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INCOME INEQUALITY AND ECONOMIC GROWTH: AN ECONOMETRIC ANALYSIS OF OECD COUNTRIES (2005-2018)

Durim SELMONAJ[*] Fisnik MORINA[**] Ercan OZEN[***] Simon GRIMA[****]

Abstract

This paper aims to explore the effect of inequality and how income inequality affects economic growth. Policymakers need to understand how income inequality affects Gross Domestic Product (GDP) and to determine if there are other effects, since this may affect the sustainability of a country. We used secondary data provided from reports of the central banks of the Organisation for Economic Co-operation and Development (OECD) member countries and then subjected them to trend analysis and 4 other analysis methods, specifically; fixed effect regression method, random effect, Hausman-Taylor estimation and Arellano-Bond estimation. Based on these empirical results we can conclude that income inequality, poverty rate and unemployment have significant effects on the economic growth of a country. In fact, during the period analysed, we see a negative correlation between Income inequality and GDP for OECD countries. In addition, we found that the most sensitive period was that of the global economic crisis of 2008-2009. However, when interpreting these results, we need to understand that there are also different approaches and meanings to poverty and the points of view of individuals and their perceptions can have an important role.

Keywords: income inequality, economic growth, unemployment, poverty rate.

GELİR EŞİTSİZLİĞİ VE EKONOMİK BÜYÜME: OECD ÜLKELERİNİN EKONOMİK ANALİZİ (2005-2018)

Öz

Bu makale, eşitsizliğin etkisini ve gelir eşitsizliğinin ekonomik büyümeyi nasıl etkilediğini araştırmayı amaçlamaktadır. Politika yapıcıların, bir ülkenin sürdürülebilirliğini etkileyebileceğinden, gelir eşitsizliğinin Gayri Safi Yurtiçi Hasıla'yı (GSYİH) nasıl etkilediğini anlaması ve başka etkilerin olup olmadığını belirlemesi gerekir. Çalışmada Ekonomik İşbirliği ve Kalkınma Teşkilatı (OECD) üye ülkelerinin merkez bankalarının raporlarından sağlanan ikincil verileri kullanılmıştır. Veriler trend analizine ve özellikle sabit etkiler regresyon yöntemi, rassal etkiler, Hausman-Taylor tahmini ve Arellano-Bond tahmini gibi dört analiz yöntemine tabi tutulmuştur. Bu ampirik sonuçlara dayanarak; gelir eşitsizliği, yoksulluk oranı ve işsizliğin bir ülkenin ekonomik büyümesi üzerinde önemli etkileri olduğu sonucuna varabiliriz. Analiz edilen dönemde, OECD ülkeleri için Gelir eşitsizliği ile GSYİH arasında negatif bir ilişki olduğu görülmektedir. Ayrıca, en hassas dönemin 2008-2009 küresel ekonomik krizi dönemi olduğu tespit edilmiştir. Ancak bu sonuçları yorumlarken, yoksulluğun da farklı yaklaşımlar ve anlamlar içerdiğini ve bireylerin bakış açılarının ve algılarının önemli rol oynayabileceğini dikkate almamız gerekir.

Anahtar Kelimeler: gelir eşitsizliği, ekonomik büyüme, işsizlik, yoksulluk oranı.

[*] Master Student, University "Haxhi Zeka" – Faculty of Business Administration, Peja, Kosovo, durim.selmonaj@student.unhz.eu, https://orcid.org/0000-0003-3183-7455.
[**] Assist.Prof.Dr. University "Haxhi Zeka" – Faculty of Business Administration, Peja, Kosovo, fisnik.morina@unhz.eu, https://orcid.org/0000-0003-1071-0439.
[***] **Corresponding Author**, Assoc.Prof.Dr. University of Uşak, Faculty of Applied Sciences, Department of Finance and Banking, Uşak, Turkey, ercan.ozen@usak.edu.tr, https://orcid.org/0000-0002-7774-5153.
[****] Assoc.Prof.Dr. Department of Insurance, Faculty of Economics, Management and Accountancy University of Malta, simon.grima@um.edu.mt, https://orcid.org/0000-0003-1523-5120.

1. INTRODUCTION

Income Inequality (II) as a general concept implies that there is some kind of dissatisfaction due to the unfair distribution of income among a population. This in turn increases the II. II is often associated with inequality in wealth distribution. A population can be grouped by for example gender or/and race or/and level of wealth, to show the levels and forms of the income distribution. Various measures, such as the Gini coefficient or even the Palma Ratio, can be used to analyse the level of II in a population (Floyd 2020).

Increasing income concentration can reduce aggregate demand and weaken growth because according to Dabla-Norris et al. (2015), the rich spend a lower share of their income than middle- and lower-income groups. This was echoed by Asthana (2009), who noted that globalization has been accompanied by an increase in II. She noted that 20% of the richest world's population in 1960 had 30 times more income than the poorest 20% and that this difference is 2009 about 50 times larger.Gilbert (2015) noted that in rich countries the heads of households, especially the single-mother households, have increased. Typical single-mother families are known to have one income because they are lower than average. This is since they are more likely to be single-income families. In addition, the trend showsthat because single mothers, in general, need to balance their work and family responsibilities,their take-home pay is usually lower than that of men.

According to Piketty (2015), equality in labour income does not exist and inequality exists between capital and labour. Murray (1998) continues to note that financial capital systematically generates unequal economic rewards since differences in social classes create different life opportunities, with unequal economic rewards.

II has important global social, health and environmental implications and this may be linked to the choice of countries and their historical, cultural, political and economic contexts (Hojjat and Hojjat, 2017).

Therefore, there is a need to explore especially for policymakers, how II affects Gross domestic product (GDP) and to determine if there are other effects, since this may affect the sustainability of a country. That is the balance between the economy, the social aspects and the environment.

2. LITERATURE REVIEW

Keely (2015) notes that the factors that drive rising II in one part of the populationdo not always shed light on the reasons for rising inequalities in other sectors and economies. Moreover, he continues to note that factors, such as social, economic and the role played by the state contribute to the increase in II.

Initially, according to Silber (1999), II can result from non-income factors, which can affect the economic boundaries. Paganetto (2014) argues that trends during the 2000s show an increased gap between the rich and the poor, for example, in high inequality countries, such as Israel and the United States and traditionally low-II countries, such as Denmark, Germany and Sweden.

The PR is a measure of absolute poverty, that is, it follows the predominance of need over an unchanging criterion (Eberstadt, 2008). Ziliak (2005) argues that while the definition of poverty is both intuitive and transparent, and can be easily understood by policymakers and voters, it is also unclear due to the perception that poverty depends on measurable resources and the determined distinctive parameters. That is, determining who are considered as poor and non-poor, each of which can be determined subjectively in time and space.

There are different ways to define poverty and Sachs (2006) notes that:

> "In a world where distance no longer determines who your neighbour is, paying the price for equality is not simply a decision of the heart; it is a decision of the smart. It became clear on September 11, 2001. The perpetrators of September 11 may have been rich and wise Saudis, but they were shocked by the poverty of Afghanistan, following an unreasonable path to the act of tire".

On the other hand, Yunus (2008), who was awarded the Nobel Peace Prize for founding Grameen Bank and studying/researching the concepts of microcredit and microfinance, explains poverty as:

> "The distribution of income around the world gives a very clear story. Ninety-four percent of the world's income goes to 40 percent of the population while 60 percent of people live on only 6 percent of the world's income. Half the world population lives on two dollars a day. Over one billion people live on less than a dollar a day. That is not the formula for peace".

It is worth noting, that although the Gini Index has been used widely to understand II, experts believe that it does not provide complete information for a thorough explanation. This is because the Gini Index is very sensitive to changes in the income spectrum but relatively blind to changes in extremes.

In 2013, Cobham and Sumner (Date) proposed the Palma Ratio as an alternative to the Gini coefficient. It was named after José Gabriel Palma, a Chilean economist. Palma had observed that in most countries, the middle class - defined in deciles (deciles - 10 categories of countries with the lowest income as 1 and the highest incomes at 10) that the fifth to the ninth, or 40% to 90% receive about half of the total revenue Floyd (2020).

UE refers to employable individuals who are constantly trying to find a job but are unable to do so. It is that section of the population in the workforce who are available for work but who do not have a suitable job (Selmonaj & Morina, 2021). Keynes (2018) in his theory of UE states that the volume of employment depends on two basic factors, namely (1) the real wage rates and (2) the form of the function of real demand for labour.

Other researches, such as (Yunus and Karl, 2017) show that UE, and specifically that of young people, is not a temporary problem. Young people who spend several years out of work, or working in low-wage jobs with no prospect of growth, tend to suffer eternal consequences. No matter how hard they work.

In addition to all the above factors, the level of education also plays an important role in the issue of GDP. Thus, Bernhard and Zilcha, (2015) believed that inconclusive and sometimes contradictory empirical results raise questions about the nature of the complex correlation between the level of education and GDP. The engine of GDP is inventions. In mathematical terms, the Solow model shows that GDP stagnates when production technology does not improve exponentially (Jones & Vollrath, 2013).

Moyo (2018) believes that despite the rapid development of economic thinking since the 1930s, the same questions of GDP continue to confuse economists. Even for an authority, such as Kuznets (Simon Kuznets, the "father" of GDP measurement), GDP was and remains an enigma to policymakers today. Creating solutions for slow growth requires an understanding of the history and paths traversed by the economic winners and losers of the past.

According to (Kopp, 2020), II is how income is distributed unequally among the population of a country, in our case, in Organisation for Economic Co-operation and Development (OECD) countries. The more unequal the distribution, the higher the II. II is often

synonymous with wealth inequality, which is the unequal distribution of wealth.

Thus, the largest share of household income growth, according to Horowitz et al. (2020), was achieved during the period from 1970 to 2000. In these three decades, the average income increased by 41% and stood at $ 70,800, at an average annual rate of 1.2%. From 2000 to 2018, household income growth slowed to an average annual rate of only 0.3%.

Studies, such as that by Heise (2006), have shown that UE and wage distribution in particular, as measured by the Gini Index, or higher decile ratio of income are important factors in determining II. According to Brueckner and Lederman (2017), regression changes show that in low-income countries, transient growth has been exacerbated by greater II. On the other hand, in high-income countries, inequality has a significant negative effect on transient growth.

Kuznets (1955) explained how II affects the process of GDP of a country and suggested that this can only be answered if we take into account defined economic and social conditions, such as the growth experience of the developed countries. However, there are no statistics that can be used directly to measure the global revenue structure.

Kwasi Fosu (2018) explains that for the poverty line of $ 1.25 per day, changes in inequality have a more significant effect than changes in the income itself, meaning that it is the main contributor to poverty reduction in countries,such as Angola, Botswana, Cape Verde, Guinea- Bissau, Namibia, Niger, Sierra Leone and Tunisia.

Oscar (1998) explains that poverty is interpreted in different ways. He notes that some see the poor as virtuous, just, independent, honest, confident, good, simple and happy, while others see them as evil, violent, and criminal. Most people in the United States find it difficult to think of poverty as a continuing phenomenon because their economy and the particularly favourable circumstances of their history has led to optimism that makes us think that poverty is transient.

In the decision on whether to focus on reforms to promote financial inclusion, innovation and access to financial services and reduce poverty and II or on whether to focus on financial stability, the Middle East and North Africa (MENA) policymakers note the trade-off between financial liberalization, integration and financial stability (Neaime and Gaysset, 2017)

Harris and Todaro (1970) found that the domestic trade model is divided into two sectors of UE, the permanent urban and rural sectors.

> "• The urban sector specializes in the production of a product, part of which is exported to the rural sector in exchange for agricultural goods".
>
> • "The rural sector has a choice of either using all available labour to produce an agricultural good, some of which is exported to the urban sector, or using only part of its work to produce this good while exporting residual power in the urban sector as a return on wages paid in the form of goods produced".

From the point of view of Ono (2018), in addition to UE insurance, in developed countries, there are large public expenditures related to redistribution between generations from young individuals to the elderly, such as public pensions and health and nursing systems for older individuals. This means that the greater political power of older people, which may stem from an increase in the ratio of old-age dependency, puts pressure on the government to shift fiscal spending from the young and unemployed to the elderly and retirees.

3. DATA METHODOLOGY AND SPECIFICATION OF THE MODEL

In this study, we conducted an empirical analysis of the impact of II on GDP. To do this, we used secondary data collected from the official OECD reports based on the financial reports

of the Central Banks of OECD countries, specifically Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, USA, Italy, Japan, Finland, Australia, New Zealand, Mexico, Czech Republic, Hungary, South Korea, Poland, Slovakia, Chile, Estonia, Israel, Slovenia, Latvia, Lithuania and Jordan, covering a period of 14 years (2005-2018).

The data was analysed using econometric models, specifically 4 tests, which are: Fixed effect regression, random effect regression, Hausman- Taylor estimation and Arellano- Bond estimation, to assess the impact of II on GDP, namely the Palma ratio and UE to GDP. Moreover, we carried out linear trend analysis and multiple linear regression analysis to determine the correlation between the dependent variable - GDP and the independent variables -UE, II and PR. Later, in the discussion, we carried out a comparison of the results. To do this, we used the STATA econometric application and MS Excel.

Dependent variable:

GDP (US Dollar per Capita): as mentioned by Selmonaj & Morina (2021), is the total of all value-added, created in an economy. Value-added means the value of goods and services that are produced minus the value of goods and services needed to produce them, the so-called intermediate consumption.

Independent variables:

Income inequality(II) (Palma ratio) - refers to the degree to which income is distributed unequally among a population. The less equal the distribution, the higher the II. (FOCUS-ECONOMICS).

Unemployment-(UE) (% of the labour force) - is a term that refers to individuals who are employable and who constantly try to find a job, but are not able to do so.

Poverty rate (PR) (persons 18 - 65 years old) - is a measure of absolute poverty, i.e. follows the prevalence of need over an unchanging criterion.

Econometric model:

$$Y\ (_{GDP}) = \beta_o + \beta_1 X_1\ (_{Income\ Inequality}) + \beta_2 X_2\ (_{Unemployment}) + \beta_3 X_3\ (_{Poverty\ Rate}) + \varepsilon$$

GDP is the dependent variable while II, UE and PR are independent variables; others refer to the term stochastic, while β_1, β_2 and β_3 represent the coefficients of the model.

Research Question (RQ): What effect do II, UE and the PR have on GDP in OECD countries?

H_0: II, UE and PR do not affect GDP in OECD member countries

H_{1a}: II affects GDP in OECD member countries

H_{1b}: UE affects GDP in OECD member countries

H_{1c}: PR affects GDP in OECD member countries

4. ANALYSIS OF LINEAR TRENDS

The following table presents the average data on the trends of the respective factors included in this study for 37 OECD countries. Variables for a period of 14 years (2005-2018) are included in this analysis. GDP is expressed in "dollars per capita", II is expressed as "Palma ratio", UE is expressed in "labour force percentage" that can work and are searching for a job, and the PR is expressed in the number of persons aged 18 to 65.

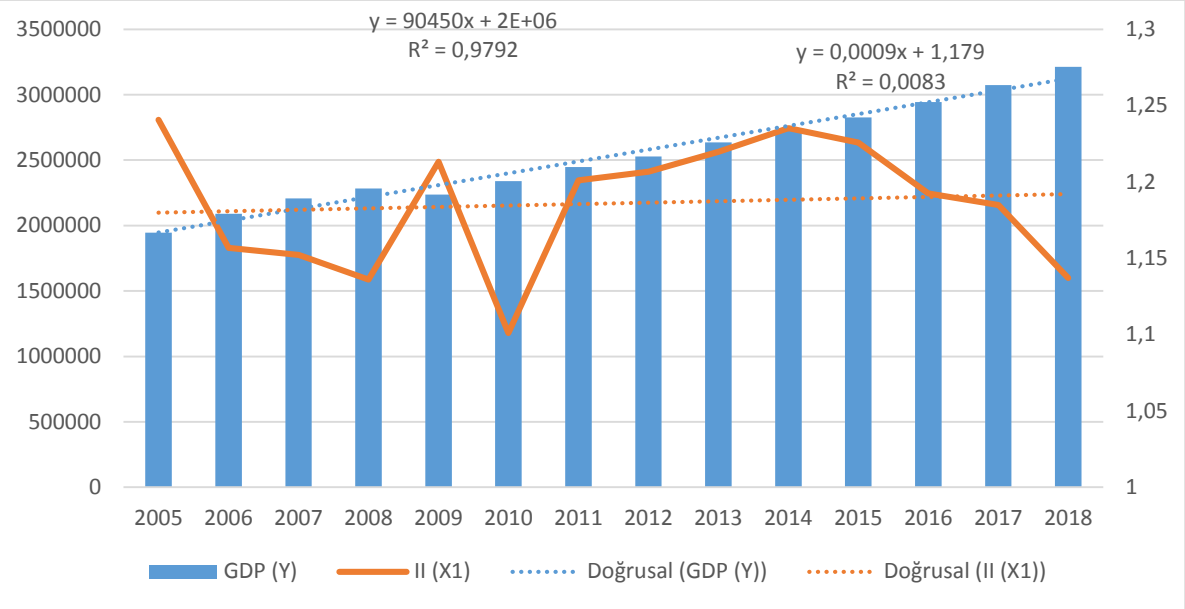
Table 1. Variables included in linear trends

Years	GDP (Y) [US Dollar/Capita]	II (X1) [Palma Ratio]	UE (X2) [% of labour force]	PR (X3) [persons 18-65 years old]
2005	1946791,39	1,240714	7,431636	0,096786
2006	2090777,37	1,156875	6,669839	0,089
2007	2208531,52	1,152222	5,929715	0,090611
2008	2282762,71	1,136	6,045037	0,09115
2009	2238185,22	1,213333	8,587184	0,100905
2010	2340171,89	1,101053	9,23747	0,097947
2011	2447313,53	1,201154	8,880649	0,101577
2012	2527632,39	1,206667	9,187059	0,103966
2013	2634568,49	1,219643	9,206985	0,105517
2014	2730016,59	1,235161	8,693706	0,106935
2015	2827286,99	1,225806	8,078789	0,109781
2016	2944170,75	1,192581	7,485867	0,103679
2017	3074678,42	1,184828	6,739038	0,102536
2018	3214223,18	1,137143	6,05803	0,100636

Source: Authors' calculations (2021)

For the respective year, the average of the variables is determined for all OECD member countries. Although for various countries, mainly Colombia as the newest member of the OECD, there was a lack of data. But this did not have much effect on the results.

Figure 1. An average linear trend between GDP and income inequality for OECD countries (2005-2018



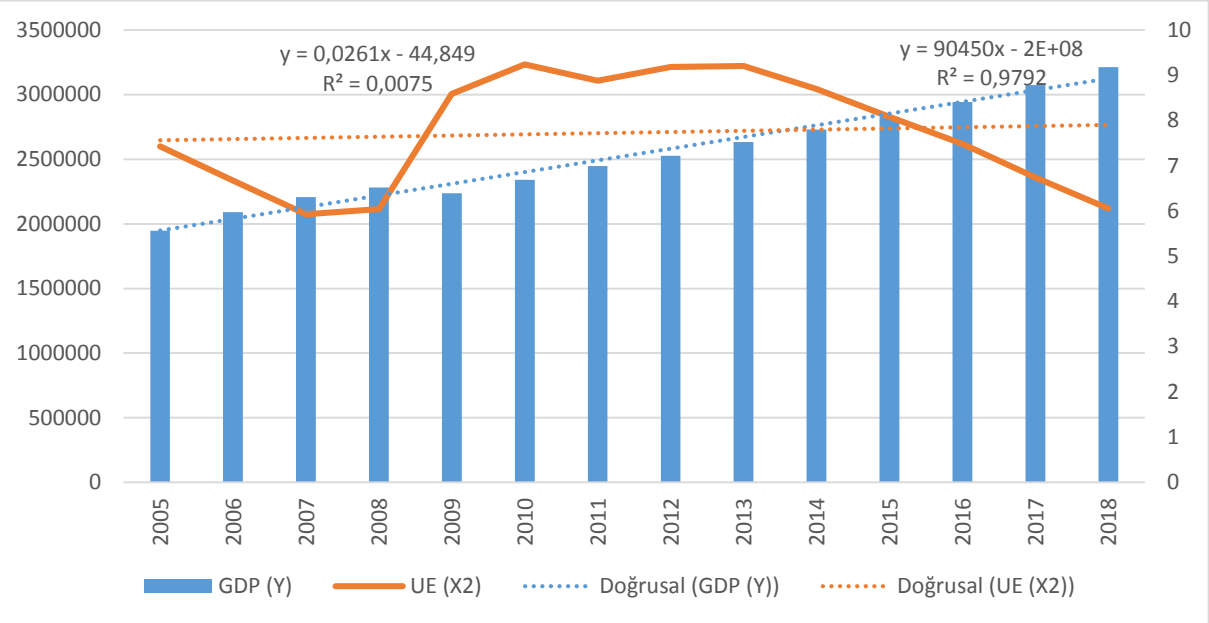
Source: Author Data Calculation in Microsoft Excel (2021)

From the data presented in Figure 1, we can conclude that for the period analysed 2005-2018, there is an average linear upward trend for the variable "II". Also, the average value of the common linear trend is increasing for both variables, GDP and II, which means that for the period analysed in the OECD countries,we have an increase in II and this has had a positive impact on the GDP.

It can be noted that from 2009 to 2010, there was a sharp decline in II (Palma ratio: from 1.2133 to 1.1010), which did not last long and there was a significant increase from 2010 to 2011. One of the reasons for the decline in II was the overcoming of the global economic crisis during the period 2008 to 2009.

According to Cingano (2014), the 1990s and early 2000s witnessed a growing gap between rich and poor in some of the already highly II countries, such as Israel and the United States, and for the first time, in traditionally low II countries, such as Germany and the Nordic countries.

Figure 2. An average linear trend between GDP and unemployment for OECD countries (2005-2018)



Source: Author Data Calculation in Microsoft Excel (2021)

From Figure 2, we can conclude that there is an average linear increasing trend for the variable "UE" during the period analysed (2005 to 2018). As we mentioned above, the global financial crisis has had a significant effect. However, UE is not affected by only one factor. Thus, according to Amadeo (2020), another cause of UE is when there are fewer jobs than job applicants. When this happens during the business cycle recession phase, it is called cyclical UE. Low consumer demand creates cyclical UE; therefore, companies lose profitability when demand falls, which results in large-scale UE. Examples include the financial crisis of 2008 and the Great Depression of 1929.

One of the main causes of rising UE immediately after the end of the recession period 2007 to 2009 was part-time employment. Part-time work creates the space that individuals who are in such work, do not have the opportunity and willingness to pay certain obligations that they have as citizens of a country. In addition to this effect or other economic symptom is the reduction of the welfare of the citizen, which also increases the possibility for the latter to find other ways to secure their existence, legally.

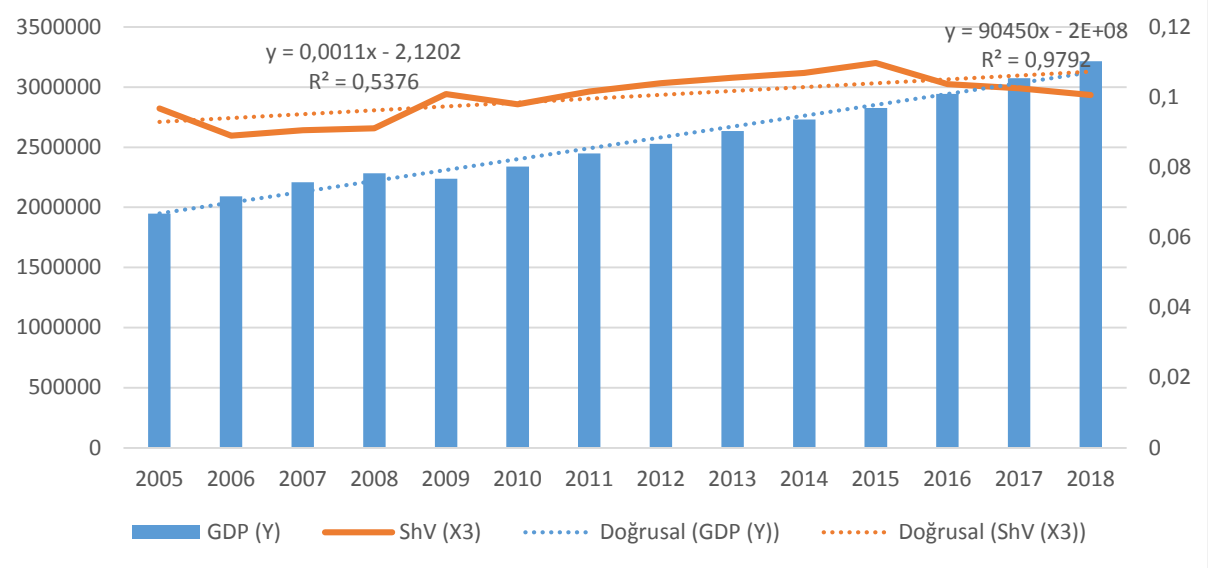
From Figure 3, we can conclude that we have an average linear upward trend for the variable “PR” for the period analysed (2005 to 2018). We note that during the period 2009 to 2010, there was a decrease in the PR coupled with an increase during the years 2010 to 2015.

The PR is directly related to the UE variable. This is because we know that employment

and income security increase the well-being of the individual, i.e. the family and respectively the society in general.

According to the OECD (2009) report, there is a considerable diversity of poverty levels across countries. Poverty levels are 17% or more in Mexico, Turkey and the United States, but below 6% in the Czech Republic, Denmark and Sweden. On average, in OECD countries, the average income of poor people is 29% lower than the average income (poverty gap), with the largest gaps in Mexico, Switzerland and the United States, and the lowest in Belgium. , Luxembourg, Finland and the Netherlands.

Figure 3. An average linear trend between GDP and poverty rate for OECD countries (2005-2018)



Source: Calculating Author Data in Microsoft Excel (2021)

5. ECONOMETRIC ANALYSIS AND STUDY FINDINGS

In this section, we analyse the data for the dependent variable and the independent variable, of the one-factorial and multi-factorial model in this study, and then through linear trends and econometric models, we perform a comparative analysis between these models.

Table 2. Descriptive statistics for the variables included in the econometric model

Variables	Obs.	Mean	Std.Deviation	Minimum	Maximum
GDP	518	1302384	2752178	11075	2.06e+07
II	344	1.184244	.3318383	.7	2.85
UE	511	7.759295	4.087673	2.27	27.49
PR	337	.101632	.0303188	.045	.165

Source: Data processing by the author in the STATA program (2021)

Table 2 shows the descriptive statistics of the variables included in our econometric model. Table 3 presents the Pearson correlation between the dependent variable GDP and the independent variables: II, UE and poverty rate (PR):

Table 3. Correlation analysis for the variables included in the econometric model

Variables	GDP	II	UE	PR
GDP	1.0000			
II	0.2866	1.0000		
UE	-0.1046	0.0955	1.0000	
PR	0.2873	0.7243	0.3995	1.0000

Source: Data processing by the author in the STATA program (2021)

Table 3 shows that all the variables included in the econometric model are correlated with each other. GDP has a positive correlation with II and PR, while with UE there is a negative correlation, which means that an increase in II increases the value of GDP.

We notice that (II) has a positive weak Pearson correlation with (UE) (R = 0.0955), but the Pearson correlation between II and PR is positive and strong (R = 0.7243). Meanwhile, UE has a positive Pearson correlation with PR (R = 0.3995). Therefore, the following econometric model results for the hypothesis of this study:

$$\boldsymbol{GDP_{it} = \beta_0 + \beta_1 II_{it} + \beta_2 UE_{it} + \beta_3 PR_{it} + \gamma_{it}}$$

5.1. Fixed Effect

Table 4 presents the results of the fixed effect regression model:

Table 4. Fixed effect regression model for the variables included in the econometric model

GDP	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
PEA	-553816.8	153418.7	-3.61	0.000	-855755	-251878.7
PP	-19480.74	4454.922	-4.37	0.000	-28248.32	-10713.16
ShV	6319024	1454776	4.34	0.000	3455929	9182118
Const.	1233884	175801.5	7.02	0.000	887895.4	1579873

Source: Data processing by the author in the STATA program (2021)

The resultant equation for the fixed effect regression test with statistically significant relationships (P-value <0.05):

$$\boldsymbol{GDP_{it}} = 1233884 - 553816.8 \times \boldsymbol{II_{it}} - 19480.74 \times \boldsymbol{UE_{it}} + 6319024 \times \boldsymbol{PR_{it}} + \boldsymbol{\gamma_{it}}$$

β_0 - if II, UE and poverty rate are constant (X_1, X_2, X_3 = 0), then GDP will be 1233884 units (P- value <0.05).

β_1 - if II increases by one unit, then GDP will decrease by 553816.8 units. (P-value <0.05).

β_2 - if UE increases by one unit, then GDP will decrease by 19480.74 units (P-value <0.05).

β_3 - if the poverty rate increases by one unit, then GDP will increase by 6319024 units (P-value <0.05).

From the above results, we see that II has a negative effect, although II refers to the Palma Ratio and not the Gini Index. This corroborates findings by authors, such as Cobham and Sumner. On the other hand, this contradicts Lederman(2015), who noted that on average, an increase of 1 percentage point in the Gini Index will reduce GDP per capita by about 1.1% over five years and that the long-term (cumulative) effect amounts to about -4.5%.

5.2. Random Effect

Table 5 shows the results of the regression model with random effect:

Table 5. Random effect regression model for the variables included in the econometric model

GDP	Coef.	Std. Err.	z	P>|z |	[95% Conf.	Interval]
II	-529895.9	153604	-3.45	0.001	-830954.2	-228837.6
UE	-19896.13	4481.312	-4.44	0.000	-28679.34	-11112.92
PR	6487320	1462164	4.44	0.000	3621531	9353109
Const.	1565853	519145.5	3.02	0.003	548346	2583359

Source: Data processing by the author in the STATA program (2021)

The resultant equation for random effect regression test with statistically significant relationships (P-value <0.05):

$$\boldsymbol{GDP_{it}} = 1565853 - 529895.9 \times \boldsymbol{II_{it}} - 19896.13 \times \boldsymbol{UE_{it}} + 6487320 \times \boldsymbol{PR_{it}} + \boldsymbol{\gamma_{it}}$$

β_0 - if II, UE and poverty rate are constant (X_1, X_2, X_3 = 0), then GDP will be 1565853 units (P- value <0.05).

β_1 - if II increases per unit, then GDP will decrease by 529895.9 units (P-value <0.05).

β_2 - if UE increases by one unit, then GDP will decrease by 19896.13 units (P-value <0.05).

β_3 - if the poverty rate increases by one unit, then GDP will increase by 6487320 units (P-value <0.05).

We note that as in the model with the fixed effect, in the model with random effect, II and UE have a negative effect on GDP, while PR, in this case, seems to have a positive effect on GDP growth (however, it should be borne in mind that the countries being analysed are OECD countries, and as such the poverty rate is not as high compared to other countries not included in this study).

5.3. Hausman-Taylor Test

Table 6 shows the results of the Hausman-Taylor regression test:

Table 6. Hausman-Taylor regression estimation model for the variables included in the econometric model

GDP	Coef.	Std. Err.	z	P>|z |	[95% Conf.	Interval]
TVexogenous						
UE	-19785.05	4494.432	-4.40	0.000	-28593.97	-10976.12
PR	6412852	1467301	4.37	0.000	3536995	9288709
TV endogenous						
II	-543561.1	154782.3	-3.51	0.000	-846928.8	-240193.4
TI exogenous						
Kodi	9935.353	48397.11	0.21	0.837	-84921.24	104792
Const.	1405068	1031960	1.36	0.173	-617536.9	3427673

Source: Data processing by the author in the STATA program (2021)

The resultant equation for regression test:

$$\boldsymbol{GDP_{it}} = 1405068 - 543561.1 \times \boldsymbol{II_{it}} - 19785.05 \times \boldsymbol{UE_{it}} + 6412852 \times \boldsymbol{PR_{it}} + \boldsymbol{\gamma_{it}}$$

β_0 - if II, UE and the poverty rate are constant (X_1, X_2, X_3 = 0), then GDP will be 1405068 units. This result is not statistically significant since the P-value is 0.173> 0.05.

β_1 - if II increases per unit, then GDP will decrease by 543561.1 units. This result is statistically significant since the P-value < 0.05.

β_2 - if UE increases by one unit, then GDP will decrease by 19785.05 units. This result is statistically significant since the P-value < 0.05.

β_3 - if the poverty rate increases by one unit, then GDP will increase by 6412852 units. This result is statistically significant since the P-value < 0.05.

We must first consider what the endogenous and exogenous variables are. An endogenous variable, according to Kenton (2020), is one that is altered or determined by the correlation with other variables within the model. In other words, an endogenous variable has the same meaning as a dependent variable, meaning that it relates to other factors within the topic under study. Endogenous variables are the opposite of exogenous variables, which are independent variables or external forces.

5.4. GMM – Arellano-Bond Estimation

Table 7 shows the results of the Arellano-Bond model regression test:

Table 7. Arellano-Bond dynamic panel-data regression estimation for the variables included in the econometric model

GDP	Coef.	Std. Err.	z	P>|z |	[95% Conf.	Interval]
GDP						
L1.	.8423925	.0656274	12.84	0.000	.7137652	.9710199
L2.	-.0518541	.0830458	-0.62	0.532	-.2146208	.1109126
L3.	.2545729	.0650573	3.91	0.000	.127063	.3820829
II	-543561.1	154782.3	-3.51	0.000	-846928.8	-240193.4
UE	-159845.9	50544.92	-3.16	0.002	-258912.1	-60779.63
PR	9935.353	48397.11	0.21	0.837	-84921.24	104792
Kodi	1304662	405163.3	3.22	0.001	510556.8	2098768
Const.	0					

Source: Data processing by the author in the STATA program (2021)

Based on the results shown in Table 7, where we have included the time delay variables (L1, L2 and L3), we see that across the years the main independent variables have been affected by the main variable of previous years.

L1: If II in 2017 increases by 1 unit, then GDP in the current year (2018) will increase by 0.8423925 units. This result is statistically significant since the P-value < 0.05.

L2: If II in 2016 increases by 1 unit, then GDP in the current year (2018), will decrease by 0.0518541 units. This result is statistically significant since the P-value < 0.05.

L3: If II in 2015 increases by 1 unit, then GDP in the current year (2018) will increase by 0.2545729 units. This result is statistically significant since the P-value < 0.05.

We note that as II increases by 1 unit, then GDP decreases by 543561.1 units in the same year. For the other 2 variables, we see that in UE, if UE increases by 1 unit, then GDP will decrease by 159845.9 units. While for the PR, we notice that with an increase of the PR by 1 unit, the GDP will increase by 9935.353 units. All these results are statistically significant since the P-value < 0.05.

In econometrics, the Arellano-Bond estimator is a generalized moment estimator method used to evaluate dynamic panel data models. This model shows an indication that II in (2017) and II in (2015) have an impact on GDP in (2018), while this cannot be said about the inequality of revenue for the year (2016). It is understandable that II has an impact and causes a chain effect on other variables.

A high level of II can manifest in various forms, so for example if one part of the income

is attributed too much to a geographical part of a country, then the other neglected part will show up in various forms which may then affect the country's economy.

This type of inequality can show "economic symptoms" if we consider inequality conditionally as a disease. UE will increase, individual expenditures will increase, and in parallel, the poverty rate will increase. The latter differs from country to country and as such shows its dark side more to poor countries.

6. DISCUSSION

The 4 tests executed, are significant at the 95% level. Data from the US show that high II reduces GDP, and conversely, this effect is persistent, implying that increasing II has a long-term negative effect on GDP.

Our findings corroborate with findings by Malinen (2015), who notes that II can manifest its effects differently in poor countries and rich countries. Although more research is needed, the available empirical evidence shows that II has a negative effect on GDP in affluent economies. When people talk about II, they should keep in mind that, while inequality has increased in rich countries over the past 30 years, global poverty has declined radically over the same period. UE also stems from inequality in the market.

In addition, our findings corroborate with the results of Jain (2014), who believes that, in nine European Union countries, approximately 75% of teachers who responded to a study, reported that recent graduates are qualified to meet the needs of prospective employers, although approximately 45% of employers reported that candidates do not possess the required skills.

Moreover, our results agree with those of Pettinger (2016), who noted that in the UK, relative poverty is defined as income that is 50% less than average income. Therefore, an increase in GDP and average income will cause a change in what constitutes relative poverty.

7. CONCLUSIONS AND RECOMMENDATIONS

Since our results coincide with the results of the above authors, they explain and confirm that our statements from the results of the 4 tests performed are based on economic theory and as such is representative and can serve as reference material for works of other authors. The process of analysing the correlation between II and GDP for the period 2005 to 2018 clarified that there are many potential issues related to such an analysis and that these problems are magnified when an international comparison is carried out.

During the period analysed, we see a negative correlation between II and GDP for OECD countries. In addition, we find that the most sensitive period was that of the global economic crisis of 2008-2009 when II, PR and UE showed a rapid rise in their values.

Moreover, while interpreting these results, we need to understand that there are also different approaches and meanings to poverty. Some see the poor as virtuous, just, independent, honest, secure, good, simple and happy, while others see them as evil, violent and criminal. Meaning it is a matter of a point of view and perception (Oscar, 1998).

However, if we try to explain the effect of II on GDP, the best approach is to use the analogy with the human body. If we exercise the muscles in every part of the body, then, of course, we will feel better. This is the same for where the income is not evenly distributed. We need to exercise all the factors that influence income distribution. This is because it affects policymakers’ decisions to increase public expenditures, reduce the labour force andincrease imports. It also affects the trust in the government of the country, as well as the differentiation and economic discrimination of the countries from each other.

One form, in which II could be addressed indirectly, would be the definition and proper functioning of the taxation models. Economic II is influenced by policies that provide public goods, such as health care and education. Another seemingly simpler form would be reducing incomes for the richest and increasing them for the poor. However, such a thing is not easy to accomplish. The most understandable and feasible way would be employment. Employment, in this case, includes strengthening collective bargaining rights, full-time employment schemes, living wage policies, stronger minimum wage lawsand wage subsidies.

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