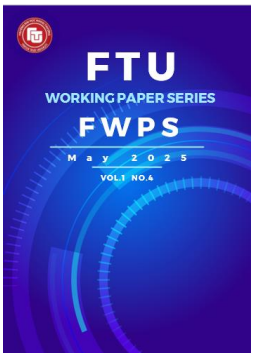

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TÁC ĐỘNG CỦA THUẾ THU NHẬP CÁ NHÂN ĐẾN BẤT BÌNH ĐẲNG THU NHẬP Ở ASEAN TRONG GIAI ĐOẠN 2013-2022

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Tóm tắt

Nghiên cứu này phân tích tác động của thuế thu nhập cá nhân đối với bất bình đẳng thu nhập tại các quốc gia thành viên ASEAN trong giai đoạn 2013–2022. Nghiên cứu xem xét ảnh hưởng của thuế thu nhập cá nhân đến hệ số Gini bằng cách sử dụng dữ liệu bảng với phương pháp tác động ngẫu nhiên và biến công cụ, đồng thời xem xét các yếu tố kinh tế vĩ mô và thể chế khác như tỷ lệ thất nghiệp, lạm phát, tham nhũng, chi tiêu của chính phủ cho giáo dục và tỷ lệ lao động hưởng lương. Kết quả nghiên cứu xác nhận rằng một hệ thống thuế thu nhập cá nhân có cấu trúc lũy tiến giúp giảm bất bình đẳng thu nhập, củng cố vai trò của thuế như một công cụ tái phân phối kinh tế. Tuy nhiên, tác động này bị ảnh hưởng bởi các điều kiện xã hội và chính trị như thất nghiệp, lạm phát và tham nhũng, những yếu tố làm trầm trọng thêm sự bất bình đẳng. Ngoài ra, nghiên cứu cũng cho thấy rằng chi tiêu cho giáo dục và tỷ lệ lao động hưởng lương cao hơn có mối tương quan với mức độ bất bình đẳng giảm. Những phát hiện này nhấn mạnh sự cần thiết của các chính

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sách có mục tiêu cụ thể hơn, kết hợp giữa cải cách thuế và chiến lược chống tham nhũng, cùng với các biện pháp can thiệp vào thị trường lao động và gia tăng đầu tư vào giáo dục, nhằm giảm bất bình đẳng thu nhập tại các quốc gia ASEAN.

Từ khóa: thuế thu nhập cá nhân, bất bình đẳng thu nhập, hệ số Gini, ASEAN, thuế lũy tiến.

IMPACTS OF PERSONAL INCOME TAX ON INCOME INEQUALITY IN ASEAN IN 2013-2022 PERIOD

Abstract

This study analyzes the effects of personal income tax (PIT) on income inequality in ASEAN member countries between 2013 and 2022. The research analyzes the impact of PIT on the Gini coefficient using panel data with the RE method and instrumental variables and considers the influences of unemployment, inflation, corruption, government spending on education, and the proportion of wage earners as other macroeconomic and institutional factors. These results confirm that a progressive PIT structure decreases income inequality, which validates the tax as a tool for economic redistribution. However, these impacts are tempered by sociopolitical conditions such as unemployment, inflation, and corruption that aggravate inequality. Moreover, it is found that spending on education and a higher share of wage employment correlate with reduced inequality. These findings indicate the necessity of more targeted policies that combine tax reforms and anti-corruption strategies, along with labor market interventions and increased spending on education, to reduce the income inequality in ASEAN nations.

Keywords: personal income tax, income inequality, Gini coefficient, ASEAN, progressive taxation.

1. Introduction

Income Income inequality has been a persistent challenge in many parts of the world, including the ASEAN region. Lawmakers and financial experts have seldom discussed personal income tax as a means to address these issues (Alexander & Gitaharie, 2024). The last decade has seen substantial economic growth within ASEAN; however, this prosperity has not been evenly distributed, leading to wider income disparities (Claus et al, 2013). Such growing gaps between the rich and poor raise concerns about social cohesion and sustainable development (ASEAN Secretariat, 2022). Understanding the relationship between personal income tax and income inequality is crucial for formulating tax policies that promote equitable economic outcomes in the ASEAN context (Alekhina & Ganelli, 2020).

Existing literature on this topic presents mixed findings. Some studies suggest that higher personal income tax rates can reduce income inequality, while others find limited or even opposite effects (Belozyorov & Sokolovska, 2018). The ASEAN region, with its diverse economic and social structures, offers a unique opportunity to explore this relationship further (Anasta & Sylviana, 2024).

This study aims to assess how personal income tax influences income inequality, measured by the Gini Index, in ASEAN countries during the period 2013-2022. It will also examine various determinants of the Gini index, such as the unemployment rate, foreign direct investment (FDI),

corruption index, and inflation rate. The findings are expected to assist ASEAN policymakers in designing and implementing policies to address pressing issues like income inequality and to foster more inclusive and sustainable development.

The period from 2013 to 2022 is particularly significant as it encompasses major economic shocks and subsequent recovery phases that have reshaped fiscal policies in ASEAN economies. During this timeframe, the lingering effects of the global financial crisis, coupled with the disruptive impact of the COVID-19 pandemic, compelled governments to implement rapid and sometimes radical policy responses, including adjustments in personal income tax regimes (Tewa & Ngepah, 2022). These turbulent yet transformative years provide a unique natural experiment to assess how targeted personal income tax reforms can influence income distribution amid economic volatility (Zhuang, 2018). Analyzing this period offers valuable insights into the resilience of tax systems during downturns and the effectiveness of recovery policies in mitigating rising income inequality.

The period from 2013 to 2022 is particularly significant as it encapsulates both pronounced economic shocks and subsequent recovery phases that have reshaped fiscal policies in ASEAN economies. During this timeframe, the lingering effects of the global financial crisis coupled with the disruptive impact of the COVID-19 pandemic forced governments to implement rapid and sometimes radical policy responses, including adjustments in personal income tax regimes. These turbulent yet transformative years provide a unique natural experiment to assess how targeted tax reforms in the realm of personal income tax can influence income distribution amid economic volatility. Analyzing this period offers valuable insights into the resilience of tax systems during downturns and the effectiveness of recovery policies in mitigating rising income inequality.

2. Literature review

2.1. Theoretical framework

2.1.1. Theoretical framework on income inequality

Income inequality refers to the unequal distribution of income across different groups within a society (IMF, 2021). The IMF states that the Gini coefficient is a typical numerical indicator of income inequality. Unless stated otherwise, Gini income inequality typically refers to disposable income or consumption, which already accounts for redistribution through taxes and transfers (IMF, 2021).

The Gini coefficient varies between 0 and 1, with 0 representing perfect equality and 1 representing perfect inequality. The Gini coefficient is typically expressed mathematically using the Lorenz curve, which graphs the proportion of total income (on the y-axis) earned by the bottom x portion of the population. The line at 45 degrees thus represents perfect equality of incomes. The Gini coefficient is equal to the area marked A divided by the total area of A and B, i.e., G = A/(A + B).

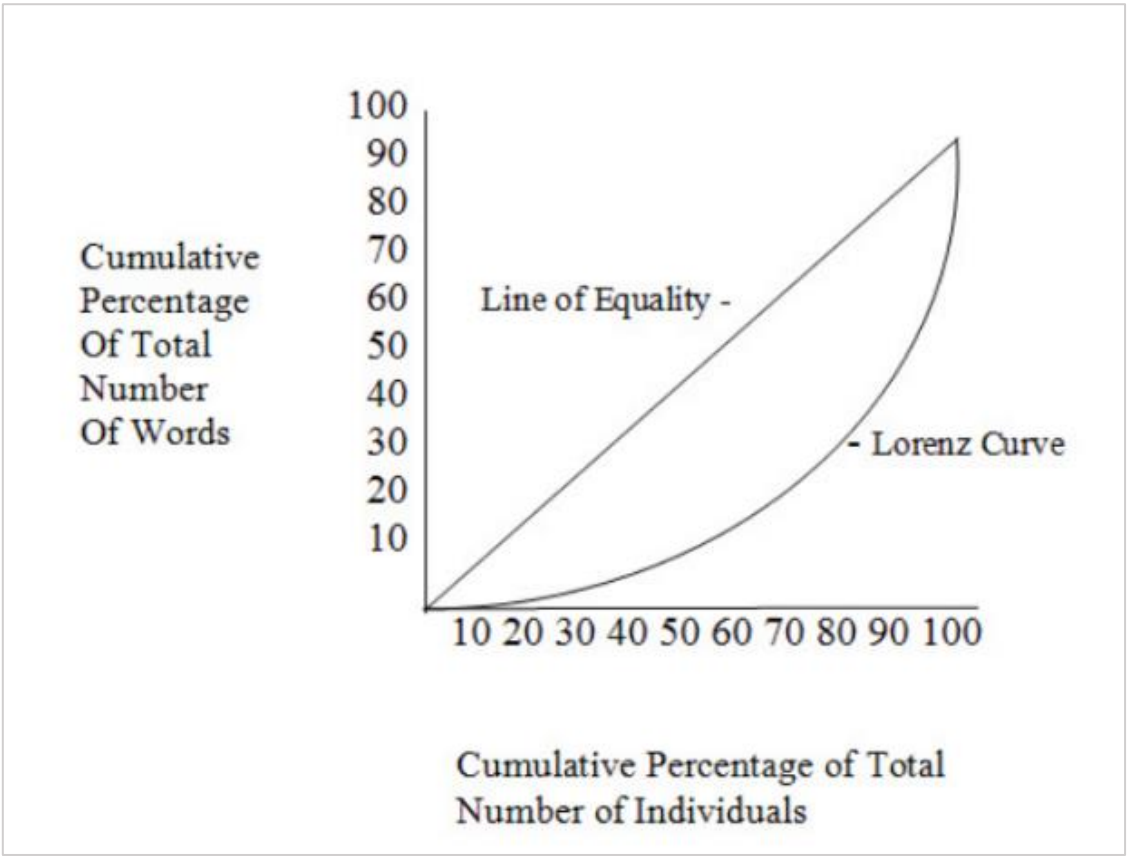

Figure 1. Illustration of gini coefficient

Source: ResearchGate

There are various factors that are proven theoretically and empirically to account for the income inequality trend, and those factors are divided into 2 groups: Global factors and country - specific factors (IMF, 2021). Factors such as technological progress, globalization, and commodity price cycle are considered to be in the global factors group. Whereas, country - specific factors include the one that related to economic developments and economic stability as well as to domestic policies - including financial integration, redistributive fiscal policies, and liberalization and deregulation of labor and product markets

2.1.2. Theoretical framework on personal income tax (PIT):

Personal Income Tax (PIT) is a direct tax imposed on an individual's earnings, including wages, salaries, business profits, and investment returns (Guo, 2012). It is a primary source of government revenue and serves as a tool for economic redistribution. According to the Ability-to-pay principle by Will Kenton (2020), each individual should be taxed based on their financial capacity. This supports the progressive PIT system, where higher income earners pay a larger percentage of their income in taxes, thereby reducing post-tax income disparities.

In relation to income inequality, (Akgun et al, 2017) explained that personal income tax was the most crucial instrument in redistributing income through the progressive design. This can be explained by the action of the government where higher tax revenue from top earners can be used for social welfare programs that benefit lower-income individuals, reducing inequality. PIT can also avoid income concentration and promote a fairer society by reducing excessive wealth

accumulation at the top. However, a weak enforcement of PIT can lead to a weak redistribution system where the tax burden is placed more heavily on the lower income groups rather than the higher ones, and an excessive PIT may discourage high-skilled labor participation, affecting overall income distribution.

2.2. Hypothesis development

An income inequality theory talks about how income gets distributed within a society so unequally and also why some people or groups find themselves differently well-off than others. The theory maintains that inequality is a major problem even in developing economies. Karl Marx had viewed inequality as the result of a clash among different social classes (Foley & Michl, 2019). More generally, income inequality theories are related to the themes of poverty and social injustice (Atkinson, 2015). Income inequality refers to the gaps between the highest- and lowest-income persons in the social hierarchy. The degree of inequality is sometimes expressed in relative terms by identifying the proportion of income received by certain groups in relation to that received by others.

2.2.1. Personal income tax and income inequality

One of the major subjects of macroeconomic studies is contraction of income inequality via fiscal measures. In fact, the rising income gap between the rich and the poor has provided impetus to study the causes of relative inequality and develop sustainable policies that are effective in lessening income inequality and poverty (Sergey A. Belozyorov et al. 2018). From their side, economic theorists and experts from international economic and financial organizations also investigate the various causes, consequences, and avenues to mitigate income inequality that exist worldwide.

With respect to taxation's impact on income inequality in various countries, a large number of studies have been done. The effect of personal income tax on distribution and income inequality in the U.S. was studied in work done by B. Okner (1975), G. Auten & D. Splinter (2023), and D. Puy et al. (1975). The results found that fiscal policy showed an ambiguous impact on household levels of inequality in the United States across different incomes, and, in fact, often ran counter to itself.

Turning to the ASEAN region, the estimation results by Angga Alexander et al. (2024) in their study "Taxation and Income Inequality in ASEAN Countries" showed that income tax is negatively correlated with income inequality, as evidenced by a coefficient value of -0.504, which is statistically significant at the 5% level. Therefore, an increase in government revenue from income tax as a percentage of GDP led to a decrease in the Gini index. This result supported the initial hypothesis based on Mirrlees's (1971) theory, which states that income tax is negatively related to income inequality.

One of the key studies examining this topic is the work of Gabriele Ciminelli et al. (2019), who investigated the impact of personal income tax on income inequality in six ASEAN countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam). In their analysis of panel data, they found that a higher level of personal income tax seemed to correlate negatively with income inequality, as measured by the Gini coefficient. The authors argue that progressive

personal income tax systems can use taxation to redistribute wealth and narrow the gap between the rich and the poor. They found corroborating evidence in the studies conducted by Caminada et al. (2019), Martorano (2018), and Parro (2024). Their interpretation of the estimation results indicated that this income tax imposed on the more highly skilled could assist in redistribution of income through transfer payments from the government to the lower-skilled groups, thereby contributing to a reduction in income concentration.

Hypothesis 1: Higher PIT reduces income inequality

2.2.2. Unemployment Rate and Income inequality

The unemployment rate might have a positive correlation with income inequality since the unemployed usually have little access to income and resources while the employed earn relatively higher incomes. Several studies have looked into this relationship, especially between developed and developing nations. According to Wenyi Gua's regression analysis (2023), the study reported that the unemployment rate significantly affects income inequality positively (as measured by the Gini index) in Germany. This finding suggests that higher unemployment rates are associated with increasing income inequality concerning Germany.

In an influential study of Howell and Rehm, 2009, the authors looked at the effect of unemployment on income inequality across 18 OECD countries. The higher the rate of unemployment within those countries, the greater was the income inequality, as measured by the Gini coefficient. The authors note that job losses have a disproportionate effect on poorer households, therefore worsening the income gap. There was a similar study carried out by Callan and Nolan in 1994, which analyzed unemployment effects on income distribution in Ireland. They concluded that rising unemployment rates raised levels of income inequality, since the unemployed enjoyed significantly lower levels of income than did the employed.

In the context of developing countries, it was an analysis across countries by Easterly (2001) on the link between unemployment and inequality. It was found that unemployment and income inequality were positively related, making the argument that reducing unemployment stands as a strategy for achieving equitable income distribution. As for the case of ASEAN countries, Thirlwall (2011) argues that the countries in the region experience varied degrees of income inequality, among many other factors being differences in unemployment rates across member states. He argued, therefore, for coordinated policies to tackle unemployment and, at the same time, income inequality as interrelated development issues in the ASEAN economic landscape.

Hypothesis 2: Higher UR increase the Gini index

2.2.3. Corruption index and Income Inequality

Corruption can affect income inequality and poverty through various channels, including overall growth, biased tax systems, and poor targeting of social programs as well as through its impact on asset ownership, human capital formation, education inequalities, and uncertainty in factor accumulation (Sanjeev Gupta, 2002). His study found out that, as regards the impact of corruption on income inequality, higher corruption is associated with higher income inequality using either one or two-tail tests at the one percent level. The magnitude of the effect of corruption on income inequality is considerable. In a similar study, Dabla-Norris et al. (2015) related

corruption to inequality. The findings from their research with a comprehensive data set covering both advanced and emerging economies show that corruption is a considerable determinant of income inequality, as it creates benefits above all these at the level of wealth and power to the detriment of the disempowered. Further explored were the dynamics just mentioned by Chong and Calderón (2000) between dirty dealings and bad loans. The authors' argument noted that it is a two-way relationship; high inequality encourages more corruption which in turn aggravates income disparity.

Hypothesis 3: Higher Corruption index increases the income inequality

2.2.4. Inflation rate and Income Inequality

The connection between inflation rate and income inequality has been a subject of extensive research, as it has significant implications for economic policy and social welfare. The previous studies have analyzed the inflation-income inequality relationship in both mature and developing economies. One important study is that of Bulir (2001), who tried to analyze the effects of inflation on the distribution of income by a broad sample of countries. It was found that with higher inflation rates the Gini coefficient indicated increased income inequality. The author reasons that the unequal impacts of inflation-were the poor mostly hit-gave rise to a widening in the income gap. Easterly and Fischer (2001) have performed another study on the inflation-poverty perceptions variable. It was found that increases in inflation are correlated with increased self-reported dissatisfaction with living standards, especially among the poor. This confirms that inflation adversely affects income inequality. In the case of developing economies, Albanesi (2007) analyzed the effects of inflation on income distribution. The author's findings suggest that high and volatile inflation tends to exert more force on the incomes of the poor, thus contributing to increased inequality. In the case of ASEAN countries, a report by the Asian Development Bank (2014) discussed the diverse levels of inflation and income inequality in the region. The report stressed, therefore, the need to link responses designed to tackle both inflation and inequality as interrelated challenges in the ASEAN economic scene.

Hypothesis 4: Higher inflation rate increases the income inequality

2.2.5. Government expenditure on education and Income Inequality

Education is widely regarded as a key mechanism for reducing income inequality by enhancing human capital and improving access to economic opportunities. Increased government expenditure on education reduces income inequality by opening up opportunities for lower-income groups to access quality education, according to Tanninen (1999). Sylwester (2002) supports this with empirical evidence that public spending on education is associated with a more equitable distribution of income in developed and developing countries. Education, as explained in the empirical findings of the Asian Development Bank (2014), mitigates income disparity through enhanced labor market outcomes and social mobility. Hence, increased government expenditure on education is expected to decrease income inequality.

Hypothesis 5: Higher government expenditure on education reduces income inequality

2.2.6. Wage and salaried workers and Income Inequality

The proportion of wage and salaried workers in total employment can influence income distribution, as formal employment generally provides more stable income and social benefits compared to informal or self-employed work. According to Burtless (1999), a growing proportion of wage and salaried workers does appear to be among the factors reducing income inequality because employment in formal sectors assures a more secure job and regulated wages. Similarly, Green and Zhou (2019) find that higher wage disputes within firms are accountable for overall income inequality, which means that a more even distribution of wage and salaried employment should also mitigate inequalities. The International Labour Organization insists that economies with a higher share of salaried employees always have lower income disparities, mainly due to having stronger labor protections and collective bargaining agreements. It is, therefore, hypothesized that increasing wage and salaried employment will probably reduce income inequality.

Hypothesis 6: A higher percentage of wage and salaried workers decreases income inequality

2.3. Research gap

Despite growing research on taxation and income inequality, two critical gaps persist. First, few studies have isolated the effects of personal income tax (PIT) on income distribution; most research aggregates various forms of taxation—such as corporate and indirect taxes—which can obscure the unique redistributive role that PIT plays in influencing disposable income and labor market decisions. Second, the ASEAN region remains underexplored in this context. While global studies often emphasize developed economies, the heterogeneous tax systems, diverse economic structures, and significant informal sectors in ASEAN countries demand a focused analysis. Targeting the impact of personal income tax within ASEAN not only fills this gap but also provides context-specific insights essential for designing progressive fiscal policies that effectively reduce income inequality in the region.

3. Methodology

3.1. Research methodology

This research involves a panel dataset that includes the data from 9 ASEAN countries in the period from 2013 to 2022. This analysis uses the random effect method to point out the relationship between the independent variables and the dependent variable.

3.2. Research model selection

3.2.1. Hausman Test for Model Selection

The Hausman test was performed to assess whether Fixed Effects (FE) or Random Effects (RE) is the more suitable approach for our 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.

	Coefficients (b) fe_model	(B) re_model	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
log_pit	-.1599042	-.0940211	-.0658831	.0502953
unemploy	.0150099	.0106389	.004371	.003149
infla	.0005742	.0004205	.0001537	.000432
rev_corrupt	.0359271	.0402412	-.0043141	.0292042
govexpenedu	-.0014454	-.0002327	-.0012127	.0029903
log_workers	-.0321896	-.0149956	-.017194	.0620789

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 4.17
Prob>chi2 = 0.6538

Figure 2. Stata Output of Hausman Test

Source: The authors' analysis

Since $p > 0.05$, 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.

3.2.2. Breusch-Pagan Lagrange Multiplier (LM) Test for RE vs. Pooled OLS

To further justify the choice of the Random Effects (RE) model, we conducted the Breusch-Pagan Lagrange Multiplier (LM) test, which determines whether Random Effects (RE) is necessary or if a simpler Pooled OLS model is sufficient. The null hypothesis assumes that Pooled OLS is preferred (i.e., there is no significant variation across countries), whereas the alternative hypothesis suggests that Random Effects should be used due to unobserved heterogeneity.

Breusch and Pagan Lagrangian multiplier test for random effects

gini[country_code,t] = Xb + u[country_code] + e[country_code,t]

Estimated results:

	Var	sd = sqrt(Var)
gini	.0023241	.0482086
e	.0008484	.0291269
u	.0014944	.0386577

Test: Var(u) = 0
chibar2(01) = 26.14
Prob > chibar2 = 0.0000

Figure 3. Stata Output of the LM Test

Source: The authors' analysis

- The p-value = 0.0000 strongly rejects the null hypothesis, confirming that Pooled OLS is not appropriate.
- Since the test suggests that country-specific heterogeneity exists, the Random Effects (RE) model is necessary.

3.2.3. Justification for Using the Random Effects Model

Based on the results of the Hausman Test, Breusch-Pagan LM Test, and VIF Test, we conclude that the Random Effects model (RE) is the most appropriate choice for estimating the effect of PIT on income inequality in ASEAN. The following reasons justify this decision:

- The Hausman Test (p = 0.6538) confirms that RE is preferable because country-specific heterogeneity is not correlated with independent variables.
- The Breusch-Pagan LM Test (p = 0.0000) confirms that RE is necessary to account for unobserved country-specific effects, rejecting the Pooled OLS model.

3.3. Research model

Our research uses the following model to assess the impact of personal income tax on income inequality.

$$gini_{it} = \beta_0 + \beta_1 log\_pit_{it} + \beta_2 unemploy_{it} + \beta_3 infla_{it} + \beta_4 infla_{it} + \beta_5 inflagovexpenedu_{it} + \beta_6 log\_worker_{it} + \varepsilon_{it}$$

In which:

i represents each country

t represents the year (2013-2022)

β_0: The intercept of regression model.

β_1 - β_6: The variables' regression coefficients.

ε is the error term

gini: Measures income inequality post-tax using the Gini index. A higher value indicates greater inequality.

log_pit: Log of personal income tax (PIT) as % of GDP. Higher PIT reduces inequality by redistributing wealth (Angga Alexander et al., 2024).

unemploy: Unemployment rate, the share of the labor force without work. Higher unemployment increases inequality as job losses hit low-income groups hardest (Thirlwall, 2011).

rev_corrupt: Reversed Corruption Index, where higher values indicate more corruption. Corruption worsens inequality by benefiting the wealthy and weakening redistribution (Gupta, 2002).

infla: Inflation rate (% annual change in prices). Higher inflation is linked to greater inequality, as it disproportionately affects lower-income groups (Bulir, 2001).

govexpenedu: Government education spending (% of GDP). Greater investment in education reduces inequality by improving access to opportunities (Tanninen, 1999; Sylwester, 2002).

log_workers: Log of wage and salaried workers (% of total employment). A larger formal labor force is expected to lower inequality by providing stable incomes (Burtless, 1999; Green & Zhou, 2019).

3.4. Data and data source

Our group utilized secondary data from 2 main sources which are World Inequality Database (WID) and World Bank. The dependent variable of the research is income inequality measured by the Gini index. There are also 5 independent variables which are: Personal income tax (PIT), unemployment rate, foreign direct investment (FDI) and inflation rate and

Table 1. Data and data source

Variables	Description	Unit	Expected sign	Source
Gini	Gini Coefficient	Index (0 - 1)		World Inequality Database
log_pit	Log of Personal Income Tax	Log (% of GDP)	-	World Bank
unemploy	Unemployment rate	% of labor force	+	World Bank
rev_corrupt	Reversed Corruption	Standardized index (-2.5 to +2.5)	+	World Bank
infla	Inflation rate	Annual % change	+	World Bank
govexpenedu	Government Education Spending	% of GDP	-	World Bank
log_workers	Log of Wage and Salaried Workers	Log (% of total employment)	-	World Bank

Source: Author

4. Result and analysis

4.1. Regression Results

Based on the Hausman test and Breusch-Pagan LM test, the Random Effects (RE) model is used to estimate the impact of PIT on income inequality in ASEAN. The result of the model:

```
. xtreg gini log_pit unemploy infla rev_corrupt govexpenedu log_workers, re

Random-effects GLS regression                   Number of obs     =         90
Group variable: country_code                    Number of groups  =          9

R-sq:                                           Obs per group:
     within  = 0.1511                                         min =         10
     between = 0.4727                                         avg =       10.0
     overall = 0.3435                                         max =         10

                                                Wald chi2(6)      =      16.17
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0129
```

gini	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
log_pit	-.0940211	.0472085	-1.99	0.046	-.1865479	-.0014942
unemploy	.0106389	.0050795	2.09	0.036	.0006832	.0205946
infla	.0004205	.0012691	0.33	0.740	-.0020668	.0029078
rev_corrupt	.0402412	.0163576	2.46	0.014	.0081808	.0723015
govexpenedu	-.0002327	.0051248	-0.05	0.964	-.010277	.0098117
log_workers	-.0149956	.0384349	-0.39	0.696	-.0903267	.0603355
_cons	.8767043	.1925691	4.55	0.000	.4992758	1.254133
sigma_u	.03865772					
sigma_e	.02912686					
rho	.63787936	(fraction of variance due to u_i)				

Figure 4. Results of Random Effects model

Source: The authors' analysis

4.2. Multicollinearity Check (VIF test)

To ensure the reliability of the regression results, we conduct a Variance Inflation Factor (VIF) test to detect the presence of multicollinearity among the independent variables. Multicollinearity occurs when explanatory variables are highly correlated, which can distort coefficient estimates and reduce the precision of statistical inferences.

Threshold Interpretation:

VIF < 5: No serious multicollinearity concerns.

VIF between 5-10: Moderate multicollinearity, which may require further investigation.

VIF > 10: High multicollinearity, requiring corrective measures.

Variable	VIF	1/VIF
rev_corrupt	2.79	0.358787
log_workers	2.55	0.391693
unemploy	1.54	0.650217
govexpenedu	1.35	0.742818
log_pit	1.31	0.765852
infla	1.28	0.783557
Mean VIF	1.80	

Figure 5. Results of multicollinearity check

Source: The authors' analysis

- The highest VIF value is 2.79 (rev_corrupt), well below the threshold of 5, indicating no severe multicollinearity issues.
- The mean VIF is 1.80, further confirming that multicollinearity does not pose a significant problem in this model.
- Since all VIF values remain below 3, the independent variables do not exhibit high correlation with one another, ensuring robust and reliable coefficient estimates.

As multicollinearity is not a concern, there is no need for variable transformation or exclusion. The Random Effects model can be reliably estimated without multicollinearity bias.

4.3. Cross-Sectional Dependence

To examine the presence of cross-sectional dependence in the panel dataset, we conduct Pesaran's test for cross-sectional independence. This test assesses whether residuals across different entities (countries) are correlated, which is crucial for determining the appropriate estimation technique in panel data models.

- Null hypothesis (H_0): No cross-sectional dependence (residuals are independent across countries).
- Alternative hypothesis (H_1): Cross-sectional dependence exists (residuals are correlated across countries).

```
. xtcsd, pesaran abs

Pesaran's test of cross sectional independence =     0.245, Pr = 0.8062

Average absolute value of the off-diagonal elements =     0.543
```

Figure 6. Results of cross-sectional dependence check

Source: The authors' analysis

- Pesaran's test statistic = 0.245
- p-value = 0.8062

Since the p-value is greater than 0.05, we fail to reject the null hypothesis, indicating that cross-sectional dependence is not present in the data.

This suggests that residuals across ASEAN countries are not significantly correlated, meaning that country-specific shocks do not strongly influence inequality across other nations in the sample.

The absence of cross-sectional dependence confirms that the Random Effects model remains appropriate and that additional corrections for cross-sectional correlation (such as Driscoll-Kraay standard errors) are not required.

4.4. Key Findings

4.4.1. Effect of Personal Income Tax on Inequality

Negative and statistically significant effect (p = 0.046):

- A 1% increase in PIT reduces inequality by 0.094 Gini points.
- This supports Progressive Taxation Theory (Musgrave, 1959) that higher taxation reduces income disparities.
- However, the effect size is relatively small, indicating that PIT alone is not enough to significantly lower inequality in ASEAN.

4.4.2. Effect of Unemployment on Inequality

Positive and statistically significant (p = 0.036):

- A 1% increase in unemployment raises the Gini coefficient by 0.0106 points.
- This aligns with Piketty's (2014) theory that high unemployment leads to greater income inequality.
- Job losses disproportionately affect low-income groups, while wealthier individuals retain assets.

4.4.3. Effect of Corruption on Inequality

Strong positive effect (p = 0.000):

- A 1-unit increase in corruption increases the Gini coefficient by 0.0402 points.
- This supports Institutional Economics Theory (North, 1990), where corruption enables the rich to evade taxes, reducing redistribution effectiveness.
- Corrupt systems allow wealth concentration among elites, worsening inequality.

4.4.4. Effect of Inflation on Inequality

Not statistically significant (p = 0.740):

- Inflation appears to have no direct impact on inequality in ASEAN.
- This suggests that price increases may be compensated by wage adjustments, stabilizing income distribution.

4.4.5. Effect of Education Expenditure on Inequality

Not statistically significant (p = 0.964):

- Government spending on education does not significantly impact inequality in ASEAN.
- This could be due to:
- Inefficiencies in education funding.
- Delayed effects (education policies take time to reduce inequality).

4.4.6. Effect of Wage-Based Jobs on Inequality

Marginally significant (p = 0.056):

- An increase in wage and salary jobs is weakly associated with increased inequality.
- This suggests that formal employment may not always reduce inequality if wages remain low or unevenly distributed.

4.4.7. Model Performance

- R-squared (Overall) = 0.3435 → The model explains 34.35% of the variation in inequality.
- Between R^2 = 0.4727 → Shows variation across countries is higher than within countries.
- Within R^2 = 0.1511 → Only 15.11% of inequality variation is within countries, suggesting structural country-level factors (like corruption) play a larger role.

4.5. Analysis of the result

The results show that PIT has a statistically significant negative effect on income inequality (p = 0.046). This establishes the position that progressive taxation does work to lessen income disparities. However, the smallish effect size suggests that PIT by itself cannot substantially reduce inequality; its degree of success depends on such things as levels of enforcement, compliance rates, and the efficiency of the redistributive process in targeting lower-income groups. Unemployment, on the other hand, has a significant positive impact on income inequality (p = 0.036), strengthening the connection between labour market conditions and distribution. Job losses increase unemployment disproportionately for low-income people, thus wider income gaps result from greater unemployment. Therefore, it points to the importance of stability in labour markets in reducing economic disparities. Corruption is noted as the single most significant contributory variable to inequality (p = 0.000). High levels of corruption undermine tax enforcement, encourage tax evasion, and weaken the capacity of redistributive policies. This allows wealth concentration at the top of the income pyramid while denying resources to low income households. The even stronger statistical significance afforded to this variable creates an emphatic statement regarding institutional integrity being critical to allow taxation policies to achieve their intended redistributive intent. Conversely, inflation has no discernible impact on inequality (p = 0.740). This suggests that price changes by themselves would not cause the divergence in income of

ASEAN member states. Wage increases, subsidies, or an assortment of other government interventions could be acting to ameliorate the effects of inflation on poorer constituents. However, this requires further research to see whether inflation affects different income groups in different ways over time. Likewise, government expenditure for education exhibits no statistically significant impact on inequality ($p = 0.964$). This may mean that spending on education takes considerable time to affect income distribution, or that inefficiencies in funding allocations hamper the attainment of any effective reductions in inequality. The insignificance in either case highlights the need for education policies that are more sharply targeted to maximize their long-run effect on inequality. The proportion of wage-based employment shows a marginally significant relationship with inequality ($p = 0.056$). By and large, formal employment provides individuals with some financial security; however, wage disparities in the formal sector can also contribute to inequality. The nearness of statistical significance suggests that policies controlling wage structures and strengthening labour rights could be pivotal in affecting income distribution.

Finally, cross-country differences explain a notable portion of the variance in income inequality, as indicated by the between R^2 value of 0.4727. This finding suggests that structural factors—such as differences in tax policies, labor market conditions, and governance quality—are key determinants of income inequality across ASEAN countries. Addressing these disparities requires tailored policy interventions that consider the unique economic and institutional characteristics of each nation.

5. Discussion and conclusion

This evaluation shows that personal income tax (PIT) assists in narrowing the income gap in ASEAN, thus validating the increments of taxation theory (Angga Alexander and others, 2024; Ciminelli and others, 2019). It is noted that a higher inequality in income can be observed at lower levels of taxation. However, it is important to point out that a great magnitude of differences cannot simply be resolved through taxation alone without other policies. Apart from taxes, the level of unemployment does account particularly for greater inequality, which supports Piketty's view of 2014. This reveals the need for policies that foster job creation and reformation of the labor market towards economic equity. Furthermore, evidence also shows that inequality is on the rise due to increasing levels of corruption which strengthens the assertions set by Gupta and Dabla Norris in 2002 and 2015. This results therefore points at the need for greater governance with tougher anti-corruption measures, as corruption cuts down on inter-class fiscal redistribution formed by elite sectors who neither benefit from nor subsidize public goods. Finally, it appears that inflation does not disturb inequality in a significant manner and this is likely to be the result of counterbalancing circumstances such as wage alteration or other active board monetary strategies. The other variable, which is government expenditure on education, does not also provide a statistically significant effect that may be explained by lagged effects or inefficiency of spending (Tanninen, 1999; Sylwester, 2002). These findings hint that increasing inequality cannot be brought down simply by increasing the finances for education, unless accompanied by policy measures directed towards equity in access to quality education.

The effect of wage and salaried workers is marginally significant, suggesting that while formal employment can be effective in decreasing inequality, the effect of wages and labor market conditions is key in determining such changes (Burtless, 1999; Green & Zhou, 2019). In other words, promoting formal employment is insufficient by itself but could be strengthened when wage policies and labor protections improve income distribution equitably.

This study provides empirical evidence on the role of taxation, labor markets, and institutional quality in shaping income inequality in ASEAN. While PIT contributes to reducing inequality, its effectiveness is hindered by corruption, weak labor protections, and structural economic factors. Future research should further explore the long-term effects of education spending and labor policies while assessing country-specific frameworks that enhance taxation's effectiveness in addressing income inequality.

6. Contribution of the research

6.1. Theoretical Contributions

Firstly, this study extends the theory of income inequality by integrating taxation, labor market factors, and institutional quality into the analysis of income distribution in ASEAN countries. While previous studies focused primarily on the impact of taxation in developed economies (Okner, 1975; Auten & Splinter, 2023), this research applies the progressive taxation theory to the ASEAN context, demonstrating that personal income tax (PIT) reduces income inequality but is moderated by labor market conditions and corruption levels. These findings provide empirical support for Mirrlees's (1971) optimal taxation theory and highlight the role of governance in shaping taxation efficiency.

Secondly, the research contributes to the understanding of macroeconomic determinants of inequality by analyzing the interaction between unemployment, inflation, and government education spending. While existing studies (Howell & Rehm, 2009; Easterly, 2001) confirm that unemployment exacerbates income disparities, our findings suggest that in ASEAN, wage structures and employment types also influence inequality. Additionally, the results indicate that education spending alone does not significantly reduce inequality unless governance quality is considered, contributing to human capital development theories (Tanninen, 1999; Sylwester, 2002).

Thirdly, this study bridges the gap in research on corruption and income inequality in emerging economies. While prior literature (Gupta, 2002; Dabla-Norris et al., 2015) suggests that corruption increases income inequality, our findings confirm that in ASEAN, corruption significantly weakens the redistributive power of taxation. This underscores the need for institutional reforms alongside fiscal policies to enhance tax effectiveness.

6.2. Practical Contributions

The findings emphasize that tax measures alone do not reduce income inequality; they must be coupled with other policies. By themselves, some redistributive impacts of a progressive personal income tax (PIT) structure are impaired by external variables like unemployment, corruption, and inefficiencies in education spending. This indicates that fiscal reform is necessary

but should be conducted in tandem with broader strategies for economic and institutional development. As a measure to buttress the redistributive nature of the PIT, tax authorities should engage in better enforcement of the tax law, eliminating loopholes and improving the structure of tax rates in such a manner as to prevent excessive burdens on low-income constituencies. However, this tax policy should be complemented by labor market interventions to reduce unemployment and wage disparities. Opening up productive avenues for work, giving formal employment status, and guaranteeing decent wages are crucial to averting income concentration on the top. The study finds that corruption accentuates inequality, allowing the rich to evade taxes and thereby divert public resources. Countries in ASEAN that have enacted robust anti-corruption legislation have also found it comparatively easier to reduce income inequalities, which points to a need for stringent governance and fiscal transparency mechanisms. Education spending is essential for promoting upward social mobility but efficacious only when efficiently allocated and accessible. Simply increasing education budgets will not suffice - policymakers must work to ensure quality and broaden access for marginalized communities, while also aligning curricula with labor market needs. Overall, ASEAN countries combining strong tax enforcement, anti-corruption frameworks, and labor market reforms achieve better inequality reduction. Sustainable economic growth will require the application of an integrated framework combining taxation with institution-building and economic policies to support a just and inclusive society.

6.3. Limitations and Future Research Directions

This study provides a compelling empirical case; it does, however, have a few limitations. First, the dataset features nine ASEAN countries and does not mirror possible variability in tax policies or the economic structures of other countries. Future studies could enlarge the database to compare it with more developing economies. The study analyzes personal income tax (PIT) without considering the differentiating tax brackets and exemptions, which may have impacts on redistributive effects. Future studies could assess the different effects of inequality by using progressive versus flat taxation models. Lastly, it has been proven that education expenditure alone does not significantly reduce inequality; however, more research should focus on quality education and labor market employment.

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