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Impact of Economic Openness Indicators on Income Inequality: Evidence from selected Developing Coutries

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Abstract

The aim of this research is to examine the impact of foreign direct investment (FDI) and trade on the level of income inequality. The research objective is to examine how the degree of economic openness affects income inequality in the studied countries in the context of an established distributional design. The study was conducted based on panel data from 2000–2022 for selected 9 regional countries: Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Turkey, and Ukraine. The Palma and Gini coefficients, as well as the inequality-adjusted human development index, were considered as indicators of inequality, and FDI and trade as indicators of the openness of economies. The results of the study showed that the increase in FDI stocks has a U-shaped effect on inequality. In the case of trade, the results are contradictory, as it is found to be a non-significant factor in the interaction with Palma ratio and Gini index, while in the case of inequality-adjusted HDI, the effect is significant and U-shaped. The results of the study also confirm that trade with developed countries has no significant impact on income inequality in the countries under study, while the impact of trade with developing countries varies by direction. According to the results of the study, the role of human capital in reducing inequality in the countries under study is quite large. This is also evidenced by the unemployment rate dynamics indicator, which has a positive and significant coefficient in all models.

JEL Classification Code: D31, I31, I32, F21

1. Introduction

The most important factors in the structural transformation and modernization of developing economies continue to be foreign direct investment and foreign trade. These factors, in various combinations, affect the technological changes in emerging market economies and the increase in labor productivity in them and, based on this, the main means of overcoming inequality. Inequality, however, continues to be one of the main challenges to development. The main factors determining this circumstance in developing countries continue to be the slow changes implemented in the education and health sectors, insufficient finances allocated to them from the state budget, the vulnerability of economic growth in terms of institutional arrangements and inclusiveness.

It should be noted that there are highly contradictory, often conflicting, approaches in the economic literature on the effects of foreign direct investment and trade openness on poverty reduction and inequality. In particular, Abdi (2025) and Khan & Khan (2023) argue that foreign direct investment can contribute to the reduction of income inequality, especially by improving the quality of institutional arrangements and developing human capital and creating competitive jobs. Contrary to the above views, research by another group of theorists suggests that in emerging market countries, foreign direct investment does not generally contribute to reducing inequality. In particular, Mensah and Adams (2026) note that foreign direct investment has a very limited impact on reducing inequality in developing countries, particularly in Africa, primarily due to underdeveloped institutions and weak technological absorption capacities. In turn, Tsitouras & Papapanagos (2025) confirm in their research that the impact of foreign direct investment differs in the short and long term, reflecting dynamic adjustment processes.

Some studies suggest that the relationship between trade openness and inequality dynamics is variable. Nguyen and Tran (2024) provide some evidence for a non-linear (inverted U-shaped) relationship between trade openness and inequality in the context of the Kuznets hypothesis. Accordingly, in the early stages of development, trade expansion may lead to a deepening of inequality, while in the long run, the benefits of trade may be more inclusively distributed, contributing to the reduction of inequality. Lee & Park (2025) and Siddique & Majeed, (2023) argue that deepening international trade ties may exacerbate inequality in developing countries due to weak institutions and market segmentation.

This research aims to examine the impact of the degree of economy openness on the inequality of income distribution.It was conducted based on panel data from 9 countries, collected from the WIID (2023), UNDP (2023), UNCTAD, and WB WDI databases.The countries included in the sample are Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Turkey, and Ukraine, and the observations cover the period 2000–2022. Palma and Gini coefficients, as well as the inequality-adjusted human development index, were considered as indicators of inequality, and FDI and trade were considered as indicators of the openness of economies.Trade was also assessed according to its components (exports and imports). In order to assess the possible non-linear effect on inequality, indicators of the economy openness were also included in a quadratic form.

2. Literature Review

There are various interpretations in the economic literature regarding the relationship between foreign direct investment (FDI) and inequality. According to the classic view, in the initial stage of modernization foreign investment may initially exacerbate the problem of inequality in countries with emerging markets, and then, as investment grows, this negative impact will gradually decrease. This theory is consistent with the Kuznets hypothesis (Kuznets, 1955), which observes a relationship between economic development and income inequality, characterized by an inverted U-shaped curve. According to another view (Mihaylova, 2015), developing countries are dependent on developed countries due to their low level of technological development and lack of skilled labor, which leads to limited employment in less developed countries and, as a result, widening of income inequality. Therefore, FDI provides developing countries in particular with capital, the latest technology and management skills, making them more market-savvy and competitive. FDI can create many jobs in developing countries (Chen, 2016), where the labor force is usually unskilled, and thus reduce the level of inequality. A number of researchers (Khalil et al., 2024), studying the situation of the Gulf Cooperation Council (GCC) countries have found that technology, economic growth, unemployment and inflation drive income inequality, while foreign direct investment and trade play a positive role in reducing income inequality. This finding is consistent with the modernization theory, according to which the impact of FDI varies according to the stages of modernization of countries and regions. Analysis of panel data from 20 African countries (Kaulihowa & Adjasi, 2018) showed the opposite effect, that is, FDI initially reduces the level of inequality, but its subsequent increase reverses the direction of the effect. An analysis of data from 37 developing countries (Nyugen, 2021) showed that FDI and the governance environment reduce income inequality, but their interaction increases it, while a panel data analysis of 6 South Asian countries (Matallah, 2019) showed that FDI inflows reduce income inequality. Similar results were also obtained from an analysis conducted for 10 countries in the Asian region (Yuldashev et al.,

2023). The authors argue that FDI reduces income inequality, but the effect is greater in the presence of human capital, which means that human capital exacerbates the effect of FDI on inequality. Another study of 37 countries (Lee et al., 2022) found that FDI reduces income inequality, but this effect diminishes when a country reaches a certain level of financial development.

A prevailing view in contemporary empirical research seems to be that modern technological change often evolves alongside rising income inequality. Accordingly, the application of innovative systems in developed countries contributes to the mitigation of income inequality, while the introduction of foreign technologies in developing countries strengthens existing inequalities (Urraca-Ruiz & Da Silva Lima, 2024). Some theorists note that trade liberalization facilitates the spread and diffusion of technologies, goods, services, as well as knowledge, which can greatly stimulate the growth of the population's living standards, as trade leads to the use of innovative technologies, which in turn provides more diverse and cheaper goods. The results of the study for 87 countries (Canh et al., 2020) showed that FDI and trade reduce the level of inequality. Some studies have examined trade in terms of its components and assessed the effects of exports and imports on the level of inequality.

The analysis for the BRICS countries (Mahesh, 2016) showed that trade, as well as exports and imports taken separately, exacerbated inequality. The research conducted for the CIS countries has led to contradictory results. When the Gini coefficient was estimated as the dependent variable (Khan & Nawaz, 2019), the effects of both trade and individual exports and imports on inequality were found to be inverted U-shaped, but when the Gini coefficient was replaced by the HDI, the results showed that the mentioned factors do not have significant effect on the level of inequality. At the same time, human development and labor market conditions are consistently cited as important determinants of inequality. Bakkeli and Kotsadam (2023) show that higher levels of HDI are associated with lower levels of income inequality, particularly when accompanied by inclusive labor market policies. Meanwhile, the results of the study of 17 transition countries (Franco & Gerussi, 2013) showed that FDI and trade cannot explain the variations in the inequality level.

3. Empirical Model, Data and Variables

The following regression model was estimated:

$$\varvec{I}\varvec{N}\varvec{E}\varvec{Q}_{\varvec{i}\varvec{t}} = \varvec{\beta}_0 + \varvec{\beta}_1\varvec{O}\varvec{P}\varvec{E}\varvec{N}_{\varvec{i}\varvec{t}-1} + \v \quad (1)$$

The dependent variable(INEQ) characterizes the level of inequality, for which three different indicators were considered: the Palma coefficient, the Gini coefficient, and the inequality-adjusted human development index (IHDI) calculated by the United Nations Development Program (UNDP). In the case of IHDI, the analyzed period is 2010–2022, because the mentioned index is calculated since 2010.FDI and trade were considered as indicators describing the openness of countries (OPEN). The impact of trade was also assessed according to its elements, for which exports and imports were considered separately both to high-income countries and to low- and middle-income countries. In order to assess the non-linear relationship between the explanatory variables and the level of inequality, the square of these indicators was also introduced. All explanatory variables were evaluated with lagged values, as a result of which the effects of previous years are also evaluated, as well as the possible endogeneity problem is somewhat mitigated. $X$is a vector of control variables introduced to improve the robustness of the estimates, as well as to assess the effects of other macroeconomic factors on inequality. Real GDP per capita, secondary school enrollment, inflation, share of urban population and unemployment rate were selected as control variables. η is the component that is indifferent to time changes and measures country-specific effects, and ϵ is the model error. All variables included in the models, their brief descriptions, and data sources are presented in Table 1.

3.1. Dependent Variables

J. G. Palma, analyzing the statistics of many countries, found thatabout half of the gross national income (GNI) falls to the "middle classes", or more precisely, to the population in the 5th-9th decile groups. Based onthis fact, it can be said that half of the world's population has acquired strong "property rights", while in the case of the other half (rich and poor), thedistribution of income is quite flexible. That is, the distribution of income ismainly due to

Table 1
Measurement Units of Variables, Definition and Data Collection Source

Variables		Definition	Measurement unit	Source
dependent	**PALMA**	Palma ratio	$\frac{\text{richest}\backslash:10\backslash\%\text{'s}\backslash:\text{share}}{\text{poorest}\backslash:40\backslash\%\text{ s}\backslash:\text{share}}$	[WIID], [WB WDI]
	GINI	Gini index	%	[WIID], [WB WDI]
	IHDI	Inequality-adjusted human development index	unit	[UNDP]
independent	**FDI**	cumulative foreign direct investment	% of GDP	[UNCTAD]
	TR	trade (import and export)	% of GDP	[WB WDI]
	EXHI	exports to high-income countries	% of total exports	[WB WDI]
	EXLMI	exports to low- and middle-income countries	% of total exports	[WB WDI]
	IMHI	imports from high-income countries	% of total imports	[WB WDI]
	IMLMI	imports from low- and middle-income countries	% of total imports	[WB WDI]
control	**GDP**	real GDP per capita	2017 PPP $	[WB WDI]
	SSE	gross secondary school enrollment rate	ratio of actual and expected values	[WB WDI]
	INFL	inflation, GDP deflator	%	[WB WDI]
	URB	Share of urban population	% ofthetotalpopulation	[WB WDI]
	UNEMP	Unemployment rate	% of labor force	[WB WDI]

Source: Table compiled by the authors according to the sources cited WIID, UNDP, UNCTAD, WB WDI *(2026)*

changes in the edges of the distribution. Palma, analyzing theindicators of 135 countries (Palma, 2011),concluded that the distribution of incomein any country is influenced bytwo opposing forces. The first is the "centrifugal" force, which leads to an increase in inequality, and the second isthe “centripetal” force, which, by increasing the share of the 5th-9th decilegroups, leads to a reduction of inequality. The peculiarity of the Palma approach to measuring inequality is that the population is divided into three groups (in a ratio of 40:50:10), so that the middle group's average income is approximately equal to half the total income of the population. The Palma ratio is the ratio of the top 10% to the bottom 40%. The peculiarity of this coefficient is that it describes the lowest and highest parts of the income distribution, while the Gini coefficient focuses on the entire distribution (Tchamyou, 2018). A. Sumner and A. Cobham checked (Cobham & Sumner, 2013) that the share of the 5th-9th decile groups is relatively stable, and the distribution is mainly influenced by the incomes of the poorest 1-4th and richest 10th decile groups, comparing 1990 and 2010 data. They concluded that the share of average deciles in different countries is stable over time, and the incomes of the poorest and richest deciles are relatively variable. They argue that the Palma coefficient can be a good tool for policymakers and for everyone in general, as it is very simple and, given the stability of the average deciles, clearly shows what action needs to be taken to reduce inequality.

The Gini coefficient is the most commonly used indicator for assessing inequality. It takes into account the deviation of each individual income not only from the average income, but also from the level of other incomes. The Gini coefficient lies in the range $[0,1]$ where 0 means absolute equality and 1 means absolute inequality. The Gini coefficient is more sensitive to the changes of the midpoint of the distribution (Yitzhaki & Schechtman, 2013).

Since 2010, the Human Development Report (HDR) has produced the Inequality-adjusted human development index (IHDI) in an attempt to reveal the distribution of human development within countries. The IHDI adjusts the HDI value by assessing the level of inequality among the population.This indicator is based on the Atkinson index of inequality assessment, the weighting parameter of which is taken as a unit value. If there is perfect equality in a country, the HDI and IHDI values will be equal, otherwise the inequality-adjusted index has a smaller value. The higher the level of inequality in a country, the greater the HDI-IHDI gap will be (UNDP 2024).

3.2. Independent Variables

As a variable explaining the level of inequality, the stock of domestic FDI was taken, which is the total capital of foreign investors in the host country. Unlike net FDI inflows, which may be temporary, the chosen indicator reflects long-term investments and has a continuous effect on the level of inequality.FDI and trade stimulate the labor market and economic growth (Shahbaz, et al., 2016), provide an opportunity to obtain durable consumer goods, stimulating imports and exports in the region, create new employment opportunities in society, contributing to human development (Wang, et al., 2018). Trade was also considered by its components, as the effects of total trade and its components on inequality may differ.

3.3. Control Variables

Real GDP per capita, secondary education enrollment rate, inflation, share of urban population and unemployment rate were selected as control variables.

GDP per capita characterizes a country's level of development by reflecting the average income of an individual. This indicator was included in the model in logarithmic form as a traditional measure of economic development. Some studies test the existence of a non-linear (inverted U-shaped) relationship between GDP and income inequality. However, the empirical literature (Meschi & Vivarelli, 2009) generally does not support Kuznets' assumption that GDP growth has a positive effect on inequality in the short term and a negative effect in the long term. Economic growth can have a positive or negative impact on

income inequality. Aghion and Hewitt argue (2002) that economic growth should improve the level of inequality in a country, but the effect can be the opposite if that growth is not inclusive and simply increases the incomes of the rich population.

Education contributes to the acquisition of a certain profession and the development of skills, so educated people have more opportunities to move into high-paying jobs. This means that the greater the participation in educational systems, the more people will be able to increase their incomes, which is expected to reduce inequality. It is the level of education that increases the skilled workforce, which in turn mitigates the level of inequality in the country (Jensen & Rosas, 2007). Enrollment in secondary education is calculated as the ratio of actual to expected indicators (in percentage terms). It may exceed 100%, which may be related to early or late school enrollment, as well as cases of remaining in the same class.

The impact of inflation on inequality was measured through the annual growth rate of the GDP deflator, which reflects the rate of price changes in the overall economy. The rate of inflation can affect inequality in a contradictory way.

Urbanization is the share of the urban population in a country's total population.Assumptions about the impact of urbanization on inequality are varied, as empirical studies in this context have produced mixed results. Analysis for African countries (Sulemana, et al, 2019) found a positive relationship between urbanization and inequality. An analysis of four Asian countries (Kanbur & Zhuang, 2013) found that urbanization exacerbated inequality in Philippines, Indonesia and India, but the effect was negative in China. Some studies (Wu & Rao, 2017) suggest that this relationship can also be characterized by an inverted U-shaped curve.

The unemployment rate is the proportion of unemployed people in the total labor force. This indicator can reflect the trends of the economic development of the country and the improvement of the living standard of the population.

3.4. Descriptive Statistics

In the observed countries, the coefficients of Palma and Gini were on average 1.38 and 33.05 respectively during the analyzed period, which means that the level of income inequality in those countries is quite high. The Palma coefficient shows that the incomes of the richest 10% of the population are 38% higher than those of the poorest 40%. The inequality-adjusted human development index was 0.70 on average. This indicator coincides with the average value recorded in recent years in Europe and Central Asia. The average values of FDI and trade were 37.16 and 88.05 percent, respectively, which means that the countries have implemented open trade policies. Outside the region, the trade of the observed countries is mostly related to the developed countries. The average GDP per capita (14,152.5 USD) coincides with the world average for the same period, which was 14,108.1 USD, but is more than 2 times lower than the average for the countries of Europe and Central Asia (31,037.8 USD). The average secondary school enrollment rate is 95.8, which is quite a good indicator and means that the countries under consideration don't have a human capital problem. Inflation rate is quite high in the region (on average it was 13.75%), meanwhile, the world average was 3.8%, and in European and Central Asian countries – 2.7%. The share of the urban population was 60.45% on average. This indicator was 51.7% in the world, and 70.8% in European and Central Asian countries. The average level of unemployment (7.9%) is also close to the indicators of the world (6.2%) and the countries of Europe and Central Asia (8.3%).

Table 2
Descriptive Statistics of Included Variables

Variables	Mean	Median	Min	Max	Std. Dev.	Obs.
PALMA	1.38	1.16	0.82	2.91	0.50	207
GINI	33.05	31.20	23.92	48.02	6.40	207
IHDI	0.70	0.70	0.57	0.77	0.04	117
FDI	37.16	33.26	6.86	117.72	22.28	207
TR	88.05	88.47	42.35	157.97	28.75	207
EXHI	50.00	49.93	14.84	76.86	14.96	207
EXLMI	13.03	11.14	0.62	39.40	8.36	207
IMHI	41.68	40.68	10.01	71.95	14.02	207
IMLMI	16.61	15.12	1.51	42.15	8.43	207
GDP	14152.47	12827.23	3078.91	33149.50	7303.77	207
SSE	95.80	94.92	74.59	129.19	10.00	207
INFL	13.75	9.24	-2.14	185.29	17.78	207
URB	60.45	63.44	35.28	80.33	13.25	207
UNEMP	7.90	7.85	0.79	20.71	4.09	207
Source: Authors' calculations (2026)						

Table 3 presents statistics by individual countries. The inequality level is highest in Turkey, followed by Russia and Georgia, and lowest in Ukraine and Belarus.Although the level of inequality in Russia is very high, it ranks 2nd in terms of inequality-adjusted HDI, behind only Belarus, due to Russia's relatively high GDP per capita. The dynamics of income inequality in all studied countries is presented in Fig. 1. Georgia and Kazakhstan receive the most investments,

while Turkey and Belarus receive the least. In terms of trade, Belarus, Kyrgyzstan and Moldova have the most open economy, and Russia and Turkey have the most closed. Turkey and Russia export the mostto developed countries, and Ukraine and Turkey to developing countries. From both developed and developing countries, Turkey and Russia import more. The dynamics of countries' economic openness indicators are presented in Fig. 2. Russia and Turkey have the highest per capita incomes, and Kazakhstan is the third in terms of this indicator. This indicator is lower in other countries. Belarus leads in terms of human capital.Average inflation is very high in Belarus, followed by Turkey and Ukraine. Belarus has the most urban population, followed by Russia and Turkey. Georgia has the highest unemployment rate, followed by Armenia and Turkey.

Source: WIID and WB WDI

Table 3
Average Indicators by Country

Variables	Armenia	Belarus	Georgia	Kazakhstan	Kyrgyzstan	Moldova	Russia	Turkey	Ukraine
PALMA	1.24	0.96	1.61	1.14	1.12	1.19	1.75	2.47	0.94
GINI	31.54	27.12	37.36	30.07	29.91	30.81	38.86	45.19	26.57
IHDI	0.69	0.75	0.69	0.72	0.61	0.68	0.74	0.67	0.71
FDI	36.53	17.99	68.35	63.98	40.44	36.68	23.10	17.19	30.20
TR	74.18	129.31	90.34	76.77	110.22	109.30	51.87	53.44	97.05
EXHI	51.74	34.99	29.13	61.06	46.81	55.54	63.89	66.07	40.81
EXLMI	14.04	8.29	8.20	16.99	7.32	2.37	15.40	20.07	24.56
IMHI	40.15	25.02	40.76	35.64	19.74	50.85	58.13	58.71	46.16
IMLMI	20.53	8.25	10.37	16.63	22.70	10.17	24.01	22.74	14.07
GDP	9 859.0	15 682.7	10 522.3	20 601.2	4 249.5	9 121.8	23 294.1	22 441.0	11 600.6
SSE	89.54	109.17	99.97	98.76	87.38	91.50	95.09	96.72	94.08
INFL	3.64	31.63	6.23	12.32	9.70	10.49	12.90	19.53	17.26
URB	63.58	75.21	55.99	56.93	35.76	42.92	73.91	71.21	68.56
UNEMP	11.08	6.91	14.82	6.63	3.02	3.26	6.43	10.22	8.68
Source:Authors' calculations (2026)									

Source:UNCTAD and WB WDI

Table 4 presents a correlation matrix that reflects the pairwise correlations between all included variables.

Table 4
Matrix of Pairwise Correlations Between Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. PALMA	1													
2. GINI	0.99***	1												
3. IHDI	-0.26**	-0.28**	1											
4. FDI	-0.44***	-0.41***	0.01	1										
5. TRADE	-0.58***	-0.59***	-0.04	-0.15	1									
6. EXHI	0.39***	0.40***	-0.22*	0.23**	-0.63***	1								
7. EXLMI	0.40***	0.37***	0.26**	-0.10	-0.52***	0.01	1							
8. IMHI	0.46***	0.44***	0.11	-0.38***	-0.51***	0.42***	0.45***	1						
9. IMLMI	0.36***	0.37***	-0.49***	0.23**	-0.32***	0.20*	0.23**	-0.26**	1					
10. GDP	0.52***	0.50***	0.55***	-0.07	-0.57***	0.34***	0.48***	0.32***	-0.08	1				
11. SSE	0.29**	0.27**	0.40***	-0.07	-0.31***	0.37***	0.07	0.17	-0.10	0.66***	1			
12. INFL	-0.08	-0.09	0.17	-0.15	0.34***	-0.12	0.00	0.03	-0.35***	0.10	0.17	1		
13. URB	0.34***	0.31***	0.65***	-0.44***	-0.19	-0.32***	0.65***	0.31***	-0.23**	0.65***	0.28**	0.23**	1	
14. UNEMP	0.50***	0.50***	0.17	-0.25**	-0.41***	-0.18	0.75***	0.28**	0.32***	0.34***	0.02	-0.04	0.66***	1

* $p<0.1$, ** $p<0.05$, *** $p<0.01$

Source:Authors' calculations (2026)

4. Results and Discussion

Empirical analysis was built around various models.The POLS, FE, and RE models were evaluated, after which the Redundant Fixed Effects and Hausman tests were performed, the results of which showed that the FE model was the best one. The models were estimated in three stages, each of which differs in the selection of the independent variable.In the first stage, the Palma coefficient was selected, in the second, the Gini index, and in the third, the inequality-adjusted human development index.

4.1. Estimation with Palma Coefficient as Dependent Variable

Table 5 presents the results of the estimated models when the Palma coefficient was considered as the dependent variable. The results of the first model show that the increase in FDI stocks has a negative and significant effect on income inequality in the sample countries. The quadratic term of FDI was also found to be significant, but the coefficient is positive, which confirms the non-linearity of the impact of FDI. The results of the second model show that trade openness has no significant effect on income distribution. In the models evaluated next, trade was considered according to its components (models 3–6). The results show that trade with developed countries has no significant effect on income inequality, while the effect of trade with developing countries varies by direction. Exports to developing countries increase inequality, while imports from such countries reduce it. The quadratic terms show that the effect of trade on the level of inequality is also not linear. Specifically, the effect of exports is inverted U-shaped, and the effect of imports is U-shaped.GDP has a significant and negative coefficient in all estimated models (except for the 6th), which means that income growth mitigates the inequality level. The rate of secondary school enrollment also has a significant and negative coefficient, which means that in the studied countries, the role of human capital is quite large in mitigating the level of inequality. This is also proven by the unemployment rate indicator, which has a positive and significant coefficient in all models, which means that increasing unemployment leads to a deepening of inequality. The level of urbanization does not have a significant effect on the level of inequality, and the rate of inflation is significant and positive only in model 4.

Table 5
The Impact of FDI and Trade on Income Inequality (Palma ratio), 2000–2022

Variables	1	2	3	4	5	6
FDI(-1)	-0.008***	-	-	-	-	-
	(-2.947)					
FDISQ(-1)	0.000***	-	-	-	-	-
	(3.337)					
TR(-1)	-	0.003	-	-	-	-
		(0.745)				
TRSQ(-1)	-	0.000	-	-	-	-
		– (0.292)				
EXHI(-1)	-	-	-0.005	-	-	-
			(-0.856)			
EXHISQ(-1)	-	-	0.000	-	-	-
			(0.731)			
EXLMI(-1)	-	-	-	0.017**	-	-
				(2.514)		
EXLMISQ(-1)	-	-	-	-0.001***	-	-
				(-3.240)		
IMHI(-1)	-	-	-	-	-0.007	-
					(-1.083)	
IMHISQ(-1)	-	-	-	-	0.000	-
					(1.463)	
IMLMI(-1)	-	-	-	-	-	-0.032***
						(-4.702)
IMLMISQ(-1)	-	-	-	-	-	0.000***
						(3.316)
GDP	-0.195***	-0.249***	-0.266***	-0.267***	-0.257***	0.065
	(-3.140)	(-4.738)	(-4.984)	(-4.923)	(-4.336)	(0.873)
SSE	-0.008***	-0.006***	-0.006***	-0.007***	-0.006***	-0.008***
	(-5.664)	(-4.730)	(-4.337)	(-5.131)	(-3.826)	(-5.991)
INFL	0.001	0.001	0.001	0.001*	0.001	0.001
	(1.466)	(1.087)	(1.287)	(1.816)	(1.079)	(1.419)
URB	-0.003	-0.008	-0.005	-0.001	-0.002	-0.002
	(-0.440)	(-1.234)	(-0.783)	(-0.161)	(-0.350)	(-0.346)
UNEMP	0.039***	0.026***	0.031***	0.033***	0.031***	0.031***
	(6.469)	(4.363)	(5.380)	(6.097)	(5.432)	(6.070)
Obs.	198	198	198	198	198	198
F-stat	190.13***	183.92***	179.14***	191.85***	181.10***	214.01***
adj. R^2	0.935	0.933	0.931	0.936	0.932	0.942

* $p<0.1$, ** $p<0.05$, *** $p<0.01$, t-values are in parentheses

Source:Authors' calculations (2026)

4.2. **Estimation with Gini coefficient as Dependent Variable**

Table 6 presents the results of the estimated models when the Gini index was considered as the dependent variable. The results obtained almost completely coincide with the data obtained in the previous section, which once again proves that the Palma coefficient is closely related to the Gini index, as proven by Alex Cobham and Andy Sumner, who claim that the components of the Palma ratio are able to explain almost 100% of the variations in Gini index, despite the fact that the Palma coefficient lacks data for the 5th-9th decile groups.

Table 6
The Impact of FDI and Trade on Income Inequality (Gini index), 2000–2022

Variables	1	2	3	4	5	6
FDI(-1)	-0.127***	-	-	-	-	-
	(-3.387)					
FDISQ(-1)	0.001***	-	-	-	-	-
	(3.598)					
TR(-1)	-	0.046	-	-	-	-
		(0.867)				
TRSQ(-1)	-	0.000	-	-	-	-
		(-0.279)				
EXHI(-1)	-	-	0.040	-	-	-
			(0.492)			
EXHISQ(-1)	-	-	-0.001	-	-	-
			(-0.939)			
EXLMI(-1)	-	-	-	0.288***	-	-
				(2.965)		
EXLMISQ(-1)	-	-	-	-0.008***	-	-
				(-3.200)		
IMHI(-1)	-	-	-	-	0.040	-
					(0.439)	
IMHISQ(-1)	-	-	-	-	-0.001	-
					(-0.730)	
IMLMI(-1)	-	-	-	-	-	-0.621***
						(-6.395)
IMLMISQ(-1)	-	-	-	-	-	0.010***
						(4.914)
GDP	-4.152***	-5.200***	-5.618***	-5.820***	-5.578***	0.418
	(-4.561)	(-6.778)	(-7.229)	(-7.250)	(-6.352)	(0.395)
SSE	-0.080***	-0.053***	-0.051**	-0.060***	-0.061***	-0.090***
	(-3.799)	(-2.667)	(-2.487)	(-3.034)	(-2.792)	(-4.646)
INFL	0.016	0.011	0.018	0.020	0.019	0.015
	(1.367)	(0.872)	(1.438)	(1.625)	1.480)	(1.362)
URB	0.161*	0.049	0.098	0.141	0.112	0.165*
	(1.673)	(0.492)	(1.020)	(1.475)	(1.127)	(1.953)
UNEMP	0.574***	0.358***	0.398***	0.474***	0.442***	0.444***
	(6.512)	(4.065)	(4.704)	(5.860)	(5.270)	(6.084)
Obs.	198	198	198	198	198	198
F-stat	143.90***	140.95***	137.50***	141.76***	134.38***	176.12***
adj. R^2	0.916	0.914	0.912	0.915	0.910	0.930

* $p<0.1$, ** $p<0.05$, *** $p<0.01$, t-values are in parentheses

Source:Authors' calculations (2026)

4□3 Estimation with IHDI as Dependent Variable

Table 7 presents the results of the estimated models when the inequality-adjusted HDI was considered as the dependent variable. The results of the first model show that FDI has a significant and positive effect, and its squared term has a negative effect on the dependent variable, which means that increasing FDI stocks mitigate inequality by increasing the value of the index, however, in this case, the nonlinear effect of FDI on the level of inequality is also proven.In the second model, the trade indicator was estimated and found to have a significant impact, in contrast to the previous models, where the Palma coefficient and the Gini index were chosen as inequality indicators.

Table 7
The Impact of FDI and Trade on Income Inequality (IHDI), 2010–2022

Variables	1	2	3	4	5	6
FDI(-1)	0.341***	-	-	-	-	-
	(6.806)					
FDISQ(-1)	-0.002***	-	-	-	-	-
	(-5.760)					
TR(-1)	-	0.283***	-	-	-	-
		(5.995)				
TRSQ(-1)	-	-0.001***	-	-	-	-
		(-4.874)				
EXHI(-1)	-	-	-0.066	-	-	-
			(-0.645)			
EXHISQ(-1)	-	-	-0.001	-	-	-
			(-0.929)			
EXLMI(-1)	-	-	-	-0.170	-	-
				(-1.160)		
EXLMISQ(-1)	-	-	-	0.002	-	-
				(0.445)		
IMHI(-1)	-	-	-	-	0.416***	-
					(3.462)	
IMHISQ(-1)	-	-	-	-	-0.006***	-
					(-4.183)	
IMLMI(-1)	-	-	-	-	-	-0.431**
						(-2.291)
IMLMISQ(-1)	-	-	-	-	-	0.007*
						(1.791)
GDP	3.329***	4.312***	7.683***	6.432***	5.540***	7.362***
	(5.644)	(8.467)	(12.212)	(12.212)	(10.112)	(10.699)
SSE	0.155***	0.069**	0.041	0.052	0.074*	0.036
	(4.024)	(2.018)	(1.115)	(1.146)	(1.879)	(0.758)
INFL	-0.012	-0.039**	-0.012	-0.018	-0.016	-0.027
	(-0.686)	(-2.282)	(-0.698)	(-0.843)	(-0.837)	(-1.262)
URB	0.270***	0.171***	0.003	0.096***	0.098***	0.033
	(7.462)	(6.236)	(0.097)	(3.003)	(3.726)	(1.114)
UNEMP	-0.468***	-0.289***	-0.335***	-0.122*	-0.264***	-0.136*
	(-6.781)	(-4.784)	(-5.650)	(-1.720)	(-3.886)	(-1.918)
Obs.	117	117	117	117	117	117
F-stat	248.65***	215.20***	224.66***	217.64***	217.62***	219.46***

* $p<0.1$, ** $p<0.05$, *** $p<0.01$, t-values are in parentheses

Source: Authors' calculations (2026)

Variables	1	2	3	4	5	6
adj. R^2	0.715	0.749	0.730	0.591	0.665	0.603
* $p<0.1$, ** $p<0.05$, *** $p<0.01$, t-values are in parentheses						
Source: Authors' calculations (2026)						

In this case, trade affects inequality in the same way as FDI stocks. The results of models 3–6 show that exports have no significant impact, while the impact of imports varies by source. The impact of imports from developed countries is the same as in the case of total trade and FDI, but the direction of the effect is reversed for developing countries. Increasing imports from developing countries leads to a decrease in the dependent variable, which implies a deepening of inequality, but in this case the effect is also not linear. GDP is a significant factor in all models and mitigates inequality, while secondary school enrollment is significant only for the first, second, and fifth models. The increase in the unemployment rate and the inflation rate negatively affect the value of the index, deepening the level of inequality, but inflation is significant only for the second model. The level of urbanization moderates inequality, but the effect is not significant for the third and sixth models.

5 Conclusions

This research aims to identify the impact of FDI and trade openness on income inequality in 9 countries in the region, using data from 2000–2022. The assumption was that both FDI and trade openness should be significant factors in the level of income inequality. Palma ratio, Gini index, and inequality-adjusted HDI were used as indices measuring inequality.

The results of the research showed that FDI is an important factor for the level of inequality in all three indicators. The coefficients obtained for the square of FDI indicate that the FDI-inequality relationship is not linear and has a U-shaped form. Trade is not a significant factor when interacted with the Palma and Gini indices, but it is a significant factor for the inequality-adjusted HDI, and its relationship with inequality also U-shaped.

Declarations

Conflicting results were obtained when the impact of trade was assessed by components.In case of interaction with Palma and Gini indices, the results showed that trade with developed countries is not significant at all. In the case of developing countries, the import-inequality relationship is characterized by a U-shaped curve, and the export-inequality relationship by an inverted U-shaped curve. When inequality-adjusted HDI was considered, the results showed that exports to both developed and developing countries had no significant impact. The impact of imports from developed countries is characterized by a U-shaped curve, and from developing countries by an inverted U-shaped curve.

Competing Interests/ Conflicts of Interest

The authors declares no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Author Contribution

All authors whose names appear on the submission made substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data; or the creation of new software used in the work;drafted the work or revised it critically for important intellectual content;approved the version to be published; and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Data Availability Statement

Data supporting the findings of this study are available from relevant sources and authors upon request.

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Figures

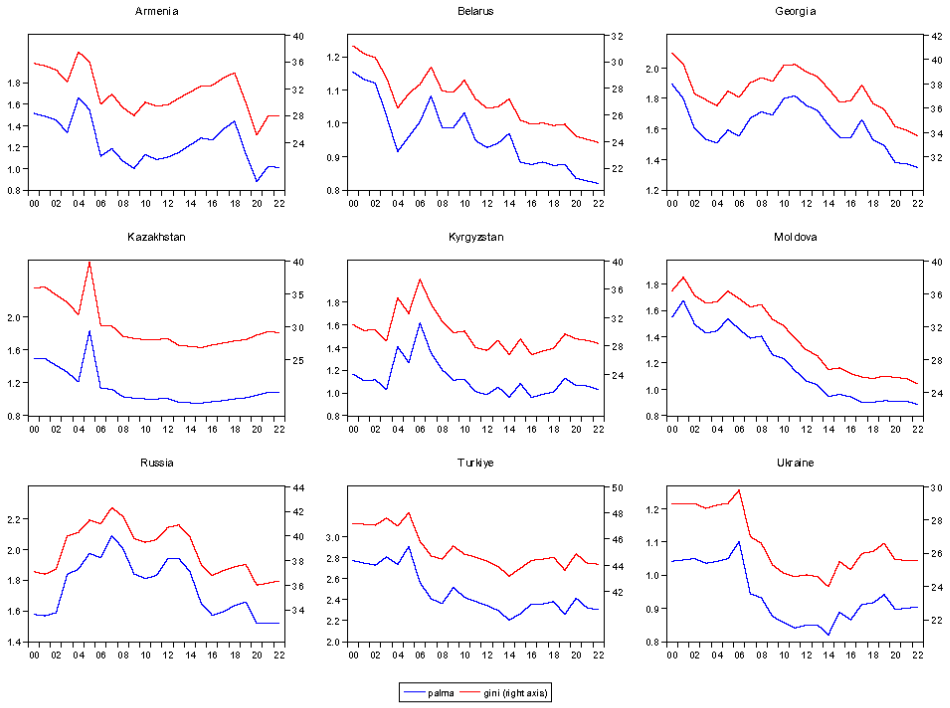


Fig. 1: Dynamics of inequality levels by country, 2000-2022

Source: WIID and WB WDI

Figure 1

See image above for figure legend

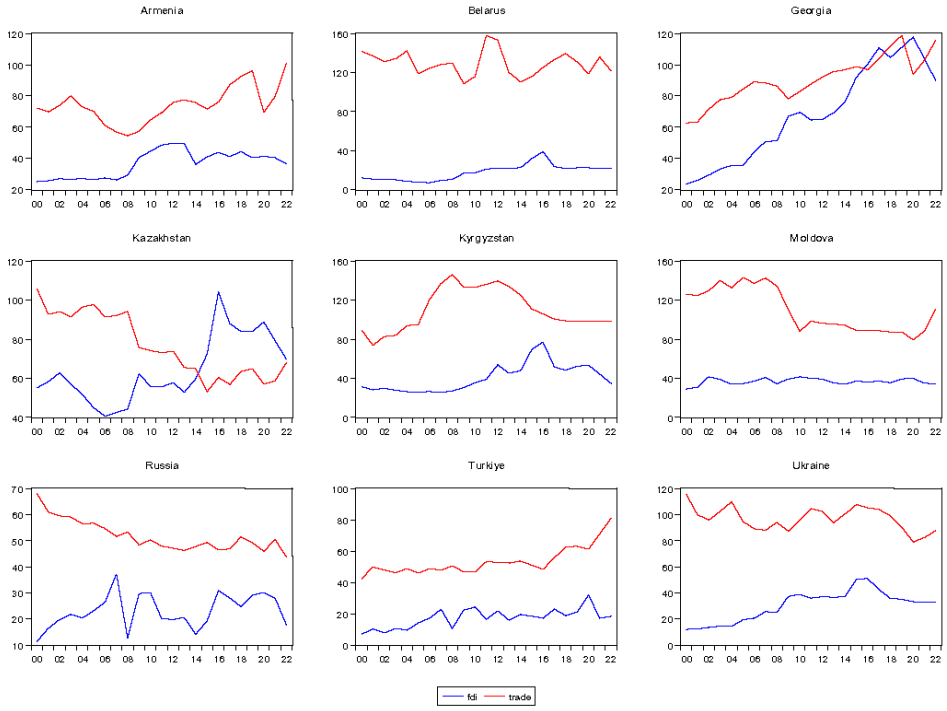


Fig. 2. Dynamics of economic openness indicators by country, 2000-2022

Source:UNCTAD and WB WDI

Figure 2

See image above for figure legend