause unfair income distribution, which is an important obstacle to the development of countries and the increase in the welfare of the society. Therefore, in this study have been investigated in what degrees and direction to act of inflation on income distribution in OECD countries including Turkey.

2. STUDIES EXAMINING THE RELATIONSHIP BETWEEN INFLATION AND INCOME DISTRIBUTION

Monnin, P. (2014) conducted a study on OECD countries. While conducting this study, data between 1971-2010 were used. Ten countries in this group were included in the study. Different economic variables were also added to his study, which examined the relationship between inflation and income distribution. According to his results, while the level of inflation increases, income inequality decreases first, and after a certain level, income inequality increases with inflation (Monnin, 2014, p.18).

Galli, R. and Hoeven, R. (2001) carried out an analysis covering the United States of America and OECD countries. In these studies, they used the data between 1966-1999 to test the effect of inflation on income distribution. In this study, as inflation increases, income inequality primarily decreases, but after a certain level, income inequality increases with inflation. The breakage levels are different for both groups (Galli and Hoeven, 2001, p.15).

Siame-Namini, S. and Hudson, D. (2019) tested the relationship between inflation and income distribution on developed and developing countries. In this study, they included twenty-four developed countries and sixty-six developing countries. Although the researchers could not reach a meaningful relationship in the short term, they found a mutual relationship in both the developed country group and the developing country group in the long term (Siame-Namini ve Hudson, 2019, p.611).

Gülmez, A. and Altintas, N. (2015), Using the data for the year 1981-2011 in their study investigated the effect of inflation on income distribution in both the short term and long term in Turkey have concluded that there is a causal relationship between the two variables. However, in their studies, inflation does not have a detrimental effect on income distribution, and it eliminates the income inequality. (Gülmez ve Altintas, 2015, p.31).

Kalaycı, S. and Öztürk, A. (2018) have investigated the effects of inflation on Turkey's income distribution in Turkey. They made use of 1980-2013 data to do this study. At the end of the study, although they found a long-term relationship between variables, they stated that among the variables they chose, the factor affecting the income distribution the most was inflation. (Kalaycı ve Öztürk, 2018, p.165).

Georgiou, M. N. (2010) included European countries in his study, in which he examined the relationship between inflation and income distribution. Generally, the researcher, who included the countries located in the west of Europe in his study, preferred the data between the years 1995-2006 to use in the data set. As a result of his study, he found that inflation increases income inequalities (Georgiou, 2010, p.1).

3. TYPES OF INFLATION AND INCOME DISTRIBUTION

Inflation can be examined under two separate headings as inflation, depending on its causes and severity. Within inflation according to its reasons includes demand inflation, cost inflation, and structural inflation. According to its severity, inflation is divided into four as creeping inflation, walking inflation, galloping inflation and hyperinflation.

Demand inflation, which is included in inflation according to its reasons, is caused by the increase in total demand in the economy, leading to inflation. If the amount of production in an economy does not change and

the money supply is increased by applying an expansionary monetary policy in return, this may cause the total demand to increase and exceed the total production in that economy. Under these conditions, the amount of goods to be purchased is more than the amount of goods produced. This will raise the general level of prices due to the high demand and will lead to demand inflation (Gürler, 2013, p130). Cost inflation is the fact that due to a number of reasons in the economy, the increases in the prices of the inputs used in production and the factors that make up the costs cause an increase in the general level of prices. A number of reasons such as rising oil prices, experiencing natural disasters and resulting unexpected decrease in production or increasing tax rates by governments can cause cost inflation (Central Bank of the Turkish Republic, 2013, p.4). Structural inflation is generally seen in underdeveloped or developing countries. It can be explained as the structural problems in the economy raising the general level of prices. The fact that production is based on agriculture, the lack of sufficient technological production, and the continuous instability of the economy can be given as examples of factors that cause structural inflation (Parasız, 1991, p.10).

Creeping inflation, which is included in inflation according to its severity, is accepted as the increase in the general level of prices at very low levels. In addition, the prevailing opinion is that it is necessary for economic growth (Atmanand, 2009, p.674). Walking inflation is a type of inflation that is one degree higher than that of creeping inflation, which is not too dangerous, but also a warning. It must be checked so that it does not rise even higher (Nadar, 2013, s.199). In galloping inflation, increases in the general level of prices have now reached two or three digit levels. The currency of a country experiencing galloping inflation is losing value very quickly. Economic actors have to take some precautions in order not to be harmed by this picture (Bocutoğlu, 2016, p.94). Hyperinflation is a level at which inflation rates rise enormously. The inflation problem has become almost inextricable. An inflation rate of around 1 000 000% could explain hyperinflation. The most difficult type of inflation to solve (Baxi, 2020, p.4).

Types of income distribution include personal income distribution, functional income distribution, sectoral income distribution and regional income distribution. Personal income distribution expresses how the income earned in an economy is distributed among individuals in that society. In this analysis, rankings are made towards the households with the lowest share from the household group with the highest share of income. (Acar, 2015, p.45). There are production factors in functional income distribution. It expresses to what extent the factors of production consisting of labor, capital, natural resources and entrepreneurs get a share from the income obtained in that economy. (Kuştepeli, ve Halaç, 2004, p.8). Regional income distribution is a definition that expresses how the income generated in an economy is distributed to different regions of that country (Şerbetçi, 2015, p.97). Sectoral income distribution, on the other hand, refers to the grouping that shows how much share the sectors such as industry, service, construction, which contribute to the national income, get from the national income. (Doğan, and Tek, 2007, p.97).

4. FACTORS AFFECTING THE INCOME DISTRIBUTION IN THE MODEL

There are many factors that affect income distribution. However, in the study, inflation, unemployment rate, final public expenditures and per capita national income, which are indicators of economic growth, are included among these factors. Other variables were not included in the model due to difficulties in data acquisition for all countries.

Inflation: Although inflation refers to the increase in the general level of prices, inflation occurs due to many factors. Inflation, which is one of the main macroeconomic problems that can be experienced in an economy, can bring many problems with it. Income distribution injustice that may arise due to inflation is one of these problems. Although many researchers have studied the effects of inflation on income distribution, empirical studies on this issue are insufficient. When the studies conducted are examined, it is seen that countries with high inflation problems also face the problem of inequality in income distribution. The problem of income distribution distortion caused by inflation is not only a problem of underdeveloped and developing countries. The problem of income inequality due to inflation can also be observed in developed countries. For this reason, one of the main problems encountered in increasing the welfare level of countries, solving poverty problems in societies and distributing income more equitably is inflation. Inflation is one of the main factors affecting income distribution.

Unemployment: In general, unemployment occurs as a result of the people living in a society not finding the job they are looking for in order to sustain their lives, and the inability to provide sufficient employment for that society. Unemployment, one of the main macroeconomic problems, also significantly affects income distribution. As a result of unemployment, individuals experience a significant loss of income, their level of welfare decreases, and significant differences occur between them and other members of the employed society.

Individuals with prolonged unemployment may stop looking for a job and spend important periods of their lives without contributing to the economy and the country and without producing. This situation both negatively affects the economic growth of the country and causes significant differences between income and welfare levels in the society. Prolonged unemployment problem can also bring poverty with it (Emek, 2020, p.52).

Final Public Expenditure: Governments can lead to a different distribution of income generated in that economy by implementing a number of policies. Main policies implemented by governments include taxation and subsidies. With the tax policies of governments, income distribution may be different and more equal than before tax. Likewise, governments make various public expenditures in areas such as education, health, transportation. Public expenditures can also affect income distribution over time and make income more equitable. The important point here is that most of the expenditures made by the public should be for the poor individuals in the society. In this way, it can be stated that if public expenditures for the poor segment of the society increase, this situation may reduce the income inequality. (Afonso et al., 2010, p.11).

Economic Growth: Kuznets is one of the first to examine the relationship between income distribution and economic growth. In his study, Kuznets states that when economic growth occurs in an economy, the distribution of income is first negatively affected by this situation (Erkişi and Ceyhan, 2020, p.196). Kuznets stated that economic growth and per capita income will increase with the transition from the agricultural sector to other sectors. (Ay, 2021, p.271). However, this situation will create serious differences between the agricultural sector and the non-agricultural sector at first and will cause the income distribution justice to deteriorate. However, after a certain threshold level, economic growth will affect the income distribution positively. Concentration will occur in non-agricultural sectors and per capita income will increase. This will reduce income inequalities (Kuznets, 1955, p.12). When economic growth occurs, it is important whether these increases in national income increase in favor of capital or in favor of labor (Özdemir, 2019, p.265). In other words, when the economic growth rate increases, if the share of wages in the economic growth rate increases, income inequalities will decrease. If the share of wages in national income decreases while economic growth increases, this has a negative effect on the justice of income distribution (Arestis ve Baltar, 2017, p.130).

5. DATA AND METHOD

In the study, panel data analysis was applied to determine the effect of inflation and other variables on income distribution. 24 OECD countries including in Republic of Turkey of covering the period 2009-2019, the annual frequency data are used. All data have been obtained from the World Bank Database. Information on the variables used in the model is given in the table below.

Variable	Description
<i>GN</i>	GINI Value
<i>INF</i>	Consumer Prices Inflation Rate
<i>UN</i>	Unemployment rate
<i>GEX</i>	General Public Expenditures, Final Consumption Expenditures
<i>GDP</i>	Per Capita Income (International Purchasing Power Parity, Base Year 2017)

It is understood that there is a unit effect in the estimated model, but no time effect. Hausman test results for unit effects and method selection are given below. Stata 16 Package Program was used in all tests and predictions.

Test	P Value	Result
Unit Effects	F Test	0.000
	LM Test	0.000
	LR Test	0.000
Time Affects	F Test	0.405
	LM Test	1.000
	LR Test	1.000
Hausman Test	0.001	Null hypothesis rejected: Random effects are ineffective
Robust Hausman Test	0.551	Null hypothesis could not rejected: Random effects are effective

The model in which unit effects are valid is given in equation 1.

$$\ln GN_{it} = \beta_{0i} + \beta_{1i} \ln INF_{it} + \beta_{2i} \ln UN_{it} + \beta_{3i} \ln GEX_{it} + \beta_{4i} \ln GDP_{it} + \mu_{it} \quad (1)$$

The "l" sign in front of the variables indicates that their logarithms are taken at the base ln. " μ " stands for error terms, " i " stands for unit and " t " stands for time dimension. " β_0 " is the constant coefficient, " β " in front of

the variables is the coefficient of the relevant variable. The model in which unit effects are valid can be expressed as follows.

$$lGN_{it} = \beta_0 + \beta_1 lINF_{it} + \beta_2 lUN_{it} + \beta_3 lGEX_{it} + \beta_4 lGDP_{it} + M_i + \mu_{it} \quad (2)$$

It expresses the variable unit effects expressed as "M_i". Tests and results regarding the deviation of the model from the assumption are as follows.

	Test	P Value (Stat)	Result
Normal distribution	Skewness and Kurtosis (Unit Effect)	0.476	Null hypothesis could not be rejected: remains are normally distributed
	Skewness and Kurtosis (Error Term)	0.728	
Changing Variance	Levene	0.000	Null hypothesis rejected: There is a changing variance problem
	Brown	0.000	
	Forsythe	0.000	
Autocorrelation	Durbin-Watson	(0.806)	Null hypothesis rejected: There is a autocorrelation problem
	Baltagi-Wu LBI	(1.085)	
Correlation between units	Pesaran	0.692	Null hypothesis could not be rejected: There is no correlation between units.
	Friedman	0.989	
	Frees	(4.139)	
Multiple Linear Connection (MDB)		1.02	There is no MDB problem.
Average Variance Inflation Factor Value			

In the model where the random effects are valid, the model is estimated using the generalized least squares (GLS) method, since there is autocorrelation and heterokedasite problem. Estimation was carried out in two ways, with and without constant. Estimated outputs are as follows.

$$lGN_{it} = 3.64 + 0.05 lINF_{it} + 0.14 lUN_{it} - 0.49 lGEX_{it} + 0.03 lGDP_{it} \quad (1)$$

(0.00) (0.00) (0.00) (0.00) (0.00)

$$lGN_{it} = 0.07 lINF_{it} + 0.20 lUN_{it} - 0.04 lGEX_{it} + 0.12 lGDP_{it} \quad (2)$$

(0.00) (0.00) (0.31) (0.00)

The values given in parentheses indicate the P Value for the relevant parameter. R Square value of Model 1 was calculated as 0.40 and was found to be meaningful at 1% significance level. According to the results of Model 1, while the other variables were zero, the Gini coefficient was found to be 38.09. The Gini Coefficient, which takes a value between 0 and 1, is evaluated between 0 and 100 in the World Bank data. Therefore, 38.09, which is found by taking the inverse logarithm of the number 3.64 in the base ln, is also a logically meaningful value.

6. CONCLUSION

According to the results of the study, a 1% increase in inflation increases the Gini Coefficient by 0.05%. In other words, increases in the general level of prices disrupt the income distribution. In addition, it has been understood that a 1% increase in unemployment rate increases the Gini Coefficient by 0.14%, and a 1% increase in per capita income increases the Gini Coefficient by 0.03%. A 1% increase in public expenditures decreases the Gini Coefficient by 0.49%. All the results obtained are significant even at 1% margin of error and 99% confidence level.

According to the results of Equation 2, a 1% increase in inflation increases the Gini Coefficient by 0.07%. In addition, it has been understood that a 1% increase in unemployment rate increases the Gini Coefficient by 0.20%, and a 1% increase in per capita income increases the Gini Coefficient by 0.12%. A 1% increase in public expenditures decreases the Gini Coefficient by 0.04%. However, this is meaningless even with 10% margin of error. In Equation 2, the coefficient of all variables except Public expenditures is significant even at 1% margin of error.

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