ANALYSIS OF THE RELATIONSHIP BETWEEN GROSS DOMESTIC PRODUCT, FOREIGN DIRECT INVESTMENTS AND INCOME INEQUALITY IN ROMANIA OVER THE PERIOD 1990-2020

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Abstract: The present study aims to confirm the existence of a non-linear association between economic growth, foreign direct investment (FDI) and income inequality in Romania, over the period of 1990 to 2020. Romania's macroeconomic output expressed through the Gross Domestic Product per capita has registered a continuous growth trend in the analysed period of time. Income distribution expressed through the GINI index registered also an ascending trend dynamic, while foreign direct investment showed an oscillating evolution. Using the Ordinary Least Square (OLS) method to estimate the impact of FDI and economic growth on income inequality we revealed that the relationship between FDI and income inequality is non-linear, namely quadratic. In the estimated regression equation the sign of FDI squared coefficient is negative, confirming the existence of a U-inverted curve. This suggests that the income gap grows in a first stage, until a threshold in economy is achieved. After this maximum, the income gap could follow a decreasing trend with increasing values of FDI. We found also that economic growth expressed by the dynamics of GDP per capita contributed to the extension of income inequality in Romania for 1990 to 2020. The non-linear model is statistically validated; tests for heteroskedasticity, autocorrelation and normal distribution of errors are performed. Policy implications in the specific case of the Romanian economy are also included, as follows: fiscal measures for supporting FDI inflows, effective channels enabling FDI to have effects on reducing income inequality, increase of FDI absorptive capacity and directing FDI to specific economic sectors.

Keywords: *income inequality, economic growth, foreign direct investment, GDP per capita*

JEL CODES: *O15, O47, F20, E01, B23*

1. Introduction

Economic growth and foreign direct investment have gained momentum both academically and worldwide, being intensively studied and debated in the economic literature in recent years, following the conclusions of various studies showing that the phenomenon of economic growth is influenced by investment. More specifically, favourable investment outcomes are becoming the key driver of

economic development strategy, but also they contributed to the increase of income gap, mainly in developing economies. Scientists have shown a strong interest in analyzing the relationship between foreign direct investment (FDI), economic growth (GDP) and income inequality.

The present paper aims to analyze the relationship between economic growth, foreign direct investment and income distribution in the Romanian economy over the period 1990-2020, based on data series extracted from the World Bank Database and Standardized World Income Inequality Database. In this study we aim to test the hypothesis that the dependence between foreign direct investment and income inequality is non-linear.

The rest of the paper is organised as follows: Section 2 presents theoretical background, which motivates our empirical analysis. Section 3 exposes the dynamic of GDP per capita, Foreign Direct investment (FDI) and Gini Index in Romania over the period 1990 to 2020, Section 4 introduces the methodology, describes the data and presents the main results, while Section 5 summarises the findings and concludes.

2. Theoretical background

According to recent literature, the effect of economic growth on inequality varies; it could be positive as some authors argue (i.e., Lundberg and Squire, 2003; Rubin and Segal, 2015; Wahiba and El Weriemmi, 2014), or negative (i.e., Nissim, 2007), or mixed (Chambers, 2010; Huang, Fang, Miller, and Yeh, 2015) due to different model specifications, different data sets, and different estimation methods. Long-term effects may differ from short-term effects. By adopting the semi-parametric method, it has been found that economic growth increases income inequality for all countries in the short and medium term. In terms of long-run effect, economic growth reduces inequalities in developing countries, but has the opposite effect in developed countries.

On the other hand, the impact of economic growth on income inequality is inconsistent, as various determinants are included in the model. Thus, taking the trade openness and human capital as determinants of inequality, Wahiba and El Weriemmi (2014) showed that in Tunisia, economic growth is positively associated with inequality. Moreover, trade openness has a rising effect on income inequality while human capital a positive one. On the contrary, considering growth volatility and human capital as determinants of inequality, Binatli, (2012) found that growth has a negative impact on income inequality. At the same time, he found that higher growth volatility could decrease income inequality all the time, but the magnitude of the effect of growth diminishes over time.

In his work, Kuznets (1955) expressed his interest on the relationship between the level of economic development (i.e. the economic growth rate) and the measures of inequality. Kuznets argued that the relationship between a country's level of development and its income inequality could be described by a U-inverted curve.

He explained this relationship in terms of the "dynamics of the dual economy", associated with the structural transformation in the economy, from an agricultural to an industrial one. Kuznets' proposal stimulated an extensive literature examining the relationship between income inequality and growth and / or economic development. Many of these studies used regressions models of growth rates in terms of inequality measures and other control variables, the results being generally inconclusive. For example, Anand and Kanbur (1993), Persson and Tabellini (1994), Perotti (1996), and others believe that inequality has a negative effect on growth. Various explanations have been given for this, including: the consequences of political economy inequality, the negative impact of inequality on education but also the imperfections of the capital market and credit constraints.

FDI is found in several studies as an important capital inflow in developing countries. A distinct group of studies investigates the impact of FDI on income inequality. The results are mixed. A group of them reports a positive effect on income inequality. For example, in the case of Chinese economy, FDI had a beneficial effect on regional income inequality (Zhang and Zhang, 2003). Similar findings are revealed by Pan-Long (1995) for Eastern and South Asian countries and by Lee (2006) for 14 European countries for the period of 1951-1992, as well as by Herzer et al. (2014) in 23 Latin America countries.

The other group of studies show a negative effect on income distribution, meaning the reduction of income inequality with FDI. In the case of Mexican economy it was reported that FDI increased the income gap due to the higher demand for skilled labour (Feenstra and Hanson, 1997). Wu and Hsu (2012) revealed that FDI is harmful for income distribution of the host countries with low absorptive capacity. Song et al. (2021) also found that FDI inflow raises income inequality in a sample of 20 developing economies over 1980 to 2016.

Herzer et al. (2014) reported a positive effect of FDI inward stock on income inequality among households in Latin American economies.

In the case of sub-Saharan African economies, Xu et al. (2021) found that FDI and income have a negative, statisticaly significant relationship with income inequality over the period of 2000 to 2015.

Chintrakarn et al. (2011) reported a similar robust and negative effect of FDI on income inequality in the United Sates.

As a result of a meta-analysis on the effect of FDI on inequality using 543 empirical studies from 1995 to 2019, Huang et al. (2020) revealed that FDI is associated with higher inequality in low-income countries and higher income inequality in developed economies.

3. Dynamics of GDP, FDI and income distribution in Romania in the period 1990-2020

In this chapter we will analyze the evolution of economic growth, income distribution and foreign direct investment in Romania over the period 1990 to 2020.
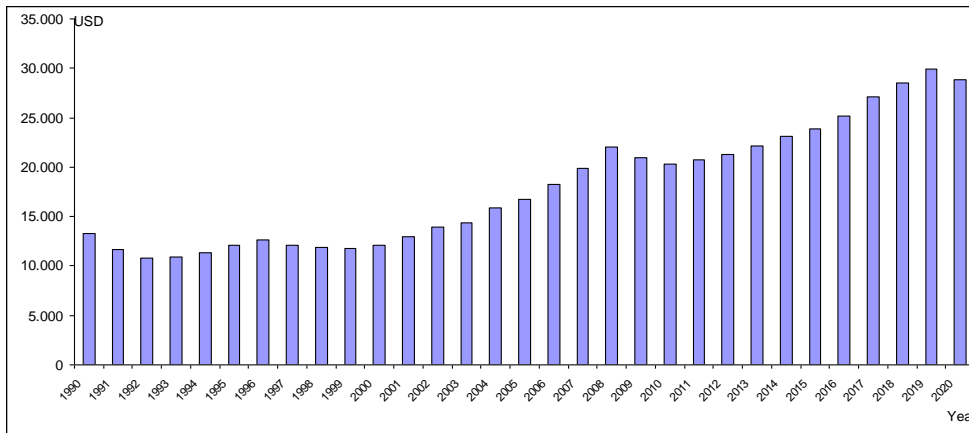
Figure 1: Evolution of GDP per capita in Romania (1990-2020) (PPP, 2007 international constant USD)
Source: World Bank Data, 2022

GDP per capita registered an increasing trend in the considered period (1990-2022) from USD 13.302,463 USD in 1990 to 28.828,112 USD in 2020. The revolution of 1989 brought many changes in the Romanian society. As a result, after the fall of the communist regime, there is a decrease of GDP per capita until 1992 to 10.757,384 USD, followed by an increase until 1996 to 12.627,194 USD. Another decline is registered in 1999 to 11.803,368 USD.After a period of massive legislative framework and institutional changes, in 2000 the economic situation became more stable, the FDI inflows were stimulated (Dragoescu, 2015). After 1999, GDP per capita increases to 22.044,292 USD in 2008, followed by a downward trend in 2009-2010 under the effect of the global financial and economic crisis. In the period of 2009-2020, GDP per capita has an ascending trend, the highest value is reached in 2019 (29.875,063 USD) (Figure 1).
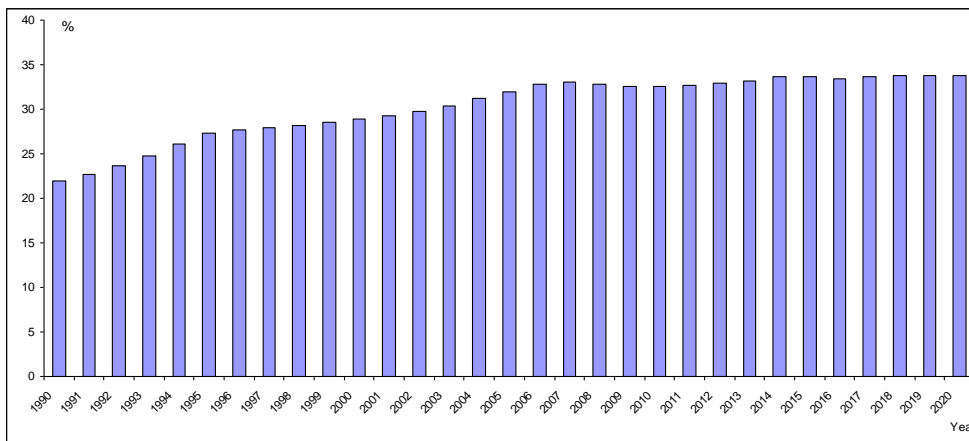

Figure 2: Gini Coefficient of income distribution in Romania (1990- 2020)
Source: Standardized World Income Inequality Database, 2022

The Romanian population is extremely vulnerable to income inequality and Romania is placed on the top positions within the European Union in this regard. This is a serious concern, given both the negative developments of recent years and the close relationship between income inequality and relative poverty (Militaru and Stanila, 2015). Unfortunately, in Romania, poverty remained a pressing social and economic problem, despite the positive economic development over the examined period of time. The Gini Coefficient shows an upward trend for the period under analysis, from 22 in 1990 to 33.8 in 2020. A considerable increase is recorded over the period of 1990 to 2007, when reaches the value of 33 (Figure 2). In terms of the poverty risk in Romania, the most vulnerable are children, young people, families with dependent children (especially those with 3 or more children), single people with and without dependent children, the unemployed, employed in agriculture and low-skilled workers. In addition, the poorest people live in a fairly large proportion in rural areas (Precupețu, 2013).

As regards to the equivalent average income, in 2010 Romania was on the last position among the EU countries, the median income being 10 times lower than in developed countries. At the same time, the risk-of-poverty rateby poverty line shows the same upward trend. Also, data on employment (as a percentage change compared to the previous period) recorded negative values. From 2007 to 2020, the Gini coefficient has many fluctuations. From 33 in 2007, it increases until 2015 reaching the value of 33.6 and the year 2016 indicates a slight decrease to 33.4 and will increase again until 2020 when it registers the value of 33.8 (Figure 2). This situation is influenced by the gradual decrease in the participation rate in education and training from 1.6 percent in 2011 to 0.9 percent in 2018. In fact, the unemployment rate in 2020 is increasing due to the impact of the emergence of the new Coronavirus which has created insecurity and economic crisis.
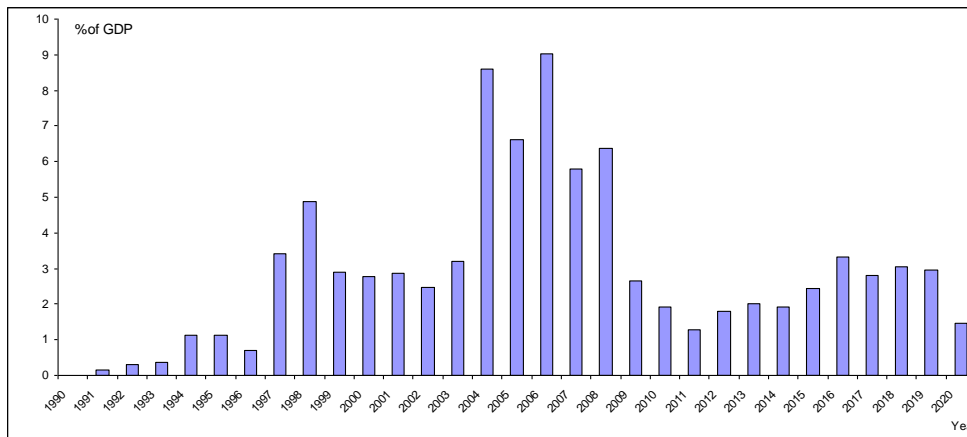

Figure 3: Evolution of Foreign Direct Investment (% of GDP) in Romania (1990-2020)
Source: World Bank Data, 2022

Over the examined period of time, FDI shows an oscillating evolution. Since 1991, it has risen from 0.138% of GDP in 1998 to 4.871% of GDP. Romania's opening for FDI begins in the 2000s - the years of major privatizations, so that later foreign investments will be encouraged by a good course of the Romanian economy and a favourable external environment, outlined by the EU accession forecasts and the beginning of a period of global expansion. The highest shares are recorded in 2004 at 8.594% of GDP and 2006 at 9.02% of GDP. The period 2003-2008 is the period of expansion of FDI in Romania. After Romania became member of the European Union in 2007, borders could no longer be considered a barrier and thus, workers, companies and capital could enter and leave freely. Considering some of the characteristics of the Romanian development regions, the accession to the EU could be considered a factor with a significant impact on the process of locating the Foreign Direct Investments in Romania. However, after 2008 from 6.377% of GDP, however, Romania loses its attractiveness for foreign investors, as a result of the effects of the global financial crisis, reaching 1.293% of GDP in 2011. FDI flows are falling sharply and are almost three times lower in 2008 than a year ago. This situation is exacerbated by a series of national economic and political turmoil, so that FDI flows in 2015 fail to exceed the 2004 volume. This is reflected in the level of FDI stocks: Romania has the lowest volume of FDI stocks per capita and in relation to GDP at the end of 2015 compared to the countries in the region (Bulgaria, Czech Republic, Poland and Hungary). Simply put, we have the lowest performance in attracting FDI, although we have a consistent set of attractive factors for FDI (such as a strategic geographic position, a large market, and low labour costs) that should have helped us. From 2018, there will be another decrease from 3.041% of GDP to 1.448% of GDP in 2020, because foreign investors withdrew money from the Romanian investment market. The impact of the emergence of the new Coronavirus worldwide had an impact on the entire world economy, and this was also reflected in foreign direct investment, so foreign investors withdrew from the Romanian investment market -1412.32 million Euros, this being the highest investment value withdrawn from the market from 2013 to 2020, because the insecurity and economic crisis created by the Coronavirus created uncertainty and uncertainty worldwide because any prediction was no longer valid.

4. The impact of FDI and GDP per capita on income inequality in Romania
In order to examine the impact of Foreign Direct Investment (FDI) and income (GDP per capita) on income distribution (expressed by GINI), the following regression equation will be used:

$$GINI_i = \alpha + \beta_1 \cdot FDI_i + \beta_2 \cdot FDI_i^2 + \beta_3 \cdot \ln GDPpc_i + \varepsilon \qquad (1)$$

where: i denotes time, $GINI_i$ represents the GINI coefficient for income distribution in the year i, FDI_i express the net inflow of foreign direct investment in the year i and FDI_i^2 denotes its square, $GDPpc_i$ express the Gross Domestic Product per capita in the year i, α is a constant, β_1 β_2 β_3 are regression coefficients and ε is the

error. We use ln of GDP per capita in order to make interpretation in terms of elasticities, due to the fact that other variables are expressed in as percentages.

The use of this model is based on the findings of Figini and Görg (20011). In their study for a panel of 100 countries for the period 1980 to 2002 they found a nonlinear effect of foreign direct investment on wages inequality in developing countries: wages inequality increases with FDI inward flows and this effect is reduced with further increases of FDI.

In our estimation, using the Ordinary Least Squared method, we expect the sign of β_2 to be negative.

Time series of FDI, GDPper capita for 1990 to 2020 were extracted from the World Bank database while the values of GINI index are sourced from Standardized World Income Inequality Database.

Table 1

Descriptive statistics of considered variables

Variable	Description	Source	Mean	Standard Deviation
GINI	GINI Index of inequality in equivalized household disposable(post-tax, post-transfer) income	Standardized World Income Inequality Database (SWIID)	30.2774	3.5878
FDI	Foreign Direct Investment net Inflow as % of GDP	World Bank	2.9122	2.2933
lnGDP per capita	Gross Domestic Product per capita based on purchasing power parity (PPP) (constant 2017 international dollars)	World Bank	9.7467	0.3247

The results of estimation of equation 1 are exposed in Table 2.

Table 2

Estimation results

Dependent variable: GINI
Method: Least Squares
Sample: 1990 2020

Variable	Coefficient	Std.Error	t-statistic	Prob.
FDI	1.840078	0.350863	5.244433	0.0000
FDIsquared	-0.153753	0.038865	-3.956107	0.0005
lnGDPpc	7.825963	0.767514	10.19651	0.0000
C	-49.27245	7.320594	-6.730662	0.0000
R-squared	0.884583	Mean dependent var		30.27742
Adjusted R-squared	0.8711759	SD dependent var		3.587823
S.E.of regression	1.284827	Akaike info Criterion		3.459040

Sum squared resid	44.57109	Schwarz Criterion	3.644071
Log likelihood	-49.61512	Hannan-Quinn criterion	3.519355
F-statistic	68.97806	Durbin-Watson statistic	0.733881
Prob(F-Statistic)	0.0000		

Source: authors' own computation using E-views 12 software

The model is statistically validated for 1% significance, due to the value of Prob (F-statistic) that is 0.000. We notice the value of R-squared of 0.88 indicating that in a proportion of 88% the variation of GINI can be explained by FDI and lnGDPper capita. All coefficients of regressors as well as the intercept (C) are statistically validated for 1% significance. GDP per capita is correlated with the inequality growth: when GDP per capita increase with one percentage point the income inequality will increase with 7.8 units. Our assumption that the dependence between GINI and FDI is non-linear is confirmed due to the negative sign of FDI squared. It means that inequality increase with FDI growth until a threshold, after it inequality tends to decrease even the FDI will continue to grow. This is a confirmation of the U-inverted curve known as Kuznets curve (for income). In our case, we used FDI instead of income. Our results are in line with the conclusions of Figini and Görg (2011).

Table 3 a								**Table 3b**
Heteroskedasticity White Test				Breusch-Godfrey Serial Correlation Test				
Null hypothesis: homoskedasticity				Null Hypothesis: no serial correlation				
F-statistic	4.177082	Prob F (8.22)	0.0036	F-statistic	6.490529	Prob F (2.25)	0.0054	
Obs*Rsquared	18.69323	Prob Chisq	0.0166	Obs*Rsquared	10.59509	Prob Chisq	0.0050	
Scaled explained SS	11.90951	Prob Chisq	0.1553					

Source: authors' computation based using E-views software

We further test the hypotheses of heteroskedasticity, autocorrelation and normality of errors. We use the White test in order to check heteroskedasticity of errors (Table 3a). The null hypothesis of homoskedasticity is confirmed due to the value of Obs*R-squared $(18.69232) > \chi^2_{0.01;3}$ (11.34).

The Breusch-Godfrey Serial correlation test (Table 3b) shows that Obs*R-squared $(10.59509) < \chi^2_{0.01;3}$ (11.34). This indicates that the null hypothesis is accepted, the errors being not autocorrelated.
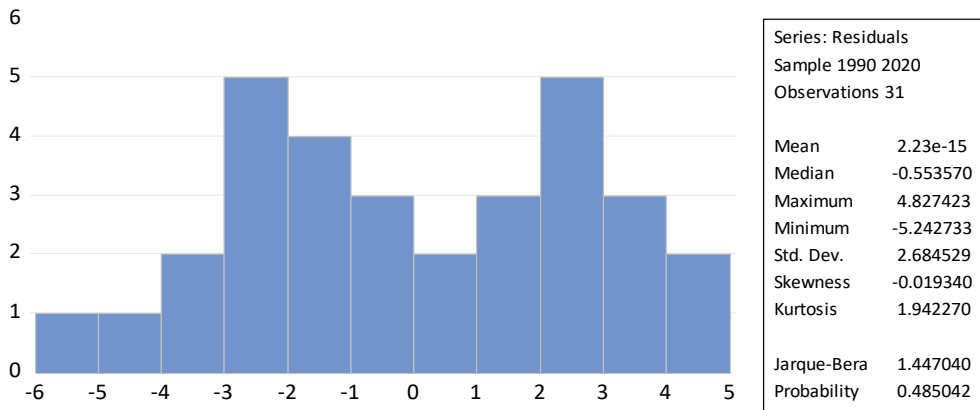
Series: Residuals	
Sample 1990 2020	
Observations 31	
Mean	2.23e-15
Median	-0.553570
Maximum	4.827423
Minimum	-5.242733
Std. Dev.	2.684529
Skewness	-0.019340
Kurtosis	1.942270
Jarque-Bera	1.447040
Probability	0.485042

Figure 4: **Jarque-Bera test**
Source: authors' computation based using E-views software
The Jarque-Bera test (Figure 4) indicates the normality of errors, the null hypothesis is accepted due to the fact that the value of this test (1.400144) is lower than $\chi^2_{0,05;3}$ (7.81), suggesting a normal distribution of errors.
After performing all these tests, we can conclude that our model is statistically validated.

4. Conclusions

The aim of the paper was to explore the impact of foreign direct investment and economic growth on income inequality in Romania. In a first step, we analysed the dynamic of net inflows of FDI and GDP per capita over the period 1990 to 2020. Within the second step, we revealed that the relationship between FDI and income inequality is non-linear, namely quadratic. The income gap was growing in a first stage in the Romanian economy until a threshold was achieved. After this maximum, the income gap followed a decreasing trend with increasing values of FDI. We found also that GDP per capita contributed to the extension of income inequality for 1990 to 2020.
Developing countries, as Romania, have been faced with severe international competition, trying to attract foreign direct investment (FDI), which would provide considerable financing capital to generate positive externalities. For example, one of the most tangible effects of FDI flow can be seen in higher employment rates with higher wages. Lee (2013) argued that FDI positively affects domestic economic activities through various factors, including technology transfer, unique effects, productivity gains, the introduction of new processes and managerial skills. As policy recommendations we can suggest the following directions: (1) to further support the increase of net inflow of foreign investment through fiscal measures (incentives for large foreign investors which create jobs); (2) developing the financial sectors required to sustained the operation of foreign and transnational corporations in Romania; (3) policies regarding efficient channels for economic

resources needed to optimize financial development to enable FDI to have a significant effect on reducing income inequality; (4) policies regarding human capital development, due to the fact that human capital is an important contributor to the absorptive capacity of FDI and (5) a national strategy for FDI attracting, with effective instruments for supporting and directing them to the specific economic sectors.

As further directions of the research, we intend to perform a deeper analysis of the channels through which the impact of FDI is visible on the income gap, with more sophisticated econometric methods and other income distribution coefficients.

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