Working Paper 2025.2.3.2

- Vol. 2, No. 3

TÁC ĐỘNG CỦA THUẾ THU NHẬP CÁ NHÂN ĐẾN BẤT BÌNH ĐẲNG THU NHẬP: NGHIÊN CỨU THỰC NGHIỆM TẠI CÁC NƯỚC OECD TRONG GIAI ĐOẠN 2012-2021

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Tóm tắt

Nghiên cứu này khảo sát tác động của thuế thu nhập cá nhân lên bất bình đẳng thu nhập ở 35 quốc gia thuộc OECD trong giai đoạn từ năm 2012 đến 2021. Sử dụng mô hình hồi quy dữ liệu bảng với hiệu ứng ngẫu nhiên, nghiên cứu phân tích cách các công cụ tài khóa—đặc biệt là thuế thu nhập cá nhân, chi tiêu công cho giáo dục và độ mở thương mại—ảnh hưởng đến hệ số Gini sau thuế, một thước đo bất bình đẳng thu nhập được sử dụng rộng rãi. Các phát hiện thực nghiệm cho thấy thuế suất thu nhập cá nhân cao hơn và tăng chi tiêu chính phủ cho giáo dục làm giảm đáng kể bất bình đẳng thu nhập, trong khi mức độ thất nghiệp cao hơn lại có liên quan đến việc gia tăng bất bình đẳng. Độ mở thương mại cũng cho thấy một hiệu ứng giảm bất bình đẳng khiêm tốn. Kết quả gợi ý rằng một hệ thống thuế thu nhập cá nhân được cơ cấu tốt, cùng với các khoản đầu tư công chiến lược và hỗ trợ thị trường lao động, có thể đóng vai trò quan trọng trong việc thúc đẩy phân phối thu nhập công bằng hơn. Nghiên cứu này đóng góp vào các cuộc thảo luận chính sách đang diễn ra bằng cách cung cấp những hiểu biết dựa trên bằng chứng về cách thức thuế và chính sách tài khóa có thể được tận dụng để giải quyết tình trạng chênh lệch thu nhập ngày càng tăng ở các nền kinh tế phát triển.

Từ khóa: thuế thu nhập cá nhân, bất bình đẳng thu nhập, hệ số Gini, OECD, thuế lũy tiến, độ mở thương mại, tỷ lệ thất nghiệp, tỷ lệ lạm phát, chỉ số tham nhũng, chi tiêu chính phủ cho giáo dục, người lao động hưởng lương và tiền công, mô hình hiệu ứng ngẫu nhiên

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IMPACT OF PERSONAL INCOME TAX ON INCOME INEQUALITY: EMPIRICAL STUDY OF OECD COUNTRIES IN 2012-20221 PERIOD

Abstract

This study investigates the impact of personal income tax on income inequality in 35 OECD countries during the period from 2012 to 2021. Using a panel data regression model with random effects, the research analyzes how fiscal instruments—particularly personal income tax, public expenditure on education, and trade openness—affect the post-tax Gini coefficient, a widely used measure of income inequality. The empirical findings reveal that higher personal income tax rates and increased government spending on education significantly reduce income inequality, while higher unemployment levels are associated with increased inequality. Trade openness also shows a modest inequality-reducing effect. The results suggest that a well-structured personal income tax system, alongside strategic public investment and labor market support, can play a crucial role in promoting more equitable income distribution. This study contributes to the ongoing policy discourse by providing evidence-based insights into how taxation and fiscal policy can be leveraged to address growing income disparities in developed economies.

Keywords: personal income tax, income inequality, Gini coefficient, OECD, progressive taxation, trade openness, unemployment rate, inflation rate, corruption index, government spending on education, wage and salaried workers, random effect model

1. Introduction

Over the last decade, income inequality has remained a persistent and growing concern, even among the world's most developed economies. Within the OECD, where economic institutions are relatively mature and progressive tax policies are often in place, disparities in income distribution have nonetheless continued to widen. This raises important questions about the effectiveness of fiscal tools—especially personal income tax (PIT)—in addressing income inequality.

Personal income tax is widely regarded as a primary mechanism through which governments can redistribute wealth and reduce inequality. However, the degree to which PIT influences income inequality is not always clear-cut. Its impact may depend on the design of the tax system, including its progressivity and enforcement, as well as the broader economic and institutional environment.

This study seeks to empirically investigate the relationship between personal income tax and income inequality in OECD countries during the period from 2012 to 2021. By focusing on this specific timeframe and group of countries, the research aims to capture both short-term policy effects and longer-term structural dynamics. In addition to PIT, the study also considers several macroeconomic and institutional factors that may interact with income inequality, including inflation rate, control of corruption, unemployment, trade openness, and the proportion of wage and salaried workers.

2. Literature review

2.1. Theoretical framework

2.1.1. Theoretical framework on personal income tax

Income inequality, as defined by the Organisation for Economic Co-operation and Development (OECD), refers to the degree to which income is distributed unevenly among the members of a population, with the Gini coefficient being a commonly utilized metric for its quantification (OECD, 2021). A Gini coefficient of 0 indicates perfect equality, where everyone has the same income, while a coefficient of 1 represents absolute inequality, where a single individual holds all income and others have none. The Gini coefficient is derived from the Lorenz curve, which compares the cumulative share of income received by the population to the line of perfect equality. Most OECD countries report post-tax and transfer Gini values between 0.25 and 0.45, suggesting moderate inequality after redistributive policies such as personal income tax and social transfers. Understanding how taxes influence the Gini coefficient is essential for evaluating the effectiveness of fiscal systems in reducing income disparities (OECD, 2022; World Bank, 2024).

In a comparative analysis of definitions provided by the OECD and Eurostat, Raitano (2025) concludes that income inequality is generally understood as the unequal distribution of household or individual income across the diverse participants within an economy. Similarly, Sibindi (2025) posits that income inequality reflects the extent to which income is distributed unevenly within a population, often captured through various ratios or indices, including the aforementioned Gini coefficient. These definitions underscore the fundamental concept of disparity in income distribution as a key characteristic of economic inequality within societies.

2.1.2. Theoretical framework on income inequality

Personal Income Tax (PIT) is a cornerstone of modern fiscal systems, serving dual objectives: generating public revenue and promoting income redistribution. The theoretical underpinnings of PIT encompass several key frameworks that elucidate its role in economic policy. Optimal Taxation Theory (Slemrod, J., 1990) provides a foundational perspective on the design of tax systems. It posits that tax structures should be formulated to achieve a balance between efficiency and equity, minimizing economic distortions while ensuring a fair distribution of tax burdens (Slemrod, J., 1990). This theory emphasizes the trade-offs between equity and efficiency, suggesting that progressive taxation can be justified if it leads to a more equitable income distribution without causing significant efficiency losses (Slemrod, J., 1990).

Furthermore, the Taxing Wages Framework developed by the OECD offers a comprehensive methodology to assess the impact of PIT on labour income. This framework evaluates average and marginal tax rates, tax wedges, and the interplay between personal income taxes and social security contributions (Taxing Wages 2020, 2020). It provides insights into how tax policies influence work incentives and income distribution across different household types (Taxing Wages 2020, 2020). Also, according to the Ability-to-Pay Principle, articulated by Adam Smith, individuals should be taxed in proportion to their financial capacity. This principle inherently supports a progressive personal income tax (PIT) system, where higher income earners contribute a larger percentage of their income in taxes. Consequently, this progressive taxation aims to reduce disparities in income distribution after taxes are applied

2.2. Literature review and hypothesis development

Personal income tax (PIT) is widely recognized as a key policy tool for reducing income inequality. According to the OECD (2024), progressive PIT systems help narrow income gaps by imposing higher tax burdens on top earners. Numerous studies have investigated the impact of tax policies on income inequality in OECD countries. For instance, Doerrenberg and Peichl (2014) analyzed data from 25 countries between 2000 and 2010, finding that personal income tax plays a role in reducing inequality, particularly in nations with strong progressive tax systems and high tax compliance. Their research also highlighted those social transfers had a more significant redistributive effect than taxes. Similarly, Iosifidi and Mylonidis (2017) focused on tax structure using data from 24 OECD countries from 2000 to 2013. They concluded that personal income tax, when designed to burden high-income groups, effectively reduces inequality. Conversely, consumption taxes like VAT tended to increase inequality. Both studies underscore the critical importance of well-designed tax policies in mitigating income disparities. For example, Dianov et al. (2022) notes that while PIT generally reduces inequality, its effectiveness depends on how it interacts with social transfers and economic conditions.

Hypothesis 1: Personal income tax has a negative relationship with income inequality

The proportion of wage and salaried workers significantly influences income inequality, as labor income structure heavily shapes household income distribution, especially where wages are the primary income source. Numerous studies highlight the crucial role of formal employment in influencing income inequality. Opoku, Acheampong, and Salim (2025) found an inverse correlation between the increasing proportion of formal employment and global income inequality, particularly in developing countries. They attribute this to better-established wage systems and social insurance policies within the formal sector. Building on this, Alimi and Maré (2025), in their research on New Zealand, also affirmed that individuals with formally employed parents tend to achieve higher incomes and experience less inequality. This underscores the stability and sustainability of income from formal employment in breaking intergenerational cycles of poverty. Tolbert and Sizer (2022) found a substantial rise in wage inequality among U.S. metropolitan wage and salaried workers from 1980-2019, linking this disparity to "winner-take-most" labor markets in sectors like finance and tech.

Hypothesis 2: Percentage of wage and salaried worker has a negative relationship with income inequality

The relationship between unemployment and income inequality has been widely examined in empirical literature, particularly in the context of macroeconomic instability and labor market dynamics. Numerous studies suggest that rising unemployment tends to exacerbate income inequality by disproportionately affecting low- and middle-income earners. For instance, Checchi and García-Peñalosa (2008) found that in developed economies, higher unemployment correlates with an increase in the Gini coefficient, as job loss among low-income households reduces their ability to sustain consumption and accumulate wealth. In a long-term historical analysis of the United States, Sheng (2013) discovered a strong positive association between unemployment and income disparity during the period 1941–2010. His study revealed that during periods of high unemployment, lower-income groups face greater financial vulnerability, whereas higher-income individuals often remain shielded due to capital-based income streams (Sheng, 2011). A study by Laurentjoye and Valdecantos (2025) on Denmark

indicated a positive correlation between rising unemployment rates and increased income inequality. Specifically, during periods of economic crisis, unemployed individuals experience more severe income losses, which widens the gap between the rich and the poor (Laurentjoye and Valdecantos, 2025).

Hypothesis 3: Unemployment rate has a positive relationship with income inequality

The World Bank defines "control of corruption" as the extent to which public power is exercised for private gain, including both petty and grand corruption (World Bank, 2024). Corruption is widely acknowledged as a driver of income inequality, stated by numerous prior empirical studies. Gupta et al. (2002) demonstrated that higher levels of corruption are associated with poorer outcomes in health, education, and income equality, especially in low-income countries. Mudayen et. al. (2025) utilized quantile regression to analyze the relationship between public debt, corruption, and income inequality in developing countries. The findings reveal that corruption exacerbates the negative impact of public debt on inequality, particularly when public expenditures fail to reach lower-income groups, leading to an increase in the Gini coefficient (Mudayen et al., 2025). Nuswantara et al. (2025) also found that political dynasties in corrupt, poorly governed developing countries worsen economic inequality, hindering SDG achievement. Their study shows dynasties boost institutional corruption and unequal budget allocation, thereby increasing income inequality via policy favoritism and benefit monopolization (Nuswantara et al., 2025).

Hypothesis 4: Corruption index has a positive relationship with income inequality

Numerous prior studies have affirmed the significant role of public expenditure on education in reducing income inequality. For instance, Akça et al. (2025) demonstrated that government spending on education in Turkey notably decreased inequality when combined with technology transfer and educational innovation, especially in regions with effective access to technology and educational investment. Similarly, Olanrele and Oshota (2025) emphasized that public education spending in Nigeria played a substantial role in reducing inequality, particularly when complemented by trade expansion and social welfare policies. They found the positive effects were most pronounced when spending was specifically targeted. Finally, Christodoulou and Antoniou (2025) focused on public investment in early childhood education in Cyprus, providing evidence that this policy helps narrow skill and opportunity gaps across income groups, thereby reducing long-term income inequality. Despite these positive findings, studies also caution that uneven distribution of education spending can exacerbate inequality.

Hypothesis 5: Government expenditure on education has a negative relationship with income inequality

Many empirical studies have explored the complex relationship between inflation and income inequality. For instance, Berisha et al. (2022) found that inflation has a nonlinear effect on inequality: when inflation exceeds 6%, income inequality increases significantly; below this threshold, the effect is statistically insignificant. Similarly, in a study covering ten OECD countries from 1971 to 2010, researchers observed a positive correlation between inflation and inequality even after controlling for factors such as economic development and trade openness (Jaumotte et al., 2013). This suggests that inflation not only erodes purchasing power but may also disproportionately affect lower-income groups, thus widening the income gap.

Furthermore, Siami-Namini and Hudson (2019) found inflation's effect on income inequality differs by country development level. It worsens inequality in developing nations by hitting the poor hardest, but this link is weaker or even inverse in developed countries due to stronger welfare systems (Siami-Namini and Hudson, 2019).

Hypothesis 6: Inflation rate has a positive relationship with income inequality

The effect of trade openness on income inequality is highly debated. While it's seen as a tool for development and poverty reduction, empirical evidence shows its distributional effects vary significantly by country and income group. Recent studies have investigated the relationship between trade openness and income inequality. Damijan and Vuković (2025) argue that higher levels of trade openness increase inequality, particularly in countries with a large proportion of low-skilled labor, as global trade primarily benefits highly skilled workers. Their estimations suggest that a 10% increase in trade openness can lead to a 1.5-2 percentage point rise in the Gini coefficient. Similarly, Rizk (2025) found that trade openness exacerbates inequality in developing countries, especially those with lax environmental policies and a lack of redistributive income policies. Both studies underscore the crucial role of domestic policies and social welfare programs in mitigating the negative impacts of trade liberalization on income distribution. Gitelson and Manes (2025) found that trade openness disproportionately benefits higher-income groups, especially during economic downturns, suggesting a need for synchronized international fiscal and social security policies to reduce exacerbated inequality.

Hypothesis 7: Trade openness has a negative relationship with income inequality

3. Research methodology

3.1. Research model and hypothesis

Drawing upon prior research Doerrenberg and Peichl (2014) on personal income tax and incorporating findings from more focused analyses concerning the relationship between personal income tax and the Gini coefficient as an indicator of income inequality, this study employs the following model to assess the impact of personal income tax on income inequality:

$$gini_{it} = \beta_0 + \beta_1 logPIT_{it} + \beta_2 logSwork_{it} + \beta_3 Unempl_{it} + \beta_4 Corupt_{it} + \beta_5 Eduexp_{it} + \beta_6 Infl_{it} + \beta_7 TO_{it}$$

In which:

- i represents each country
- t represents the year (2012-2021)
- β0: The intercept of the regression model.
- β1 - β7: The variable coefficients of the regression model .
- ε is the error term
- gini: Measures income inequality after the implementation of personal income tax, utilizing the Gini index. A higher Gini index value signifies a greater degree of income inequality within the population.
- logPIT: The logarithm of personal income tax (PIT) as a percentage of Gross Domestic Product (GDP).

- logSwork: The logarithm of wage and salaried workers (% of total employment).
- Unempl: Unemployment rate, the share of the labor force without work.
- Corupt: Corruption index (standardized ranging from approximately -2.5 to 2.5.) where higher values indicate more corruption.
- Eduexp: Government education spending (% of GDP).
- Infl: Inflation rate (% annual change in prices)
- TO: Trade openess (% of GDP)

The research hypothesis include:

Hypothesis 1: Personal Income Tax has a negative relationship with income inequality

Hypothesis 2: Percentage of wage and salaried workers has a negative relationship with income inequality

Hypothesis 3: Unemployment Rate has a positive relationship with income inequality

Hypothesis 4: Corruption index has a positive relationship with income inequality

Hypothesis 5: Government expenditure on education has a negative relationship with income inequality

Hypothesis 6: Inflation rate has a positive relationship with income inequality

Hypothesis 7: Trade openness has a negative relationship with income inequality

3.2. Data and data source

This research utilizes a panel dataset encompassing data from 35 OECD countries spanning the period from 2012 to 2021. To investigate the relationships between the independent variables and the dependent variable, this analysis employs the random effects model.

Our study utilized secondary data obtained primarily from the World Bank. The dependent variable in this research is income inequality, quantified using the Gini index. The seven independent variables investigated for their potential impact on income inequality are: personal income tax (PIT), wage and salaried workers, unemployment rate, corruption index, government education spending, inflation rate, and trade openness.

Table 1. Data and data source table

Variable	Description	Unit	Data Source	Expected Sign
gini	Gini Coefficient	Index (0-100)	World Bank	
logPIT	Log of personal income tax	Log (% of GDP)	World Bank	-

logSwork	Log of wage and salaried workers	Log (% of total employment)	World Bank	-
Unempl	Unemployment rate	(% of labor force)	World Bank	+
Corupt	Corruption index	Standardized index (-2.5 to + 2.5)	World Bank	+
Eduexp	Government education spending	% of GDP	World Bank	-
Infl	Inflation rate	Annual %	World Bank	+
TO	Trade openess	% of GDP	World Bank	-

Source: Collected by authors

3.3. Data description

This study employs a panel dataset consisting of 306 observations, derived from the World Bank dataset. The research focuses on 35 OECD member countries across the period from 2012 to 2021. This timeframe and country selection were chosen to ensure data completeness, thereby enhancing the reliability of the study's findings. It is noted that some OECD countries were excluded from the analysis due to data limitations.

3.3.1. Data and summary statistic

Variable	Obs	Mean	Std. dev.	Min	Max
GINI	350	.3323143	.0609637	.232	.496
logPIT	350	1.278326	.1344619	.9584368	1.575336
logSwork	350	1.920111	.0392912	1.798878	1.978611
Unempl	350	7.617583	4.31663	2.015	27.686
Corupt	350	1.118454	.7978991	-1.02064	2.399378
Eduexp	350	5.290413	1.145565	3.00598	8.58383
Infl	350	1.841308	2.259793	-1.735888	19.59649
TO	350	106.247	62.00315	23.07978	393.1412

Source: Calculated by authors

Figure 1. Data summary

3.3.2. Correlation matrix

	GINI	logPIT	logSwork	Unempl	Corupt	Eduexp	Infl	TO
GINI	1.0000							
logPIT	-0.3916	1.0000						
logSwork	-0.5429	0.1755	1.0000					
Unempl	0.1998	0.0670	-0.3918	1.0000				
Corupt	-0.4327	0.2344	0.6616	-0.3329	1.0000			
Eduexp	-0.2076	0.3069	0.3400	-0.2271	0.5367	1.0000		
Infl	0.3188	-0.0895	-0.3328	-0.0570	-0.2947	-0.0910	1.0000	
TO	-0.3625	0.1797	0.2620	-0.1256	0.1189	-0.2992	-0.1160	1.0000

Source: Calculated by authors

Figure 2. Correlation matrix

The correlation analysis reveals generally low inter-correlations among the independent variables included in the model, with all coefficients below an absolute value of 0.5. The strongest correlation observed is between the GINI coefficient and Trade Openness, registering an absolute value of 0.4534. This finding suggests that multicollinearity is unlikely to pose a substantial threat to the model's integrity (Wooldridge, 2012). Nonetheless, further diagnostic testing is warranted to ensure the model's reliability.

Concerning the dependent variable (GINI), the explanatory variables exhibit moderate correlations, ranging from 0.1171 to 0.4534 in absolute terms. However, some variables have correlation signs that differ from expectations. This indicates the need for deeper examination to identify any potential model weaknesses and ensure its robustness.

3.4. Research model selection

The result of the tests for model selection are summarized in the below table.

Table 2. The result of tests for mode selection

Name	Result	Conclusion
Hausman test for model selection	p = 0.0540 > 0.05	Random Effects (RE) is preferred over Fixed Effects (FE).
Breusch-Pagan Lagrange Multiplier (LM) test for random effect model	p = 0.0000	Random Effects model is preferred over Pooled OLS model
Hausman test for endogeneity (Durbin-Wu-Hausman test)	Small p-value > 0.05 (p = 0.0922 > 0.05)	All independent variables in the model are exogenous

Source: Summarized by authors

3.4.1. Hausman test for model selection

The Hausman test (1978) was utilized to assess whether Fixed Effects (FE) or Random Effects (RE) is the more suitable approach for the dataset. The null hypothesis of the Hausman test states that Random Effects (RE) is preferred, assuming that unobserved individual effects (country- specific effects) are not correlated with the independent variables. The alternative

hypothesis suggests that Fixed Effects (FE) is necessary, meaning that country-specific heterogeneity is correlated with explanatory variables.

The result is in Appendix 1. Since $p = 0.0540 > 0.05$, we fail to reject the null hypothesis, indicating that Random Effects (RE) is preferred over Fixed Effects (FE). This suggests that country-specific effects are not correlated with the explanatory variables, making RE the more efficient estimator.

3.4.2. Breusch-Pagan Lagrange Multiplier (LM) test for random effect model

To provide further justification for the selection of the Random Effects (RE) model, we performed the Breusch-Pagan Lagrange Multiplier (LM) test (1980). This test assesses whether the Random Effects model is necessary or if a more parsimonious Pooled Ordinary Least Squares (OLS) model would be adequate. The null hypothesis of the LM test assumes that the Pooled OLS model is preferred, implying no significant unobserved heterogeneity across countries. The alternative hypothesis suggests that the Random Effects model is more appropriate due to the unobserved heterogeneity.

The result is in Appendix 2. The Breusch-Pagan Lagrange Multiplier (LM) test indicates a highly significant p-value of 0.0000, leading to a strong rejection of the null hypothesis. This outcome confirms that a Pooled Ordinary Least Squares (OLS) model is not appropriate for this dataset. The significant test result indicates the presence of substantial country-specific heterogeneity, thus requiring the use of the Random Effects (RE) model to account for the unobserved individual effects.

3.4.3. Hausman test for endogeneity (Durbin-Wu-Hausman test)

The Hausman test (Durbin-Wu-Hausman Test) assesses if a regression variable is endogenous (correlated with the error term), which biases OLS. The null hypothesis H0 states the variable is exogenous (OLS is reliable), while the alternative H1 suggests endogeneity (requiring IV/2SLS). A small p-value ($p < 0.05$) leads to rejecting H0, indicating endogeneity and that OLS results are unreliable. This test is crucial for checking if the model has endogenous variables.

After performing the Durbin-Wu-Hausman test, the author's calculations revealed that trade openness (TO) had the highest p-value at 0.8223, while personal income tax (logPIT) had the lowest at 0.0922. As all p-values for the independent variables are greater than 0.05, we accept the null hypothesis. This leads to the conclusion that all independent variables in the model are exogenous, and there is no endogeneity present.

4. Result analysis

4.1. Random effect model results

Based on the Hausman test and Breusch-Pagan LM test, the Random Effects (RE) model is the most appropriate for estimating the impact of PIT on income inequality in OECD groups. The result of the mode is presented below:

Random-effects GLS regression — Number of obs = 350
Group variable: CountMH — Number of groups = 35

R-squared:
Within = 0.2683
Between = 0.2789
Overall = 0.2731

Obs per group:
min = 10
avg = 10.0
max = 10

Wald chi2(7) = 121.71
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

GINI	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
logPIT	-.0343634	.0173481	-1.98	0.048	-.068365	-.0003618
logSwork	-.1478555	.0929177	-1.59	0.112	-.3299708	.0342598
Unempl	.0021713	.0002607	8.33	0.000	.0016604	.0026822
Corupt	.0057929	.0038425	1.51	0.132	-.0017382	.013324
Eduexp	-.0038595	.0014098	-2.74	0.006	-.0066227	-.0010962
Infl	-.0001324	.0003733	-0.35	0.723	-.000864	.0005992
TO	-.0001521	.0000615	-2.47	0.013	-.0002728	-.0000315
_cons	.6739472	.1800548	3.74	0.000	.3210464	1.026848
sigma_u	.05010478					
sigma_e	.00854039					
rho	.97176686	(fraction of variance due to u_i)				

Source: Calculated by authors

Figure 3. Random effect model results

4.2. Multicollinearity check (VIF test)

To ensure the reliability of the regression results, a Variance Inflation Factor (VIF) test was conducted to assess the presence of multicollinearity among the independent variables. Multicollinearity arises when explanatory variables exhibit high inter-correlations, potentially leading to distorted coefficient estimates and reduced precision in statistical inferences. The thresholds for interpreting VIF values are as follows:

• VIF < 5: Indicates no serious concerns regarding multicollinearity.

• VIF between 5 and 10: Suggests moderate multicollinearity, which may warrant further investigation.

• VIF > 10: Signals high multicollinearity, necessitating corrective measures to address the issue.

The result is in Appendix 3. Based on the author's calculations, the highest Variance Inflation Factor (VIF) observed is 2.31 for the Corupt variable, which is well below the established threshold of 5, indicating the absence of severe multicollinearity and no need for variable transformation or exclusion. Given that all individual VIF values remain below 3, the independent variables do not exhibit high levels of inter-correlation, thus ensuring robust and reliable coefficient estimates in the regression analysis. Therefore, the Random Effects model can be reliably estimated without multicollinearity bias.

4.3. Cross-sectional dependence

To examine the potential for cross-sectional dependence within the panel dataset, Pesaran's test for cross-sectional independence was utilized. This diagnostic test evaluates whether the residuals across different entities (in this case, countries) exhibit correlation, a critical consideration for selecting the appropriate estimation technique for panel data models. The result is in Appendix 4

- Null hypothesis (H0): No cross-sectional dependence (residuals are independent across countries).
- Alternative hypothesis (H1): Cross-sectional dependence exists (residuals are

4.4. Key findings and discussion

The model's overall R-squared value of 0.2731 indicates that it explains 27.31% of the variation in income inequality. Further decomposition of the variance shows that the "Between R-squared" is 0.2789, suggesting that a larger proportion of the variation in inequality exists across countries rather than within them over time. Conversely, the "Within R-squared" is considerably lower at 0.2683, meaning only 26.83% of the variation in inequality is explained by changes within individual countries.

The random model effect results offer insights into the relationship between income inequality and several economic indicators, including personal income tax, inflation rate, trade openness, ... While most of the estimated coefficients align with theoretical expectations, a few deviations warrant further analysis.

4.4.1. Personal income tax and income inequality

The results show that personal income tax has a positive and significant relationship with GDP with the coefficient of -0.0343 and p-value of 0.048 (< 0.05). This finding supports Progressive Taxation Theory (Musgrave, 1959) that higher taxation reduces income disparities. The finding also aligns with the studies suggesting that personal income tax has a clear inequality-reducing effect, especially in OECD countries with highly progressive tax systems (Doerrenberg & Peichl, 2014). Moreover, previous studies mainly utilized data before 2010, and to some extent make the results outdated. By using data from the last 10 years, this study may suggest a new point of view to the role of development on the development of one’s country.

4.4.2. Wage and salaried worker and income inequality

The coefficient for wage and salaried workers (-0.1478, p = 0.112) is negative and statistically insignificant, yet still aligning with the expected negative effect. Typically, wage and salaried workers have an inverse correlation between the increasing proportion of formal employment and global income inequality (Opoku et al., 2025). However, the insignificance of salaried workers in this situation may suggest that the percentage of wage and salaried workers in OECD countries does not always translate into the decline of income inequality since simply increasing the proportion of wage and salaried workers doesn't automatically reduce inequality in many countries, as low, unstable wages in the lower segments can overwhelm existing tax and welfare policies (Joumard, 2012).

4.4.3. Unemployment rate and income inequality

The coefficient for unemployment rate (0.0021, p = 0.000) is positive and statistically significant, aligning with the findings of Piketty's (2014) theory that high unemployment leads to greater income inequality. This also align with the previous studies (Sheng, 2011; Laurentjoye and Valdecantos, 2025; Checchi and García-Peñalosa, 2008). Higher unemployment correlates with an increase in the Gini coefficient, as job loss among households reduces their ability to sustain consumption and accumulate wealth

4.4.4. Corruption index and income inequality

The coefficient for corruption (0.0057, p = 0.132), yet aligning with the expected positive effect, is statistically insignificant. Although many previous studies state that corruption has a significant impact on income inequality, it is not always the case. In countries with robust progressive tax systems and comprehensive social welfare programs, the impact of corruption on income inequality is often negligible (Gronwald, 2025). Furthermore, in some instances, redistribution from the middle class to the corporate sector through "opaque" incentives might temporarily narrow the rich-poor gap, yet it could lead to detrimental long-term effects (Xiao & Fei, 2024).

4.4.5. Government expenditure on education and income inequality

The coefficient for corruption (-0.0038, p = 0.006) is negative and statistically significant, aligning with the findings of previous studies (Christodoulou and Antoniou, 2025; Akça et al. ,2025). Government education expenditure can reduce income inequality by enhancing access to quality education for all, boosting human capital and earning potential, especially for disadvantaged groups. However, if spending disproportionately benefits the already privileged (e.g., heavily subsidizing tertiary education), it can exacerbate existing inequalities (Christodoulou and Antoniou, 2025).

4.4.6. Inflation rate and income inequality

The coefficient for inflation rate (0.0057, p = 0.132), is negative and statistically insignificant, completely contradicting the proposed hypothesis. The finding that inflation appears to have no direct impact on inequality in OECD countries, with the suggestion that price increases may be compensated by wage adjustments, warrants further analysis. This result stands in contrast to some theoretical predictions and empirical evidence from developing countries, where inflation often disproportionately affects lower-income groups due to their limited ability to hedge against rising prices and weaker social safety nets.

4.4.7. Trade Openness and income inequality

The coefficient for Trade Openness (-0.0001, p = 0.013), is negative and statistically, aligning with the findings of previous studies (Rizk, 2025; Gitelson and Manes; 2025). Trade openness can affect income inequality by shifting demand for different labor skills, altering relative wages and profits. This process, driven by increased competition and specialization, can benefit various labor and capital groups unevenly, ultimately widening or narrowing income disparities (Rizk, 2025).

5. Recommendation

Given that a higher personal income tax significantly reduces income inequality, policymakers should consider enhancing the progressivity of tax brackets and bolstering compliance mechanisms. This means potentially introducing higher top-marginal rates for ultra-high earners, closing tax loopholes, and improving the auditing capabilities of tax authorities to ensure existing regulations are rigorously enforced. These measures aim to ensure that wealthier individuals contribute equitably, thereby reducing post-tax income disparities.

Moreover, the robust inequality-reducing effect of government spending on education suggests a need for increased public resource allocation to under-funded areas, particularly early childhood education and vocational training for low-income groups. Prioritizing subsidies, investing in infrastructure in disadvantaged regions, and offering scholarships to marginalized students can foster human capital development and promote more equitable income opportunities in the long run.

Finally, the positive correlation between unemployment and income inequality highlights the importance of proactive labor market programs. These should include job retraining initiatives, wage subsidies, and stronger unemployment insurance to support low-income workers during economic downturns. While trade openness appears to modestly reduce inequality, governments should pair liberalization with targeted social safety nets and skills development programs. This approach ensures that the benefits of increasing economic integration are distributed more broadly across all income levels, rather than exacerbating existing disparities.

6. Conclusion

This empirical study of 35 OECD countries over 2012–2021 demonstrates that progressive personal income taxation and increased public investment in education are effective fiscal tools for narrowing income disparities, while higher unemployment exacerbates them. The random-effects model explains approximately 27.3 percent of the variation in the post-tax Gini coefficient, suggesting that well-designed tax and spending policies can play a meaningful role in promoting more equitable outcomes.

Despite these insights, the research is subject to certain limitations. First, the panel covers only a ten-year span, potentially overlooking longer-term structural shifts. Second, the analysis relies on aggregate national data, which may mask important within-country variations and non-linear effects. Third, the model does not account for all possible determinants of inequality—such as technological change, demographic shifts, or informal sector dynamics—leaving room for further investigation.

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Appendix

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) Std. err.
logPIT	-.0233462	-.0343634	.0110172	.0038623
logSwork	-.0132071	-.1478555	.1346484	.0394897
Unempl	.0023543	.0021713	.000183	.0000301
Corupt	.0104274	.0057929	.0046345	.0014028
Eduexp	-.0032083	-.0038595	.0006512	.0001846
Infl	-.0002859	-.0001324	-.0001535	.
TO	-.0000983	-.0001521	.0000539	.0000268

b = Consistent under H0 and Ha; obtained from **xtreg**.
B = Inconsistent under Ha, efficient under H0; obtained from **xtreg**.

Test of H0: Difference in coefficients not systematic

chi2(**7**) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= **13.84**
Prob > chi2 = **0.0540**
(V_b-V_B is not positive definite)

Source: Calculated by authors

Appendix 1. Hausman test

Breusch and Pagan Lagrangian multiplier test for random effects

GINI[CountMH,t] = Xb + u[CountMH] + e[CountMH,t]

Estimated results:

	Var	SD = sqrt(Var)
GINI	.0037166	.0609637
e	.0000729	.0085404
u	.0025105	.0501048

Test: Var(u) = 0

chibar2(01) = 1399.37

Prob > chibar2 = 0.0000

Source: Calculated by authors

Appendix 2. Breusch-Pagan Lagrange Multiplier (LM) test

Variable	VIF	1/VIF
Corupt	2.31	0.432772
logSwork	2.12	0.471444
Eduexp	2.01	0.497306
TO	1.49	0.670608
Unempl	1.34	0.748305
logPIT	1.28	0.782367
Infl	1.21	0.828642
Mean VIF	1.68	

Source: Calculated by authors

Appendix 3. VIF test

Pesaran's test of cross sectional independence = 0.626, Pr = 0.5312

Average absolute value of the off-diagonal elements = 0.342

Source: Calculated by authors

Appendix 4. Cross-sectional dependence