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THE IMPACT OF FOREIGN DIRECT INVESTMENT ON SUSTAINABLE ECONOMIC GROWTH, RESPECTIVELY ON INEQUALITIES BETWEEN COUNTRIES

Mirela POPA
Babes-Bolyai University, Cluj-Napoca, Romania
mirela.popa@econ.ubbcluj.ro

Anuța BUIGA
Babes-Bolyai University, Cluj-Napoca, Romania
anuta.buiga@econ.ubbcluj.ro

Lavinia BECEA
Babes-Bolyai University, Cluj-Napoca, Romania
lavinia.becea@econ.ubbcluj.ro

Abstract
This study aims to examine the effects of FDI (foreign direct investment) on sustainable economic growth in 73 countries and to analyze the impact of FDI on inequalities between countries. The economic growth of a country is measured by the real gross domestic product per capita (GDPpc). The inequalities between countries are measured by the Sustainable Development Goals score, respectively the SDG10 score (reduced inequalities) and the SDG8 score (decent work and economic growth). The study shows that the statistically significant impact of exogenous variables on GDPpc or SDG10 score, differs from one group of countries to another, as follows: (1) in small countries (the size of the population), purchasing power index of exports (PPexp) negatively affects GDPpc, while productive capacities index and FDI inward positively affect GDPpc; (2) in large countries, PPexp (negatively) and GDP growth (positively) affect SDG10; (3) in developed countries, PPexp negatively affects GDPpc; (4) in developing countries Gross Fixed Capital Formation Inward (positively) and GDP growth (negatively) affect GDPpc. FDI inward and Gross Fixed Capital inward have negative impact on SDG10, while FDI outward and Gross Fixed Capital outward positively affect SDG10, only in developing countries; (5) in high-income countries, FDI positively affects GDPpc; (6) GDP growth has a positive and statistically significant impact on SDG10 only in upper-middle countries. The multiple regression coefficients that highlight the impact of exogenous variables on SDG8, do not highlight differences between high-income, upper-middle-income and lower-middle-income countries.
Keywords: Foreign direct investment, Gross domestic product per capita, Sustainable development goals, Productive capacities index, Purchasing power index of exports.
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1. INTRODUCTION

There are massive shortfalls of global justice, with hundreds of millions of people in the world living below the threshold of extreme poverty, and billions living not far above that threshold Laoghaire (2023). The literature suggests that global capitalism is dominated by a powerful small elite, the so-called Transnational Capitalist Class (TCC) and neo-liberalism, which becomes the taken-for-granted everyday language and culture, justifies state policies that result in a further class polarization between the rich and poor (Ngendakurio, 2021). The international investment is crucial to advance sustainable development, especially in developing countries; but not only facilitating more FDI, but sustainable FDI (Berger et al., 2018).

The present paper investigates the effects of FDI and Gross Fixed Capital Formation on sustainable economic growth in 73 countries and analyze the inequalities between countries. FDI offers significant advantages, principally because it provides the host country with a relatively more stable flow of funds, helps augment productive capacity, and increases employment and trade, generates positive knowledge externalities through labor training and skill acquisition, helps transfer technology and organisational knowhow, introduces new production processes, creates backward and forward linkages across sectors, and provides domestic firms with much-desired access to foreign markets (Iamsiraroj & Ulubaşoğlu, 2015). The economic growth of a country is measured by the real GDPpc. Generally, the real GDP is influenced by many macroeconomic indicators which have been featured under agriculture and rural development, climate change, economy and growth, education, energy and mining, environment, external debt, financial sector, public and private sectors, science and technology, and so on (world bank, 2022). Each of these categories has many indicating variables ranging from population, mortality rate, poverty headcount ratio, renewable energy consumption, central government debt, gross capital formation, labor force, inflation rate and unemployment rate. The inequalities between countries are measured by using the SDG10 score (reduced inequalities) and SDG8 score (decent work and economic growth).

The present paper has seven sections in its content. Section 2 shows the literature review. The data and the econometric model are presented in Section 3 and Section 4. The empirical results are analyzed and discussed in Section 5. The heterogeneity is presented in Section 6. Finally, a short section 7, with conclusions, is then provided.

2. LITERATURE REVIEW

This topic continues to be relevant because at the theoretical level it has been argued that FDI is growth enhancing but existing empirical studies do not appear to find a strong relationship between the two variables. The overall picture of the empirical evidence on the FDI-growth relationship is offered by

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Iamsiraroj and Ulubaşoğlu (2015) who report that, of the 108 empirical studies surveyed, 43% show a positive and significant effect, 17% a negative and significant effect, 26% a positive and insignificant effect and 14% a negative and statistically insignificant effect. The co-integration and causality analyses for the period of 2004-2016 revealed that the influence of FDI inflows on economic growth varied from country to country in EU transition economies (Bayar & Sasmaz, 2019).

International investment is crucial to advance sustainable development, especially in developing countries. Based on a panel data for 42 small states between 2005 and 2019, Forte & Neves (2021) concluded that FDI is crucial for sustainable development.

Izadi & Madirimov (2023) studied the potential effect of FDI on sustainable development in 78 Eurasian countries and revealed that there is a positive and significant effect of FDI on the SDG index. Unfortunately, the statistical analysis of international business involvement in environmentally harmful sectors/industries of the EU economy indicates that the share of such investments in most member states did not exceed 20% of the total FDI stocks between 2015 and 2020. The collapse of FDI in sectors important for SDGs (i.e., infrastructure, renewable energy, water supply and treatment, health, agriculture and food production, and education) makes these objectives more difficult to achieve, especially in developing countries (Witkowska, 2023).

FDI is a very important resource for developing countries in supporting economic growth but can exacerbate the inequality in income distribution in host countries. Using the data on 33 emerging economies between 1980-2019, Tung (2022) focused on testing the Kuznets curve hypothesis for the FDI-inequality nexus. The empirical results confirm the Kuznets inverted U-curve through the existence of a non-linear impact. The initial negative impact of FDI on inequality is inevitable, but policymakers need to persevere to pass a threshold, at which point the impact will begin to be positive.

Topalli et al. (2021) show that FDI has significantly contributed to poverty reduction after empirically examines the impact of FDI inflows on poverty in six Western Balkan countries during the period from 2002 to 2021. Using a sample of Chinese listed companies during 2010-2018, Sheng et al. (2022) show the positive effects of FDI on corporate sustainable development performance.

Covering the period 1990 to 2020, Liu et al.`s study (2022) suggests that the technological innovation, FDI and gross fixed capital formation are substantial factors of sustainable development. Chowdhury & Mavrotas (2006) studied the causal relationship between FDI and economic growth and found out that GDP causes FDI in the case of Chile and not vice versa, while for both Malaysia and Thailand, there is strong evidence of a bi-directional causality between the two variables. Banday et al. (2021) investigated the causal relationship between FDI and GDP in BRICS countries over the period of 1990–2018 and found out that FDI has a positive impact on long-term economic growth; there is a long-run relationship from gross capital formation to economic growth and a bidirectional causality from FDI to economic growth.

Sahu`s (2020) paper examines the effect of FDI inflows on host country's economic growth for a group of 45 developing countries for the period 1990-2014. The results suggest that FDI inflows on growth rate of GDPpc is higher in the emerging market economies as compared to the non-emerging market economies. The growth of GDP depends on many parameters such as the country's land area, geography, agriculture, technological progress and productivity, mineral resources, energy consumption, renewable sources, education, and human resources, purchasing power, exports of goods and services, financial power, administration, domestic and international political struggles, tourism, etc. Nath (2009) finds that FDI inflows do not have significant impact on GDPpc growth rate in 13 transition economies for the period 1991–2005, while trade and domestic investment have significant positive influence on economic growth. More than that, FDI has indirectly worsened poverty through international trade (Do et al., 2021).

3. DATA

The main objectives of this study are to examine the effects of FDI on sustainable economic growth in 73 countries and to analyze the inequalities between countries. FDI offers significant advantages, principally because it provides the host country with a relatively more stable flow of funds, helps augment productive capacity, and increases employment and trade, generates positive knowledge externalities through labor training and skill acquisition, helps transfer technology and organizational knowhow, introduces new production processes, creates backward and forward linkages across sectors, and provides domestic firms with much-desired access to foreign markets (Iamsiraroj & Ulubaşoğlu, 2015). For FDI we approached 2 directions: (a) FDI flows Inward (FDIin) and FDI flows Outward (FDIout), and (b) Percentage of Gross Fixed Capital Formation Inward (GFCin) and Percentage of Gross Fixed Capital Formation Outward (GFCout).

The economic growth of a country is measured by the real GDPpc. Generally, the real GDP is influenced by many macroeconomic indicators which have been featured under agriculture and rural development, climate change, economy and growth, education, energy and mining, environment, external debt, financial sector, public and private sectors, science and technology, and so on (World Bank, 2022). Each of these categories has many indicating variables ranging from population, mortality rate, poverty headcount ratio, renewable energy consumption, central government debt, gross capital formation, labor force, inflation rate and unemployment rate.

The inequalities between countries are measured by the SDG10 score (reduced inequalities) and SDG8 score (decent work and economic growth). The SDG Index score is an assessment of each country's overall performance on the 17 SDGs - Sustainable Development Goals, giving equal weight to each Goal).

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It signifies a country's position between the worst possible outcome (score of 0) and the target (score of 100). The 2020-2023 SDG Index edition includes 97 global indicators. Two-thirds of the data come from official statistics (typically United Nations custodian agencies) with one third from non-traditional statistics, including research centres, universities, and non-governmental organizations (Schmidt-Traub et al. 2017; Papadimitriou, Neves, and Becker 2019).

The dataset for 73 countries (for 2020 year) was collected from various sources. The descriptive statistics are presented in Table 1.

TABLE 1. DESCRIPTIVE STATISTICS (2020)

Variable	Mean	Std. Dev.	Min	Max
GDPpc	4.19	.439	3.173	5.07
SDG10	71.549	24.784	12	100
SDG8	73.15	9.865	48.827	89.479
FDIin	4.455	.037	2.77	4.64
FDIout	4.581	.032	3.019	5.436
GFCin	2.671	.021	.047	2.767
GFCout	2.8	.058	.01	3.261
GDPgw	.832	.178	.061	1.137
PPexp	108.333	19.977	13.123	193.797
PCI	54.644	7.767	31.364	69.196
Employ	55.522	8.727	32.27	86.31

Sources: EUROSTAT, World Bank, UNCTAD, World Investment Report[1]

The exogenous variable, the endogenous variable and the control variables (considered to assess the impact of independent variables on dependent variable) used in our analysis are presents in Appendix 1.

In our sample, the countries with the lowest GDPpc (2020) are Cambodia, India, Nicaragua, Senegal and at the opposite pole are Luxembourg, Switzerland, Ireland and Norway. The countries with the lowest SDG10 score (below 17) are Brazil, Colombia and South Africa. SDG10 maximum score (100) was recorded in 2020 by Azerbaijan, Belgium, Czech Republic, Iceland, Slovak Republic and Slovenia. Out of 73 countries analyzed in our study, the lowest scores for SDG8 (below 56) were recorded by Cambodia, Iran, Islamic Rep. Iraq, Kuwait, and the highest scores (over 87) were recorded by Ireland, Denmark, New Zealand and Finland (2020).

4. MODEL

We assume that the fitting function f(x) is linear, y = a + b*x. To anticipate the results, we expect FDI to have a positive and robust significant effect on sustainable economic growth only in developed economies and high-income countries.

[1] https://www.ilo.org/shinyapps/bulkexplorer14/?lang=en&id=SDG_0831_SEX_ECO_RT_A

The next empirical models are used to investigate the impact of FDI on GDPpc (Equations a and b), on SDG10 (Equations c and d), and on SDG8 (Equations e and f).

The multilinear regression model is estimated by the following multiple regression equations:

GDPpc = c0 + c1*FDIin + c2*FDIout + c3*GDPgw + c4*PPexp + c5* PCI + εt Equation (a)

GDPpc = c0 + c1* GFCin + c2*GFCout + c3*GDPgw + c4*PPexp + c5* PCI + εt Equation (b)

SDG10 = c0 + c1*FDIin + c2*FDIout + c3*GDPgw + c4*PPexp + c5* PCI + εt Equation (c)

SDG10 = c0 + c1* GFCin + c2*GFCout + c3*GDPgw + c4*PPexp + c5* PCI + εt Equation (d)

SDG8 = c0 + c1*FDIin + c2*FDIout + c3*GDPgw + c4*PPexp + c5* PCI + εt Equation (e)

SDG8 = c0 + c1* GFCin + c2*GFCout + c3*GDPgw + c4*PPexp + c5* PCI + εt Equation (f)

Where:

GDPpc - Gross domestic product per capita (US dollars at current and constant prices 2015)

SDG10 – SDG goal 10 score (Reduced Inequalities)

SDG8 – SDG goal 8 score (Decent Work and Economic Growth)

FDIin – FDI flows: Inward (US dollars at current prices per capita)

FDIout – FDI flows: Outward (US dollars at current prices per capita)

GFCin – Percentage of Gross Fixed Capital Formation: Inward (%)

GFCout – Percentage of Gross Fixed Capital Formation: Outward (%)

GDPgw – Adjusted GDP growth (%)

PPexp – Purchasing power index of exports (index base 2015

PCI – Productive capacities index

εt – residual value

The matrix of correlations is presented in Table 2 (a, b, c, d, e, f - corresponding to multiple regression equations).

TABLE 2(A). THE MATRIX OF CORRELATIONS (FDI - GDPPC)

Variables	1	2	3	4	5	6	7
1 GDPpc	1.000						
2 FDIin	0.150	1.000					
3 FDIout	-0.069	0.217	1.000				
4 GDPgw	0.436	0.161	-0.145	1.000			
5 PPexp	-0.184	0.117	-0.156	0.416	1.000		
6 PCI	0.912	0.063	-0.098	0.516	-0.074	1.000	
7 Employ	0.434	0.054	0.025	0.305	-0.016	0.441	1.000

Source: Authors' research

TABLE 2(B). THE MATRIX OF CORRELATIONS (GFC - GDPPC)

Variables	1	2	3	4	5	6	7
1 GDPpc	1.000						
2 GFCin	0.013	1.000					
3 GFCout	0.046	0.543	1.000				
4 GDPgw	0.436	0.094	-0.063	1.000			
5 PPexp	-0.184	0.126	-0.109	0.416	1.000		
6 PCI	0.912	-0.054	0.009	0.516	-0.074	1.000	
7 Employ	0.434	0.007	0.089	0.305	-0.016	0.441	1.000

Source: Authors' research

TABLE 2(C). THE MATRIX OF CORRELATIONS (FDI - SDG10)

Variables	1	2	3	4	5	6	7
1 SDG10	1.000						
2 FDIin	0.040	1.000					
3 FDIout	0.045	0.543	1.000				
4 GDPgw	0.423	0.176	0.026	1.000			
5 PPexp	-0.109	-0.013	-0.245	0.385	1.000		
6 PCI	0.458	0.117	0.083	0.518	-0.137	1.000	
7 Employ	0.140	0.054	0.021	0.289	-0.025	0.456	1.000

Source: Authors' research

TABLE 2(D). THE MATRIX OF CORRELATIONS (GFC -SDG10)

Variables	1	2	3	4	5	6	7
1 SDG10	1.000						
2 GFCin	-0.047	1.000					
3 GFCout	0.070	0.562	1.000				
4 GDPgw	0.423	0.108	0.047	1.000			
5 PPexp	-0.109	0.057	-0.233	0.385	1.000		
6 PCI	0.458	-0.028	0.114	0.518	-0.137	1.000	
7 Employ	0.140	0.002	0.042	0.289	-0.025	0.456	1.000

Source: Authors' research

TABLE 2(E). THE MATRIX OF CORRELATIONS (FDI - SDG8)

Variables	1	2	3	4	5	6	7
1 SDG8	1.000						
2 FDIin	0.075	1.000					
3 FDIout	-0.045	0.543	1.000				
4 GDPgw	0.644	0.178	0.029	1.000			
5 PPexp	0.018	-0.014	-0.246	0.370	1.000		
6 PCI	0.747	0.118	0.084	0.518	-0.139	1.000	
7 Employ	0.347	0.058	0.023	0.314	-0.034	0.456	1.000

Source: Authors' research

TABLE 2(F). THE MATRIX OF CORRELATIONS (GFC -SDG8)

Variables	1	2	3	4	5	6	7
1 SDG8	1.000						
2 GFCin	-0.029	1.000					
3 GFCout	-0.011	0.562	1.000				
4 GDPgw	0.644	0.110	0.050	1.000			
5 PPexp	0.018	0.056	-0.234	0.370	1.000		
6 PCI	0.747	-0.027	0.115	0.518	-0.139	1.000	
7 Employ	0.347	0.006	0.047	0.314	-0.034	0.456	1.000

Source: Authors' research

5. RESULTS AND DISCUSSION

Table 3 comprises the main results of simple and multiple regression models, used for estimating the coefficients of each factor taken in consideration. Models (1) - (5) estimate the linear relationship between each explanatory variable and GDPpc as our dependent variable. Model (6) estimates the Equation (a) considering the impact of FDIin, FDIout, GDPgw, PPexp and PCI on GDPpc as a measure for economic growth, for our full sample. We removed the outliers from the analysis, as we specified above. Thus, when analyzing the impact on GDPpc we retained 73 observations.

Analysing Table 3 we notice that FDIin has a positive impact on GDPpc only in model (6) at 5%, Equation (a). As expected, GDPgw has a positive and statistically significant impact on GDPpc at 1% significance level in simple regression model (3) but R2 is only 0.178. PPexp has a negative and statistically significant in model (6) at 1% significance levels. PCI has a positive and statistically significant impact on GDPpc at 1% significance level in simple regression model (5), so, increasing by one unit of PCI will determine 0.47 units increase in GDPpc, on average (we can explain approximately 87% of GDPpc variation; R2=0.87). This positive and statistically significant impact of PCI is also kept in the complex multiple regression model (6) at 1% significance level.

TABLE 3. THE MAIN RESULTS FOR GDPPC, EQUATION (A)

GDPpc	Simple regression OLS (1)	Simple regression OLS (2)	Simple regression OLS (3)	Simple regression OLS (4)	Simple regression OLS (5)	Multiple regression OLS (6)
FDIin	1.836					1.347**
FDIout		-.815				-.371
GDPgw			1.088***			.066
PPexp				-.004		-.003***
PCI					.047***	.049***
Constant	-4.017	7.892	3.275***	4.607***	1.634***	-2.501
R-squared	0.021	0.003	0.178	0.033	0.814	0.870
Robustness check for GDPpc, adding Employment-to-population ratio as a control variable						
FDIin	1.564					1.355**
FDIout		-1.079				-.41
GDPgw			.782***			.034
PPexp				-.004		-.003**
PCI					.046***	.049***
Employ	.022***	.023	.017***	.023***	.002	.002
Constant	-4.027	7.855***	2.568***	3.326***	1.588***	-2.436
R-squared	0.224	0.213	0.279	0.239	0.802	0.860

Note: The level of statistical significance is *** p<1%, ** p<5%, * p<10%

Source: Authors' research

In Table 3 the robustness test is performed by including in the regression the Employment-to-population ratio as an additional control variable, namely Employ. Mainly, all simple regressions are re-estimated by considering Employment-to-population ratio as a control variable and we also have a multiple regression

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model, optimized corresponding to Equation (a). All signs of the estimated coefficients from Table 3 remain unchanged and most of their significance levels are kept, confirming that our estimations are robust. Employment-to-population ratio has a positive and statistically significant impact on GDPpc at 1% significance level in simple regression model (1), (3) and (4). The exogenous variables analyzed in multiple regression, Equation (a), explain 87% of the GDPpc variation.

Table 4 comprises the main results of simple and multiple regression models, used for estimating the coefficients of each factor taken in consideration. Models (1) - (5) estimate the linear relationship between each explanatory variable and GDPpc as our explained variable. Model (6) estimates the Equation (a) considering the impact of GFCin, GFCout, GDPgw, PPexp and PCI on GDPpc as a measure for economic growth, for our full sample. The robustness for GDPpc is check by adding Employment-to-population ratio as a control variable.

TABLE 4. THE MAIN RESULTS FOR GDPPC, EQUATION (B)

GDPpc	Simple regression OLS (1)	Simple regression OLS (2)	Simple regression OLS (3)	Simple regression OLS (4)	Simple regression OLS (5)	Multiple regression OLS (6)
GFCin	.653					3.108*
GFCout		1.324				-1.763
GDPgw			1.088***			.061
PPexp				-.004		-.003***
PCI					.047***	.05***
Constant	2.417	.461	3.275***	4.607***	1.634***	-1.609
R-squared	0.001	0.003	0.178	0.033	0.814	0.867
Robustness check for GDPpc, adding Employment-to-population ratio as a control variable						
GFCin	.536					3.306*
GFCout		.212				-1.995
GDPgw			.782***			.02
PPexp				-.004		-.003**
PCI					.046***	.05***
Employ	.023***	.023***	.017***	.023***	.002	.002
Constant	1.487	2.329	2.568***	3.326***	1.588***	-1.578
R-squared	0.208	0.207	0.279	0.239	0.802	0.857

Note: The level of statistical significance is *** p<1%, ** p<5%, * p<10%

Source: Authors' research

Analysing Table 4 we notice that GFCin has a positive impact on GDPpc only in model (6) at 10%. As expected, GDPgw has a positive and statistically significant impact on GDPpc at 1% significance level in simple regression model (3), Equation (b). PPexp has a negative and statistically significant in model (6) at 1% significance levels. PCI has a positive and statistically significant impact on GDPpc at 1% significance level in simple regression model (5), a 1% increase in PCI determining a 4.7% increase in GDPpc, on average. This positive and statistically significant impact of PCI is also kept in the complex multiple

regression model (6) at 1% significance level, implying that a 1% increase in PCI produces a 3% increase in GDPpc, on average.

In Table 4 the robustness test is performed by including in the regression the Employment-to-population ratio as an additional control variable, namely Employ. Mainly, all simple regressions are re-estimated by considering Employment-to-population ratio as a control variable and we also have a multiple regression model, optimized corresponding to Equation (b). All signs of the estimated coefficients from Table 4 remain unchanged and most of their significance levels are kept, confirming that our estimations are robust. Employment-to-population ratio has a positive and statistically significant impact on GDPpc at 1% significance level in simple regression model (1), (2), (3) and (4). The exogenous variables analyzed in multiple regression, Equation (b), explain 86.7% of the GDPpc variation.

TABLE 5. THE MAIN RESULTS FOR SDG10, EQUATION (C)

SDG10 *Reduced inequalities*	**Simple regression OLS (1)**	**Simple regression OLS (2)**	**Simple regression OLS (3)**	**Simple regression OLS (4)**	**Simple regression OLS (5)**	**Multiple regression OLS (6)**
FDIin	27.964					-32.315
FDIout		12.285				1.765
GDPgw			59.606***			51.322**
PPexp				-.148		-.182
PCI					1.211***	.728*
Constant	-54.296	13.913	21.616*	86.896**	6.12	144.906
R-squared	0.002	0.002	0.172	0.019	0.197	0.281
Robustness check for SDG10, adding Employment-to-population ratio as a control variable						
FDIin	25.159					-31.287
FDIout		11.502				-3.805
GDPgw			57.799***			59.756***
PPexp				-.174		-.292*
PCI					1.434***	.806*
Employ	.207	.211	.093	.209	-.39	-.304
Constant	-53.063	6.071	17.874	78.306***	15.549	183.391
R-squared	0.007	0.008	0.172	0.025	0.211	0.307

Note: The level of statistical significance is *** p<1%, ** p<5%, * p<10%

Source: Authors' research

Table 5 comprises the main results of simple and multiple regression models, used for estimating the coefficients of each factor taken in consideration. Models (1) - (5) estimate the linear relationship between each explanatory variable and SDG10 as our dependent variable. Model (6) estimates the Equation (c) considering the impact of FDIin, FDIout, GDPgw, PPexp and PCI on SDG10 as a measure for reduced inequalities, for our full sample. We removed the outliers from the analysis, as we specified above. Thus, when analysing the impact on SDG10 we retained 73 observations. The robustness for SDG10 is check by adding Employment-to-population ratio as a control variable.

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Analysing Table 5 we notice that FDI has no impact on SDG10, Equation (c). GDPgw has a positive and statistically significant impact on SDG10 at 1% significance level in simple regression model (3) and at 5% level in multiple regression model (6), Equation (c). PCI has a positive and statistically significant impact on SDG10 at 1% significance level in simple regression model (3). This positive and statistically significant impact of PCI is also kept in the complex multiple regression model (6) at 10% significance level. The exogenous variables analyzed in multiple regression, Equation (c), explain only 28.1% of the SDG10 variation. All estimated coefficients from Table 5 and the robustness test, remain almost unchanged and most of their significance levels are kept, confirming that our estimations are robust.

Table 6 comprises the main results of simple and multiple regression models, used for estimating the coefficients of each factor taken in consideration. Models (1) - (5) estimate the linear relationship between each explanatory variable and SDG10 as our explained variable. Model (6) estimates the Equation (d) considering the impact of GFCin, GFCout, GDPgw, PPexp and PCI on SDG10 as a measure for reduced inequalities, for our full sample. We removed the outliers from the analysis, as we specified above.

TABLE 6. THE MAIN RESULTS FOR SDG10, EQUATION (D)

SDG10 ***Reduced inequalities***	**Simple regression OLS (1)**	**Simple regression OLS (2)**	**Simple regression OLS (3)**	**Simple regression OLS (4)**	**Simple regression OLS (5)**	**Multiple regression OLS (6)**
GFCin	-101.361					-66.05
GFCout		33.678				10.58
GDPgw			59.606***			50.495**
PPexp				-.148		-.168
PCI					1.211***	.707*
Constant	341.09	-23.963	21.616*	86.896***	6.12	156.069
R-squared	0.007	0.006	0.172	0.019	0.197	0.281
Robustness check for SDG10, adding Employment-to-population ratio as a control variable						
GFCin	-104.751					-98.814
GFCout		31.515				8.115
GDPgw			57.799***			59.383***
PPexp				-.174		-.276*
PCI					1.434***	.777*
Employ	.225	.205	.093	.209	-.39	-.3
Constant	337.919	-29.022	17.874	78.306**	15.549	267.569
R-squared	0.013	0.011	0.172	0.025	0.211	0.308

Note: The level of statistical significance is *** p<1%, ** p<5%, * p<10%

Source: Authors' research

Analysing Table 6 we notice that GFC has no impact on SDG10, Equation (d). GDPgw has a positive and statistically significant impact on SDG10 at 1% significance level in simple regression model (3 and at 5% level in multiple regression model (6). PCI has a positive and statistically significant impact on SDG10 at 1% significance level in simple regression model (3). This positive and statistically significant impact of PCI is also kept in the complex multiple regression model (6) at 10% significance level. All estimated

coefficients from Table 4 and the robustness test, remain almost unchanged and most of their significance levels are kept, confirming that our estimations are robust.

Table 7 comprises the main results of simple and multiple regression models, used for estimating the coefficients of each factor taken in consideration. Models (1) - (5) estimate the linear relationship between each explanatory variable and SDG8 as our dependent variable. Model (6) estimates the Equation (e) considering the impact of FDIin, FDIout, GDPgw, PPexp and PCI on SDG8 as a measure for decent work and economic growth, for our full sample. We removed the outliers from the analysis, as we specified above.

TABLE 7. THE MAIN RESULTS FOR SDG8, EQUATION (E)

SDG8 *Decent Work & Economic Growth*	**Simple regression OLS (1)**	**Simple regression OLS (2)**	**Simple regression OLS (3)**	**Simple regression OLS (4)**	**Simple regression OLS (5)**	**Multiple regression OLS (6)**
FDIin	21.517					3.274
FDIout		-2.808				-12.567
GDPgw			36.396***			23.752***
PPexp				-.024		-.052
PCI					.847***	.627***
Constant	-23.707	85.072	42.481***	74.945***	27.226***	68.141
R-squared	0.007	0.001	0.390	0.003	0.558	0.671
Robustness check for SDG8, adding Employment-to-population ratio as a control variable						
FDIin	15.475					1.96
FDIout		-4.231				-12.001
GDPgw			32.689***			22.489***
PPexp				.018		-.042
PCI					.841***	.67***
Employ	.409***	.415***	.204*	.401***	.063	-.035
Constant	-19.024	69.078	34.646***	48.549***	24.065***	71.004
R-squared	0.136	0.134	0.438	0.125	0.562	0.665

Note: The level of statistical significance is *** p<1%, ** p<5%, * p<10%

Source: Authors' research

Analysing Table 7 we notice that FDI has no impact on SDG8, Equation (e). GDPgw has a positive and statistically significant impact on SDG8 at 1% significance level in simple regression model (3) and in multiple regression model (6). PCI has a positive and statistically significant impact on SDG8 at 1% significance level in simple regression model (3). This positive and statistically significant impact of PCI is also kept in the complex multiple regression model (6) at 1% significance level. The exogenous variables analyzed in multiple regression, Equation (E), explain only 67.1% of the SDG8 variation. All estimated coefficients from Table 7 and the robustness test, remain almost unchanged and most of their significance levels are kept, confirming that our estimations are robust. Employment-to-population ratio has a positive

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and statistically significant impact on GDPpc at 1% significance level in simple regression model (1), (2) and (4).

Table 8 comprises the main results of simple and multiple regression models, used for estimating the coefficients of each factor taken in consideration. Models (1) - (5) estimate the linear relationship between each explanatory variable and SDG8 as our explained variable. Model (6) estimates the Equation (f) considering the impact of GFCin, GFCout, GDPgw, PPexp and PCI on SDG8 as a measure for decent work and economic growth, for our full sample. We removed the outliers from the analysis, as we specified above. Thus, when analysing the impact on SDG8 we retained 73 observations. The robustness for SDG8 is check by adding Employment-to-population ratio as a control variable.

TABLE 8. THE MAIN RESULTS FOR SDG8, EQUATION (F)

SDG8 *Decent Work & Economic Growth*	Simple regression OLS (1)	Simple regression OLS (2)	Simple regression OLS (3)	Simple regression OLS (4)	Simple regression OLS (5)	Multiple regression OLS (6)
GFCin	-27.894					1.312
GFCout		1.297				-19.755
GDPgw			36.396***			23.737***
PPexp				-.024		-.05
PCI					.847***	.633***
Constant	146.691	68.546	42.481***	74.945***	27.226***	76.239
R-squared	0.003	0.000	0.390	0.003	0.558	0.668
Robustness check for SDG8, adding Employment-to-population ratio as a control variable						
GFCin	-15.498					7.62
GFCout		-2.946				-20.578
GDPgw			32.689***			21.337***
PPexp				.018		-.035
PCI					.841***	.693***
Employ	.415***	.414***	.204*	.401***	.063	-.047
Constant	91.02	57.916	34.646***	48.549***	24.065***	61.545
R-squared	0.133	0.132	0.438	0.125	0.562	0.658

Note: The level of statistical significance is *** p<1%, ** p<5%, * p<10%

Source: Authors' research

Analysing Table 8 we notice that GFC has no impact on SDG8, Equation (f). GDPgw has a positive and statistically significant impact on SDG8 at 1% significance level in simple regression model (3) and in multiple regression model (6). PCI has a positive and statistically significant impact on SDG8 at 1% significance level in simple regression model (5). This positive and statistically significant impact of PCI is also kept in the complex multiple regression model (6) at 1% significance level. All estimated coefficients from Table 4 and the robustness test, remain almost unchanged and most of their significance levels are kept, confirming that our estimations are robust. Employment-to-population ratio has a positive and statistically significant impact on GDPpc at 1% significance level in simple regression model (1), (2) and (4).

6. HETEROGENEITY

Considering the heterogeneity we further examined the possible influences of FDI on GDPpc, SDG10 and SDG8 on different sub-sample (Table 9). To examine the differential effects of FDI we split the full sample (73 countries) into sub-groups: (i) small and large countries (depending on the size of the population), (ii) developed and developing countries, (iii) high-income countries, upper-middle-income countries and lower-middle-income countries.

TABLE 9. ESTIMATED RESULTS (MULTIPLE REGRESSION OLS) - HETEROGENEITY

Variable	The size of the population		National economic development levels		Income levels of countries		
	Small *countries*	***Large*** *Countries*	***Developing*** *countries*	***Developed*** *countries*	***High*** *-income*	***Upper-middle-*** *income*	***Lower-middle-*** *income countries*
	45.2%	*54.8%*	*42.4%*	*57.6%*	*53.4%*	*31.5%*	*15.1%*
Coef – GDPpc Equation (a)							
FDIin	1.228*	-1.752	.343	.53	.967*	14.608	-159.589
FDIout	-1.048	1.58	11.281	-1.09	-.965	-33.344	431.593
GDPgw	.389	-.099	-.303	-.205	.272	-.068	-.038
PPexp	-.008***	-.002	0	-.004*	-.005***	-.003*	-.001
PCI	.039***	.054***	.039***	.047***	.027***	.029***	.008
Employ	0	-.002	.003	-.002	.005	-.002	-.01
Constant	2.044	2.143	-51.219*	5	3.067	90.666	-1263.059
R^2	0.876	0.897	0.869	0.830	0.703	0.577	0.638
Coef – GDPpc Equation (b)							
GFCin	3.084	-.151	7.126**	-.706	1.8	-.53	-7.348
GFCout	-2.825	.675	5.551	.089	-1.696	-10.061	30.035
GDPgw	.332	-.096	-.365*	-.056	.338	.026	-.014
PPexp	-.007***	-.002	-.001	-.003	-.005**	-.003*	-.002
PCI	.042***	054***	.041***	.049***	.028***	.027***	.011
Employ	0	-.002	.005	-.003	.005	-.005	-.008
Constant	2.156	.13	-32.616*	3.701	2.723	32.609	-60.654
R^2	0.864	0.896	0.858	0.819	0.668	0.559	0.594
Coef – SDG10 Equation (c)							
	Small	***Large***	***Developing***	***Developed***	***High***	***Upper-middle***	***Lower-middle***
FDIin	-68.382	186.46	-1210.974*	-.145	-50.169	-1424.645	28791.641
FDIout	12.214	-175.221	3021.001*	-3.155	.339	12478.566	-123959.18
GDPgw	52.146	34.856	45.517	-17.756	40.607	68.755*	102.753
PPexp	0	-.509**	-.144	-.006	-.181	.109	-.776
PCI	1.132	.853	-.466	-.116	-.165	-2.788	4.227
Employ	.319	-.818	-.665	.344	.087	-.096	-.328
Constant	199.034	64.646	-8359.454*	104.344	293.719	-50686.647	439559.32
R^2	0.361	0.295	0.232	0.041	0.073	0.313	0.785
Coef – SDG10 Equation (d)							
GFCin	142.451	519.887	109.805**	140.861	-143.499	-251.853	1919.104
GFCout	25.316	60.352	296.728**	28.795	15.425	3945.93	-12330.602
GDPgw	50.592	0.757**	41.471	-20.822	34.593	62.365*	99.641
PPexp	.004	-.447*	.027	.058	-.143	.196	-.743
PCI	1.053	.82	-.985	-.126	-.244	-2.457	3.909
Employ	.325	-.863*	-.903	.34	.143	-.018	-.475
Constant	264.942	27.271	5131.047**	381.368	414.417	-10240.448	29217.818
R^2	0.359	0.382	0.294	0.076	0.085	0.362	0.783

Note: The level of statistical significance is *** p<1%, ** p<5%, * p<10%

Source: Authors' research

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Referring to multiple regression, Equation (a), the estimated coefficients indicate that FDIin positively affects GDPpc only small countries and high-income countries (at 10% significance level). PPexp keeps its negative and statistically significant influence on GDPpc only in small countries and high-income countries (at 1% significance level) and developed countries (at 10% significance level). PCI also kept its positive and statistically significant influence on GDPpc (at 1% significance level) on all sub-samples, except for lower-middle-income countries (Equation (a), Equation (b)).

As can be seen in the Table 9 Equation (b), GFCin positively affects GDPpc only in developing countries (at 5%, significance level). PPexp keeps its negative and statistically significant influence on GDPpc especially in small countries and high-income countries (at 1% and 5% significance level).

Analizing the coefficients in Table 9, Equation (c), it can be said that only in large countries PPexp has a negative and statistically significant impact on SDG10 (at 5% significance level). The other variables have no significant influence on SDG10 for the analyzed subgroups. Referring to Equation (d), GFCin has a negative and statistically significant impact on SDG10, respectively GFCout has a positive and statistically significant impact on SDG10 only in developing countries (at 5% significance level). GDPgw has a positive and statistically significant impact on SDG10 only in large countries.

TABLE 9. (CONTINUATION) ESTIMATED RESULTS (MULTIPLE REGRESSION OLS) - HETEROGENEITY

Variable	The size of the population		National economic development levels		Income levels of countries		
	Small *countries*	***Large*** *countries*	***Developing*** *countries*	***Developed*** *countries*	***High*** *-income*	***Upper-middle-*** *income*	***Lower-middle-*** *income countries*
	45.2%	*54.8%*	*42.4%*	*57.6%*	*53.4%*	*31.5%*	*15.1%*
Coef – SDG8 Equation (e)							
FDIin	2.573	71.852	395.253***	14.359	-12.841	572.959	462.873
FDIout	18.106*	51.747	954.744***	-16.426**	-9.711	-1821.909	-24537.2
GDPgw	18.168*	4.923***	8.238	30.945***	41.365***	13.092**	11.427
PPexp	-.103	-.013	-.019	-.094*	-.046	-.143**	.079
PCI	.881***	526***	.191	.606***	.584***	.585**	.095
Employ	-.524***	.243**	.293**	.041	-.292**	.282*	.54
Constant	124.407	62.097	2651.495***	34.722	130.888*	5824.725	110337.02
R^2	0.684	0.781	0.478	0.652	0.553	0.650	0.736
Coef – SDG8 Equation (f)							
GFCin	4.143	05.208	180.037	46.266	1.22	60.98	-68.084
GFCout	31.095*	74.297	-493.917	31.543**	-21.615	-396.294	-2935.025
GDPgw	17.61*	1.304***	8.997	32.591***	39.334***	15.254**	11.458
PPexp	-.094	-.037	-.013	-.095*	-.044	-.147**	.103
PCI	.913***	524***	.182	.642***	.612***	.521*	-.084
Employ	-.521***	.239**	.245*	.035	-.296**	.223	.551
Constant	126.366	55.061	936.803	-15.094	86.391	978.175	8397.167
R^2	0.678	0.777	0.340	0.650	0.542	0.621	0.740

Note: The level of statistical significance is *** p<1%, ** p<5%, * p<10%

Source: Authors' research

In Table 9, Equation (e), only in developing countries FDIin has a positive and statistically significant impact on SDG8 and FDIout has a negative and statistically significant impact on SDG8 (at 1% significance level). FDIout has a negative and statistically significant impact on SDG8 on developed countries but only at 5% significance level.

In upper-middle-income countries PPexp has a negative and statistically significant impact on SDG8 (at 5% significance level) (Equation (e), Equation (f)).

In large, developed and high-income countries GDPgw has a positive and statistically significant impact on SDG8 (at 1% significance level); in small countries the impact of GDPgw is only at 10% significance level; in upper-middle-income countries GDPgw has a positive and statistically significant impact on SDG8 (at 5% significance level).

PCI is also kept its positive and statistically significant influence on SDG8 (at 1% significance level) on almost all sub-samples, except for developing countries and lower-middle-income countries (Equation (e), Equation (f)).

In small countries, Employment-to-population ratio has a positive and statistically significant impact on SDG8 at 1% significance level (Equation (e)). On the contrary, in large countries Employment-to-population ratio has a negative and statistically significant impact on SDG8 at 5% significance level.

In the multiple regression that analyzes the influence of FDI/GFC on GDPpc, including robustness check and considering the heterogeneity, our results emphasize the fact that PCI has a positive and statistically significant impact ($p<.01$) and PPexp has a negative and statistically significant impact ($p<.01$) on GDPpc but only in small countries and high-income countries. FDIin has a positive and statistically significant impact ($p<.1$) only in small and high-income countries. A result that we cannot explain refers to situation that GFCin has a positive and statistically significant impact on GDPpc ($p<.05$) only in developing countries ($R2=85.8\%$), while, in the same model, GFCin has a negative impact (statistically insignificant) on GDPpc in developed countries ($R2=78.8\%$).

Referring to multiple regression, Equation (c) and (d), that analyzes the influence of FDI/GFC on SDG10, including robustness check and considering the heterogeneity, our results emphasize the fact that PPexp has a negative and statistically significant impact ($p<.05$) on SDG10 only in large countries (but $R2=29.5\%$). FDIin/GFCin has a negative and statistically significant impact and FDIout/GFCout has a positive and statistically significant impact ($p<.1$/ $p<.05$) on SDG10 but only in developing countries. GDPgw has a positive and statistically significant impact ($p<.1$) only in large countries.

In the multiple regression that analyzes the influence of FDI/GFC on SDG8, Equation (e) and (f), including robustness check and considering the heterogeneity, our results emphasize the next situations: FDIin has a positive and statistically significant impact ($p<.1$) on SDG8 only in developing countries. FDIout has a

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negative and statistically significant impact both in developing countries (p<.01) and in developed countries (p<.05). GDPgw has a positive and statistically significant impact (p<.1) on SDG8 only in large, developed and high-income countries. PCI has a positive and statistically significant impact (p<.01) and PPexp has a negative and statistically significant impact (p<.01) on SDG8 but only in developed countries and high-income countries. Employment-to-population ratio has a statistically significant impact (p<.01) on SDG8, but a negative impact in small countries and a positive impact in large countries. Therefore, it is important to state that some subsamples included a small number of countries in order to generalize the results and contradictory results may appear, difficult to explain.

7. CONCLUSION

In the current context of globalization and the urgent requirements of sustainable development, each country can utilize international resources to serve its own economic and social interests through FDI. It is known that, from a general perspective and at a worldwide level, sustainable economic growth and the reduction of inequalities are objectives that can be achieved over longer periods of time, especially by those countries that have the capacity to invest abroad as well to attract foreign FDI, which has high competitiveness in all fields, efficient and effective national policies, etc. Besides these, at the microeconomic level there are many other variables, factors or sources that can support and accelerate sustainable economic growth.

This paper uses a dataset of 73 countries for 2020 to examine the influence of FDI on sustainable economic growth, respectively on the inequalities. Countries were divided considering 3 classification criteria, as follows: (i) small and large countries (depending on the size of the population), (ii) developed and developing countries, (iii) high-income countries, upper-middle-income countries and lower-middle-income countries. Taking these into account, the influence of heterogeneous levels on the empirical results was explored. The most important findings of this paper, which also includes robustness tests, are as follows:

First, the study on countries with different sizes of the population shows that PPexp (negative impact, p<.01), PCI (positive impact, p<.01) and FDIin (positive impact, p<.1) has effect on GDPpc only in small countries. Regarding the influences of FDI/GFC on SDG10, this study shows that PPexp has a negative and statistically significant impact on SDG10 (p<.05) only in large countries. Also, GDPgw has a positive and statistically significant impact on SDG10 (p<.05) when it is in multiple regression with GFC. The coefficients from the multiple regression that highlight the impact of independent and control variables on SDG8, do not highlight differences between small and large countries.

Second, the study on developing and developed countries shows that PPexp has a negative and statistically significant impact (p<.1) on GDPpc only in developed countries. GFCin has a positive and statistically significant impact (p<.05) on GDPpc and GDPgw has a negative impact * p<. on GDPpc only in developing countries. FDIin (negative impact, p<.1) and FDIout (positive impact, p<.1) have effect on SDG10 only in developing countries. Also, GFCin (negative impact, p<.05) and GFCout (positive impact, p<.05) have effects on SDG10 only in developing countries. Positive and statistically significant (p<.01) impact on SDG8 have FDIin and Employ, in developing countries. FDIout has a negative and statistically significant impact (p<.01) on SDG8 only in developing countries. On the other hand, positive and statistically significant impact p<.01 on SDG8 have GDPgw and PCI only in developed countries. PPexp has a positive and statistically significant impact p<.1 on SDG8 only in developed countries.

Third, FDIin has a positive effect (p<.1) on GDPpc only in high-income countries. Other variables that have statistically significant impact (p<.01) on GDPpc, in high-income countries but also in upper-middle countries are PPexp (negative impact) and PCI (positive impact). GDPgw has a positive and statistically significant impact (p<.1) on SDG10 only in upper-middle countries. The multiple regression coefficients that highlight the impact of independent and control variables on SDG8 do not highlight differences between high-income, upper-middle-income and lower-middle-income countries.

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APPENDIX

Table A1. Description of variables, definitions/measures and data sources

Variables *(and codes)*	**Definition, measurement**
Dependent variable (endogenous variable)	
Gross Domestic Product per capita *(GDPpc)*	GDP per capita (US dollars at current and constant prices 2015). Real GDPpc is calculated as the ratio of real GDP (GDP adjusted for inflation) to the average population of a specific year and is based on rounded figures.

SDG 10 Score: Reduced Inequalities *(SDG10)*	The score includes: (a) inequalities within countries: income distribution (income quintile share ratio), income share of the bottom 40 % of the population (% of income), relative median at-risk-of-poverty gap (% distance to poverty threshold), urban-rural gap for risk of poverty or social exclusion (pp difference, % of population), (b) inequalities between countries: purchasing power adjusted GDPpc, adjusted gross disposable income of households per capita, (c) migration and social inclusion: asylum applications, citizenship gap for people at risk of income poverty after social transfers, citizenship gap for early leavers from education and training, citizenship gap for young people neither in employment nor in education and training (NEET), citizenship gap for employment rate.
SDG 8 Score: Decent Work and Economic Growth *(SDG8)*	The score includes: (a) economic growth: real GDPpc, investment share of GDP (% of GDP), (b) employment young people neither in employment nor in education and training (% of population aged 15 to 29, employment rate (% of population aged 20 to 64), long-term unemployment rate (% of active population), gender gap in inactive population due to caring responsibilities (percentage points, persons aged 20 to 64), (c) decent work: fatal accidents at work (number per 100 000 workers), in-work at-risk-of-poverty rate (% of population). SDG 8 recognizes the importance of sustained economic growth and high levels of economic productivity for the creation of well-paid quality jobs.
Independent variables (exogenous variables)	
FDI: Inward and Outward *(FDIin)* *(FDIout)*	FDI: Inward and outward flows and stock, annual (US dollars at current prices per capita). FDI is an investment made by a resident enterprise in one economy (direct investor or parent enterprise) with the objective of establishing a lasting interest in an enterprise that is resident in another economy (direct investment enterprise or foreign affiliate).
Percentage of Gross Fixed Capital Formation: Inward and Outward *(GFCin)* *(GFCout)*	The real investment (Gross Fixed Capital Formation). Gross capital formation consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories, while FDI relates to financing—that is, the purchase of shares in foreign companies where the buyer has a lasting interest (10 % or more of voting stock). FDI can be used to finance fixed capital formation, however it can also be used to cover a deficit in the company or paying off a loan.
Control variables	
Adjusted GDP growth *(GDPgw)*	The growth rate of GDP (%) adjusted to income levels (where rich countries are expected to grow less) and expressed relative to the average growth rate of high-income countries.
Purchasing power index of exports (*Ppexp)*	Indices, Index Base 2015. Merchandise: Trade value, volume, unit value, terms of trade indices and purchasing power index of exports, annual.
Productive Capacities Index *(PCI)*	Productive capacities are the productive resources, entrepreneurial capabilities and production linkages that together determine a country's ability to produce goods and services that will help it grow and develop. As such, building productive capacity is the engine of growth to achieve the SDGs and national development goals. The PCI is composed of 42 indicators across eight categories of productive capacities: natural capital, human capital, energy, transport, private sector, institutions and structural change.
Employment-to-population ratio *Employ*	Measures the civilian labor force currently employed against the total working-age population of a country (%, annual).

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