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ANALYSIS OF THE INFLUENCE OF INTERNATIONAL TRADE AND PER CAPITA INCOME ON ECONOMIC INEQUALITY IN THE UNITED STATES 1975-2023

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Abstract

This study examines the relationship between income inequality and trade openness to economic growth in the United States during the period 1975 to 2023. The study answers the classic question: does globalization encourage inclusive development or does it widen economic disparities? In particular, this study asks how trade and income inequality affect the trajectory of real GDP per capita. The novelty of this study lies in the integration of the variables of inequality and trade in a single long-term time series model over nearly five decades, an approach that is still rarely applied in studies focusing on the United States context. Unlike previous studies that generally examined these two variables separately, this study brings them together in one simultaneous analytical framework. Using quantitative methods and annual data from the World Development Indicators, this study applied multiple regression analysis, ADF stationarity test, Johansen cointegration test, and Granger causality test. The results show that GDP is already stationary at the level, while the Gini and Trade Indices are stationary after the first differentiation. No long-term equilibrium relationship (cointegration) between variables was found, but there was a two-way causal relationship between inequality and GDP. The findings show that both income inequality and trade openness have a significant effect on economic growth, albeit through different mechanisms. The influence of trade is contextual depending on the quality of institutions and the flexibility of the labor market, whereas inequality has a more direct macroeconomic impact. These findings support the structuralist critique that liberalization requires redistribution mechanisms to avoid inequality. This study concludes that openness and growth can go hand in hand, but must be supported by inclusive policies. Redistribution mechanisms, progressive taxes, and investment in human capital are key to ensuring equitable distribution of growth results. Further research is suggested using dynamic models such as ARDL or VECM and extending the scope of variables to technological, institutional, and fiscal policy aspects.

INTRODUCTION

Income inequality and trade liberalization have been central issues in the United States economy for the past five decades. Although per capita income growth tends to increase in aggregate, disparities between income groups are widening, suggesting that the outcomes of growth are not evenly distributed (Piketty et al., 2023);(Bhatt, Anjali; Kolb, Melina; Ward, 2020)

Grafik 1. GDP per kapita (1975–2023)

Source: Word Development Indicators (2024)

Globalization and trade openness since the 1980s are considered to play an ambivalent role as well as a driver of growth and a cause of inequality (Elhanan Helpman Working, 2016).

This phenomenon became even more striking after 1990, when a wave of international trade expansion significantly increased the value of U.S. export-imports. However, along with this, data from (Indicators, 2024) showed a steady increase in the Gini Index, especially after the global financial crisis and China's entry into the WTO.

Graph 2. Gini Index (1975–2023)

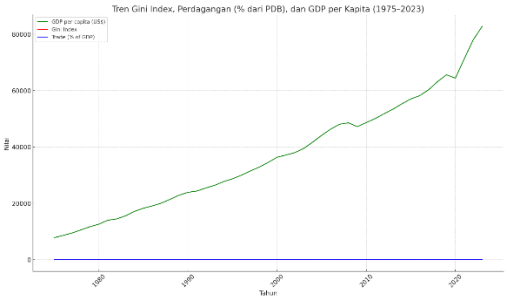
Source: Word Development Indicators (2024)

Graphs 1 and 2 illustrate that although GDP per capita has nearly tripled since 1975, the Gini Index still shows an upward trend.

Graph 3. Trade Value, 1975–2023

Source: Word Development Indicators (2024)

Graph 4. Combined GDP – Gini – Trade (1975–2023)



Source: Word Development Indicators (2024)

Graphs 3 and 4 confirm that the surge in trade has coincided with stagnation of inclusivity, raising a fundamental question: does trade really improve well-being equally?

In understanding the relationship between income growth, trade, and inequality, there is a theoretical debate between the neoclassical approach and the theory of dependency. The neoclassical perspective assumes that the free

market will drive efficiency, specialization, and ultimately fair distribution through the trickle-down effect (Kostis, 2004). However, structuralist approaches and dependency theory highlight how international trade relations create dependencies that are exploitative, exacerbating the gap between the center and the periphery, even in the context of developed countries (Özekin, 2023); (Kuran, 2024).

A number of studies reinforce these findings. Wolszczak-Derlacz & Parteka, (2018), showing that increased openness with trade further increases inequality in OECD countries. (Naz, 2023), found a positive correlation between export volumes and the Gini index in the US post-2001. (Ghoshray et al., 2022), confirming that although trade increases productivity, its distributive effects are precisely uneven. (Hartmann & Pinheiro, 2024), stating that export-based economic growth does not guarantee vertical mobility for low-income groups. In research Howell & Kalleberg, (2019), highlighting how the transformation of the technology- and trade-based labor market is leading to income polarization.

In addition, a study by (Antràs & Chor, 2021), highlighting the role of global value chains in lowering the real wages of the U.S. workforce, while (Goldberg & Pavcnik, 2016), underscoring the link between trade expansion and declining share of labor income. (Paper et al., 2024), adding that increased dependence on imports of consumer goods has led to the erosion of the domestic manufacturing sector. On the other hand, (Coveri et al., 2024), showing that countries with high value-added industrial structures are better protected from global inequality.

Findings from Forster et al., (2020)and (Cingano, 2023), concluding that adaptive social policies are key in mitigating the negative effects of liberalization. In research Cave & Cammers-Goodwin, (2024), even attributing U.S. deindustrialization as a consequence of free trade, which has an impact on lower-middle working groups. (Baselgia & Foellmi, 2023), reinforcing the argument that passive redistribution through markets is not enough to create inclusive growth. Last (Conceição, 2024), asserting that the separation between growth and social justice will only create the stagnation of economic democracy in the long run.

Although studies on the relationship between per capita income and inequality have been extensive, studies that specifically examine long-term dynamics in the US context during the period 1975–2023, by integrating trade variables as mediators, are still relatively limited. A holistic approach that combines macroeconomic dimensions and micro-distributions becomes essential to understand the complexity of these relationships empirically. This research aims to contribute to the debate through quantitative analysis based on long-term time series data, as well as to build a theoretical foundation that can reconcile the antagonism between growth and distribution justice within the framework of the global economy.

LITERATURE REVIEW

The study of the relationship between per capita income growth, income inequality, and international trade has been at the center of theoretical and empirical debate in economics. The approaches used in the literature fall into two major camps: the liberal or neoclassical

approach and the structuralist or dependency approach.

Early studies based on the neoclassical framework assumed that free trade and economic growth would automatically reduce inequality. The Heckscher-Ohlin and Stolper-Samuelson theories emphasize that labor-rich countries will experience increased labor wages and decreased inequality once they are integrated into the global market (Siddique, 2021). Some studies support this view, as found by (Dollar & Kraay, 2001), which suggests that trade can accelerate economic growth and lower inequality when supported by redistribution and education policies.

However, previous contemporary findings from other literature suggest that this relationship is not linear. Structuralist approaches and dependency theory suggest that unbalanced global integration often creates a concentration of wealth among capital owners, increasing social inequality and income (Wade, 2021). In research (Pfeffer et al., 2020) Affirming that globalization and per capita income growth actually strengthen the accumulation of wealth by the upper class, without bringing real improvements to the middle and lower groups.

In the context of the United States, various studies have delivered mixed results. In research (B. D. Autor et al., 2025) and shows that the expansion of trade with China (China shock) has a negative impact on manufacturing workers, who are losing their jobs and facing income stagnation. This is reinforced by (Feenstra & Sasahara, 2017), which found that regions with high exposure to imports from Asia experienced increased regional income inequality.

On the other hand, some literature highlights that the effect of per capita income growth on inequality is highly dependent on state policies. In research (Zweimüller, 2000) argues that innovation and productivity can drive inclusive growth only when combined with effective redistribution and a progressive taxation system. In research Tica et al., (2022) suggests that rapid growth without social protection can exacerbate inequality.

A number of empirical studies have also proven the statistical relationship between these variables. In research Edwards, (2002) found that GDP growth per capita does not necessarily automatically lower the Gini Index. In contrast to predictions (Majeed, 2016), which states that inequality increases in the early stages of growth and will decline once it reaches a certain threshold, contemporary studies show that inequality can continue to increase even as national incomes grow (Milanovic, 2024).

In cross-country studies, Cerdeiro & Komaromi, (2021) concludes that countries with high trade expansion experience a surge in inequality if not accompanied by strong welfare systems. In the United States, the effect of trade on inequality is influenced by the liberalization of the labor market and the weakness of labor unions (Card et al., 2020).

Some literature also highlights the importance of technological change and automation in mediating these relationships. (Lynn) et al., n.d.) It shows that technological advances contribute to job polarization, which widens the gap

between high- and low-skilled workers.

However, there is a gap in the literature that quantitatively examines the long-term relationship between these three variables—per capita income, inequality, and trade—in a single integrative model, particularly in the context of the post-1975 United States, which includes the era of modern globalization. Most previous studies only tested the relationship between two variables or focused on short periods.

Therefore, this study is here to fill this gap by using long-time series data (1975–2023), to simultaneously analyze the effect of per capita income on inequality and trade value. The study is expected to contribute to policy discussions on how economic growth can be managed to be inclusive in the era of global trade.

The study of the relationship between per capita income, inequality, and international trade remains at the center of theoretical and empirical debate in economics. Two major approaches color this literature: the liberal neoclassical approach and the critical structuralist approach. In the neoclassical framework, free trade and economic growth are believed to be able to reduce inequality through trickle-down mechanisms and market efficiency (Siddique, 2021). Seminal studies by (Dollar & Kraay, 2001)Supporting this view, emphasizing that trade openness accompanied by education and redistribution can reduce inequality.

However, the structuralist approach suggests that global economic integration often deepens inequality, especially when states lack strong institutional capacity (Wade, 2021).(Pfeffer et al., 2020). In the context of the United States, (B. D. Author et al., 2025) suggests that the "China shock" is causing job losses in the manufacturing sector, which is reinforced by the findings (Feenstra & Sasahara, 2017). Research by Hötte et al., (2023) Through a systematic review it concluded that technology and globalization magnify inequality through its effects on low-income jobs.

On the other hand, (Gilfoyle, 2023) asserts that automation widens the income gap if it is not balanced with adaptive labor market policies. (Taniguchi & Yamada, 2022) It also found that the impact of technology on wages and labor participation is highly dependent on institutional design. In fact, the IMF report (Close, 2021) states that trade is only inclusive when accompanied by strong structural adjustment policies and social interventions.

In research Acemoglu & Restrepo, (2019), asserting that technology-based growth does not automatically create economic justice; Instead, capital accumulation tends to be centralized on technology owners. (Adolph, 2016) The cross-country panel study also showed that financial and trade liberalization widens inequality except under good governance conditions. On the fiscal side, (Gerber *et al*., 2021) states that only progressive tax reform can keep pace with the exclusive growth trend.

In the context of the relationship between per capita income and inequality, studies such as (Zweimüller, 2000) Showing that productivity can drive inclusive growth when combined with a progressive tax system. Instead (Tica) *et al*., 2022) It shows that countries with high growth but without social policies actually widen

the income gap. In research (Edwards, 2002) and (Majeed, 2016) suggests that GDP per capita is not necessarily negatively correlated with the Gini index, and in most cases, the correlation is non-linear. (Gerber *et al*., 2021) It also concludes that inequality trends are strongly influenced by long-term structural dynamics.

(Cerdeiro & Komaromi, 2021) In cross-country studies, it is confirmed that trade expansion without strengthening the social security system actually increases disparities. In the US, inequality is also exacerbated by weakening trade union strength and liberal labor market policies (Card et al., 2020). Research by Freeman, (2024) adding that the global trade architecture contains asymmetrical power relations between central and peripheral countries, even in the context of developed countries such as the US.

However, despite the extensive literature, there are still gaps in the integration of simultaneous models that include the effect of per capita income on inequality and trade quantitatively in a single long time-series frame. In research Shojaie & Fox, (2022) encourages the application of causality approaches in the context of time series to explain multivariate relationships. Therefore, this study is here to answer this gap, using annual data 1975–2023 to analyze the simultaneous interconnectedness of the three main variables in the context of the political economy of the modern United States.

METHODOLOGY

1. Sampling
   This study uses a quantitative approach with annual time series data from 1975 to 2023, as many as 49 observations. The unit of analysis is an all-time United States macroeconomic indicator, with target populations in the form of macroeconomic aggregates such as real GDP per capita, income inequality, and trade openness. The context of the study refers to long-term economic trends influenced by structural changes in inequality and globalization. The sample used was non-probabilistic and included the overall annual data available during the observation period without random processes. This approach corresponds to the characteristics of time series macroeconomic data that aim to capture systemic relationships in historical trajectories (Enders, 2015).
2. Data Collection
   The data used in this study is sourced from the World Development Indicators (WDI) database published by the World Bank (Indicators, 2024). The data collection process was carried out by taking real GDP per capita data (in constant US dollars 2015), the Gini Index as a proxy for income inequality, and trade openness measured through the ratio of exports and imports to GDP. These data sources are open, have been internationally standardized, and are often used in empirical economic research, thus ensuring validity and comparability (Wooldridge, 2016).
3. Measurements and Variables
   The variables in the model are analyzed with logarithmic transformations (if necessary) to stabilize the variance, smooth out the relationship, and allow interpretation in the form of elasticity. The specifications of the regression model are as follows:

$$LNGDP_t = \beta_0 + \beta_1 LNGI_t + \beta_2 TRD_t + e_t$$

Where:
$LNGDP_t$= Real GDP per capita
$LNGI_t$= Gini Index
TRD_t= Trade to Gross Domestic Product (% GDP) ratio
e_t= Error term, i.e. residual components that reflect the influence of other variables not included in the model
Logarithmic transformations in GDP and Gini follow common practice in econometric modeling to address heteroscedasticity with non-linearity problems (Socrates, 2017).

4. Data Analysis Techniques
The estimation method used is regression *Ordinary Least Squares (OLS)*. This technique was chosen because of its easy-to-interpret nature, efficient under Gauss-Markov assumptions, and suitable for use in preliminary analyses to test causal influences in economic models (Tananaiko et al., 2023). Before estimating, a stationary test was carried out using the *Augmented Dickey-Fuller (ADF)* to ensure that all variables are integrated to the same degree and prevent false regressions from occurring (Enders, 2015).
The regression model is also tested with the following classic assumptions:
   1. Normality tests (Jarque-Bera or Shapiro-Wilk) are used to test the residual distribution.
   2. The Stationarity Test aims to ensure that time series data does not contain pseudo-regression. The ADF test is used, where the data is said to be stationary if the probability value < 0.05.
   3. The Cointegration test was conducted to test the long-term relationship between non-stationary variables. This study uses the Johansen test through trace and maximum eigenvalue statistics.
   4. The multicollinearity test is carried out through the Variance Inflation Factor (VIF) value to ensure that independent variables do not have a high correlation.
   5. The heteroscedasticity test uses the Breusch–Pagan method to check if the residuals have a constant variance.
   6. Autocorrelation tests are performed through Durbin-Watson statistics and Breusch-Godfrey tests to detect serial correlations in residuals.

To improve the accuracy of causal analysis, a Granger causality test was performed. This test is used to assess whether the past value of a variable can predict the value of another variable, so as to identify the direction of temporal relationships in the system (Shojaie & Fox, 2022); (Lutkepohl, 2019). This test is relevant in macroeconomic contexts where reciprocal relationships between variables are highly likely.

RESULT

INTERPRETATION OF THE CLASSICAL ASSUMPTION TEST:

Table 1. Autocorrelation Test (dwatson stat)

Command	Result
Durbin–Watson d-statistic (3, 49)	0.457165

Source: Stata Processing Results 17

Based on the results of the Durbin-Watson test, a d-statistical value of 0.4572 was obtained. This value is well below the number 2, which indicates that there is a positive autocorrelation in the regression model. This means that there is a correlation between the current residual value and the previous residual value, which can cause the model's estimation to be biased and inefficient if not addressed.

Table 2. Autocorrelation Test (estatbgodfrey)

lags(p)	chi2	df	Prob > chi2
1	26.037	1	0

Source: Stata Processing Results 17

The results of the Breusch-Godfrey test show a Prob value > chi2 of 0.0000, which is smaller than 0.05. That is, the hypothesis of zero H0 (no autocorrelation) is rejected, so it can be concluded that there is an autocorrelation in the regression model. These findings reinforce the results of the previous Durbin-Watson test.

Table 3. Normality Test (sktest resid)

Variable	Obs	Pr(Skewness)	Pr(kurtosis)	Adj chi2(2)	Prob > chi2
resid	49	0.0016	0.0137	12.81	0.0017

Source: Stata Processing Results 17

Based on the results of the normality test with the resid test order, a Prob > chi2 value of 0.0017 was obtained. Since this value is less than 0.05, it can be concluded that the residue is not normally distributed. This means that the regression model violates the assumption of normality, so further handling is needed, such as data transformation or the use of robust regression methods against normality violations.

Table 4. Results of ADF Stationarity Test on lnGDP Variable

		Dickey-Fuller critical value		
	Test statistic	1%	5%	10%
Z(t)	-4.749	-3.594	-2.936	-2.602

Mackinnon approximate p-value for Z(t) = 0.0001

Source : Stata Processing Results 17

Based on the results of the Augmented Dickey-Fuller (ADF) test on the lngdp variable, the statistical value of the Z(t) test was obtained of -4,749, which is smaller than the critical value at the significance level of 5% (-2,936) or 1% (-3,594). In addition, a very small p-value of 0.0001 also indicates that the result is statistically significant. Thus, the null (H0) hypothesis that the lngdp variable contains root units or is non-stationary is rejected. This means that the lngdp variable has met the stationary properties at the level. The implication of these findings is that lngdp can be used directly in econometric analysis without the need for further transformation to the first form of differentiation. However, because the lngdp is already stationary at the level, this variable is not suitable for cointegration testing with other variables that are stationary only at the first difference (I(1)), because the cointegration condition requires that all variables be in the same order of integration.

Table 5. ADF Stationarity Test Results on lnGI Variables

		Dickey-Fuller critical value		
	Test statistic	1%	5%	10%
Z(t)	-6.781	-3.594	-2.936	-2.602

Mackinnon approximate p-value for Z(t) = 0.0000

Source : Stata Processing Results 17

The results of the Augmented Dickey-Fuller (ADF) test on the dlngi variable showed a value of Z(t) = -6.761 with a p-value = 0.0000, which is smaller than the critical values at the significance levels of 1%, 5%, and 10%. This shows that the variable is stationary, so the null hypothesis is rejected. Thus, lngi is not stationary at the level but becomes stationary after the first differentiation, or is integrated on the order of one (I(1)).

Table 6. ADF Stationarity Test Results on Variable trd

		Dickey-Fuller critical value		
	Test statistic	1%	5%	10%
Z(t)	-7.198	-3.594	-2.936	-2.602

Mackinnon approximate p-value for Z(t) = 0.0000

Source : Stata Processing Results 17

The results of the Augmented Dickey-Fuller (ADF) test on the dtrd variable showed a statistical value of Z(t) = -7,198 with a p-value = 0.0000, which is much smaller than the critical values at significance levels of 1% (-3,594), 5% (-2,936), and 10% (-2,602). This means that the null hypothesis is rejected, so the dtrd variable is stationary. Thus, the trd variable is not stationary at the level, but becomes stationary after the first differentiation, or is integrated on order one (I(1)).

Table 7. Optimal Lag Determination Results with AIC, HQIC, and SBIC Criteria

Sample : 1975 thru 2023 obs : 49

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-22.8043	0	0	0	0.000632	1.14686	1.19176	1.2673
1	162.897	372.4	9	0,000	2.50E-07	-6.70652	-6.52692	-6.22474
2	172.034	18.275	9	0.032	2.50E-07	-6.71264	-6.39834	-5.86953
3	181.423	18.777	9	0.027	2.50E-07	-6.72992	-6.28091	-5.52547
4	186.968	11.09	9	0.27	2.90E-07	-6.57636	-5.99266	-5.01059

Source: Stata Processing Results 17

Based on the results of the optimal lag selection test (varsoc) for the variables lngdp, lngi, and trd, it was obtained that the recommended optimal lag was lag 3. This is shown by the lowest Akaike Information Criterion (AIC) and Hannan-Quinn Information Criterion (HQIC) values at the 3rd lag, at -6.7292 and -6.28091, respectively. Although the Schwarz Bayesian Information Criterion (SBIC) chose the 1st lag because of its lowest value of -6.22474, the general decision in econometric practice is to follow the majority of information criteria, especially AIC and HQIC as both are more tolerant of model complexity in an intermediate sample like this. Therefore, the 3rd lag is chosen as the optimal lag for use in advanced models such as VAR, VECM, and Johansen Cointegration Test. This lag selection is important so that the model does not experience overfitting or underfitting, and can capture the dynamics of the relationship between variables more accurately.

Table 8. Results of the Johansen Cointegration Test between lnGDP, lnGI, and TRD

obs : 49

Sample : 1975-2023 lags : 4

Maximum rank	Params	LL	Eigenvalue	Trace statis	Critical value 5%
0	21	169.58738	.	25.1033	29.68
1	26	178.00618	0.30652	8.2657	15.41
2	29	182.07022	0.16197	0.1376	3.76
3	30	182.13903	0.00299		

Maximum rank	Params	LL	Eigenvalue	Maximum	Critical value 5%
0	21	169.58738	.	25.1033	20.97
1	26	178.00618	0.30652	8.2657	14.07
2	29	182.07022	0.16197	0.1376	3.76
3	30	182.13903	0.00299		

Source : Stata Processing Results 17

Based on the results of the Johansen co-integration test using the vec rank model on the variables lngdp, lngi, and trd with a constant trend and three lags, it was obtained that the trace statistic value at rank 0 of 25.1033 was smaller than the 5% critical value of 29.68. This shows that there are no more than zero cointegration vectors in the system, which means that the zero hypothesis (no cointegration) cannot be rejected. Similarly, the trace statistic values at rank 1 and 2 are 8.2657 and 0.1376, respectively, also smaller than the critical values of 15.41 and 3.76. This result is reinforced by the Maximum Eigenvalue test which shows that the entire maximum statistical value (16.8376; 8.1281; and 0.1376 respectively) is also below the critical value of 5%, i.e. 20.97; 14.07; and 3.76. Thus, it can be concluded that there is no cointegration relationship between real GDP (lngdp), investment (lngp), and trade (trd) variables in the long term during the period 1975 to 2023.

Table 9. Multicolityiness Test (vif)

Variable	BRIGHT	1/LIVE
lngi	3.39	0.295069
Trd	3.39	0.295069
Mean VIF	3.39	

Source: Stata Processing Results 17

Based on the results of the multicollinearity test using the Variance Inflation Factor (VIF), a VIF value of 3.39 was obtained for each of the lngi and trd variables, and the Mean VIF = 3.39. Since the VIF value is still below the general threshold of 10, there is no indication of serious multicollinearity in this regression model. Thus, the relationship between independent variables is still within reasonable limits and does not influence each other excessively.

Table 10. Heteroscedasticity Test (hettest stat)

H0 : Constant variance

Chi2(1)	0.74
Prob > chi2	0.3897

Source: Stata Processing Results 17

Based on the results of the Breusch-Pagan/Cook-Weisberg heteroscedasticity test, the above Prob > chi2 value of 0.3897 was obtained. Since this value is greater than 0.05, there are no symptoms of heteroscedasticity in the model. That is, the residual variance is constant, so the assumption of homogeneity is fulfilled and the regression model can be said to be valid from this side.

Table 11. Causality Test (vargranger)

Equation	Exluded	chi2	df	Prob > chi2
1ngdp	1ngi	73.506	2	0.025
1ngdp	trd	44.881	2	0.106
1ngdp	ALL	13.336	4	0.010
1ngi	1ngdp	98.662	2	0.007
1ngi	trd	56.107	2	0.060
1ngi	ALL	16.966	4	0.002
trd	1ngdp	.38864	2	0.823
trd	1ngi	6.496	2	0.039
trd	ALL	10.96	4	0.027

Source: Stata Processing Results 17

Based on the results of Granger's causality test, it was found that there was a reciprocal relationship between several variables. The real GDP variable (lnGDP) was shown to be significantly influenced by the industrial investment variable (lnGI) with a probability value of 0.025, and overall by all independent variables with a probability value of 0.010. However, the trading variable (trd) does not have a significant influence on lnGDP because it has a probability value of 0.106. In contrast, lnGI was significantly influenced by lnGDP (p = 0.007) and all independent variables together (p = 0.002), while the influence of trd was close to

significant (p = 0.060). For the trd variable, no significant influence was found of lnGDP (p = 0.823), but there was a significant influence of lnGI (p = 0.039) and all independent variables (p = 0.027). Thus, it can be concluded that there is a two-way relationship between lnGDP and lnGI, whereas the trd variable is only influenced by lnGI and does not significantly affect the other variables.

Table 12. Regression Test

Source	SS	df	MS		Number of obs	49
Model	169.439.111	2	847.195.554		F(2,46)	203.91
Residual	191.114.764	46	.041546688		Prob > F	0.000
Total	188.550.587	48	.392813723		R-squared	0.8986
					Adj R-squared	0.8942
					Root MSE	.20383

1ndp	Coeffisient	Std. err.	t	P>|t|	[95% conf.	intreval]
1ngi	737.564	.9368485	7.87	0.000	5.489.862	9.261.418
trd	.0424414	.01211543	3.49	0.001	.0179761	.0669068
_cons	-1.769.795	3.209.296	-551	0.000	-2.415.793	-1.123.797

Source: Stata Processing Results 17

Table 13. Coefficient DeterminationTest

Number of obs	49
F(2,46)	203.91
Prob > F	0.0000
R-squared	0.8986
WO R-squared	0.8942
Root MSE	.20383

Source: Stata Processing Results 17

It is known that the *value of Adj R-Square* is 0.8942, so this value shows how much independent variables in this case Gini Index (X1) and Trade (X2) are able to explain the changes that occur in the dependent variables, namely GDP (Y) means that 89.42% of the variation in GDP can be explained by Gini Index (X1) and Trade (X2), while the remaining 10.58% is explained by other factors outside this study.

Table 14. F Test (Simultaneous)

Number of obs	49
F(2,46)	203.91
Prob > F	0.0000
R-squared	0.8986
WO R-squared	0.8942
Root MSE	.20383

Source: Stata Processing Results 17

It is known that *the Prob (Significance)* value of 0.0000 (<0.05) concludes that the independent variable Gini Index (X1) and Trade (X2) simultaneously have a significant effect on GDP (Y). This means that both variables are indeed relevant and important to explain or influence inclusive growth.

Table 15. T Test (Hypothesis Test)

1ndp	Coeffisient	Std. err.	t	P>|t|	[95% conf.	intreval]
1ngi	737.564	.9368485	7.87	0.000	5.489.862	9.261.418
trd	.0424414	.01211543	3.49	0.001	.0179761	.0669068
_cons	-1.769.795	3.209.296	-551	0.000	-2.415.793	-1.123.797

Source: Stata Processing Results 17

- Variable X1 (Gini Index) has a Prob (Significance) value of 0.000 (>0.05) with t Table of 2.013, so it can be concluded that variable X1 has a significant effect on variable Y (GDP). This means that the higher the inequality (Gini Index), the GDP will also increase.
- The variable X2 (Trade) has a Prob (Significance) value of 0.001 (>0.05) with a Table t of 2.013, so it can be drawn that the conclusion that the X2 variable has a significant effect on the variable Y (GDP). This means that the larger the trade, the GDP will also increase.

Table 16. Regression equations

1ndp	Coeffisient	Std. err.	t	P>|t|	[95% conf.	intreval]
1ngi	737.564	.9368485	7.87	0.000	5.489.862	9.261.418
trd	.0424414	.01211543	3.49	0.001	.0179761	.0669068
_cons	-1.769.795	3.209.296	-551	0.000	-2.415.793	-1.123.797

Source: Stata Processing Results 17

$$\ln(GDP_t) = \beta_0 + \beta_1 \ln(Guinea_t) + \beta_2 Trade_t + et$$

$$\ln(GDP_t) = -17.69795 + 7.37564 + 0.0424414$$

- The Intercept constant of -17.69795 indicates that if all independent variables (ln(GINI) and TRADE) are in a constant condition or equal to zero, then the value of ln(GDP) is estimated to be -17.69795. Nonetheless, this value is economically meaningless because in reality, the value of GINI and trade is unlikely to be zero.
- The variable coefficient of ln (GINI) is 7.37564 and is statistically significant (p-value = 0.000) shows that if income inequality (GINI index) increases by 1 percent, then Gross Domestic Product (GDP) will increase by 7.38 percent, assuming the other variables remain the same. Thus, in this study, GINI has a positive relationship with GDP, which can indicate that an increase in income inequality in the short term correlates with economic growth.
- The variable coefficient of TRADE of 0.04244 and significant (p-value = 0.001) indicates that every 1 unit increase in the international trade indicator will increase GDP by 0.042 percent. This shows that international trade plays an important role in driving economic growth.

Discussions

The results of multiple linear regression model estimation show that income inequality (Gini Index) and trade openness (Trade) significantly affected the real GDP (GDP) of the United States during the period 1975–2023. The value of the determination coefficient (Adjusted R^2 = 0.8942) states that about 89.42% of the variability in GDP can be explained by the combination of these two independent variables. These results are consistent with the findings (Lang & Tavares, 2024), (Monfort et al., 2020) and (Material, 2010), and reinforced by (LAGET et al., 2019), which shows that global economic integration and domestic distribution structures are the dominant factors in influencing the dynamics of economic growth.

A significant positive coefficient on the Gini Index indicates that an increase in inequality is positively correlated with GDP growth. These findings support the literature that states that in developed countries with high levels of capital accumulation, inequality may reflect an increase in the income of the upper group that drives consumption and investment, as explained by (Barro, 2000) and (Redding, 2010), and is supported by (Brueckner & Lederman, 2018). Nevertheless, these results are also controversial, as many studies suggest that extreme long-term inequality can weaken macro stability and undermine the foundations of inclusive growth (Rahmad, 2016).

Furthermore, trade openness also shows a significant positive influence on GDP growth. This is in line with the results of classical research (Frankel & Romer, 1996), as well as a recent study from (Rodrik, 2018), as well as additional studies (Yan & Liu, 2024), which suggests that trade improves allocative efficiency and expands access to technology and global markets. Nonetheless, these effects are contextual and highly dependent on the structure of the labor market and the capacity of national institutions (Eaton et al., 2022).

Before the model was estimated, stationarity testing was carried out using Augmented Dickey-Fuller (ADF). The results showed that the GDP variable (lngdp) was already stationary at the level (Z(t) = -4.749; p = 0.0001), while the Gini Index (lngi) and Trade (trd) only became stationary after the first differentiation, which means that they were integrated on order one (I(1)). Thus, caution is required in advanced modeling, since the main requirement in the cointegration test is that all variables have the same order of integration.

Furthermore, the determination of the optimal lag was carried out using the AIC, HQIC, and SBIC criteria, where the

3rd lag was chosen because it provided the lowest AIC and HQIC values. This ensures that the model can capture short-term dynamics between variables more accurately.

Granger's causality test in this model found that only the inequality variable (lnGI) had a two-way relationship with GDP, while trade openness (TRD) showed no direct causal relationship with GDP. These results reinforce the conclusions of the (Pierce & Schott, 2016) and (Vandekerckhove, 2014), which states that the relationship between liberalization and economic growth in developed countries is nonlinear and requires strong domestic policy intermediation. In contrast, inequality appears to have a more direct effect on macroeconomic dynamics, as confirmed by ARDL panel research by (Seyfullayev, 2022), and as evidenced in studies (Alvaredo, F., Chancel, L., Piketty, T., Saez, E., & Zucman, 2018).

In terms of model validity, no serious problems were found in the multicollinearity and heteroscedasticity tests, but the model showed a violation of the assumption of normality and the existence of positive autocorrelation. This problem is common in time-series models and can be solved through transformations or robust model approaches such as ARDL or VAR (Enders, 2015).

The novelty of this study lies in the use of long-term time-series data for almost five decades, as well as the simultaneous integration of indicators of inequality and trade openness in modeling economic growth in developed countries. Most of the previous literature examined each factor separately and in a cross-section or panel framework (D. H. Author, 2013). In addition, the study makes a theoretical contribution through the comparison of two major approaches: the neoclassical paradigm that emphasizes market efficiency and the dependency theory that highlights structural relationships in global systems (Kuran, 2024).

In policy, these results confirm the importance of the role of redistribution in offsetting the asymmetric impact of globalization. As stated by (Erikson, 2015), and is supported by findings (Furceri & Louis, 2013), liberalization that is not followed by fiscal reform and investment in human capital can increase social exclusion and exacerbate inequality. This is in line with the findings (Atkinson & Morelli, 2014), which emphasizes the importance of progressive fiscal policy design in addressing income disparities, and (Milanovic, 2016), which suggests that without state intervention, economic liberalization tends to magnify the accumulation of wealth among elites. Thus, even with openness and economic growth going hand in hand, the quality of the distribution of growth results remains the main key in ensuring the long-term sustainability of the economy in the United States.

CONCLUSION

This study examines the influence of income inequality and trade openness on economic growth in the United States during the period 1975–2023. The results show that these two variables significantly affect the dynamics of real Gross Domestic Product. Income inequality shows a positive relationship with economic growth, especially in the context of developed countries, where capital accumulation in the upper income group can drive investment and consumption. However, this pattern raises important questions about the inclusivity and sustainability of this growth.

Trade openness also makes a positive contribution to economic growth, reinforcing the theoretical view that global integration can improve the efficiency of allocative and the diffusion of technology. Nonetheless, the impact of trade is not uniform and

highly dependent on domestic institutional capacity and labour market flexibility. The study also found that only income inequality had a two-way causal relationship with GDP, while trade showed no direct causal influence, indicating the role of trade was more mediated by other structural factors.

From a policy perspective, these findings underscore the importance of strengthening redistribution mechanisms to balance the asymmetric impact of globalization. Social safety nets, progressive fiscal policies, and investments in education and workforce development are crucial so that the benefits of economic growth can be felt equally. Institutional reforms need to be directed at increasing the resilience of the labor market and supporting inclusive innovation.

For further research, it is recommended to use dynamic time series models such as VECM or ARDL to capture long-term interactions in more depth. Researchers are also encouraged to add other structural variables such as human capital, digital infrastructure, or tax policy to broaden understanding of the relationship between trade, inequality, and sustainable growth in the global economy.

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