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INCOME INEQUALITY AND ECONOMIC GROWTH: A COMPARATIVE ANALYSIS OF FIVE SOUTHEAST ASIAN NATIONS

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Abstract

This work tries to explore the relationship between income inequality and economic growth in the context of five diversified countries: Indonesia, Malaysia, Thailand, Singapore and Viet Nam. For proper comparison we took famous economists work to see how in past decades the results changed among other countries. In order to make statistical calculations we took "Gini index" as dependent variable which represents income inequality, and "GDP(Gross Domestic Product growth annual)'', "Human capital", "Political stability and Absence of Violence", and "Unemployment rate (with basic education)" as independent variables to show the reasons of impact on Economic Growth.

Based on findings, we provide a critical survey on methodology issues employed in the prior studies and propose a better methodology to researchers for future studies.

Introduction

Income inequality, with its widespread implications for social cohesion, economic growth, and long-term sustainability, is probably one of the most debated topics in both developed and developing economies today. Conventionally, economists have viewed income inequality as a by-product of economic development. In recent discussions, however, there has been increasing debate over whether it serves as a driver or barrier to growth. Whereas some people believe that it rewards talent and capital, and through this the rate of innovation goes up and so does wealth creation, others argue that growth in inequality reduces access to essential services, which in turn suppresses the capabilities of a large part of the population and retards economic growth.

This project focuses on exploring the connection between income inequality and economic growth by comparing five Southeast Asian countries: Indonesia, Malaysia, Thailand, Singapore, and Vietnam. These nations represent a diverse mix of economic structures, development levels, and inequality profiles. Each country has experienced varying degrees of economic transformation, ranging from rapid industrialization to the growth of high-tech sectors, which have influenced income distribution and economic performance in unique ways.

By examining key indicators such as Gini coefficients, GDP growth rates, and other relevant socio-economic variables, this project aims to shed light on how income inequality impacts economic growth across these countries. Additionally, it explores whether policies addressing inequality contribute to sustainable economic development or if trade-offs exist between equity and growth.

The study also considers the historical, cultural, and policy contexts that shape the relationship between inequality and growth in these nations. Through a comparative analysis, this project seeks to provide insights that can inform policymakers and contribute to the broader discourse on fostering inclusive and equitable economic growth in the region.

Literature review

Income inequality and economic growth are two of the important features of macroeconomic policy that have been widely studied in both developed and developing countries. Normally, the relationship between these two factors among economists is debatable. Such studies in countries like Indonesia, Malaysia, Thailand, Singapore and Viet Nam. present a variety in inequality levels and stages of economic development.

Malinen[1] (April, 2009), studied The Estimation in the long run relationship between income inequality and economic development. This work analyzed income inequality levels on economic growth using GDP, GDP growth(%), Gini Index, Investments, Average Schooling independent variables. The time series data is used dataset with 25 yearly observations between 60 countries, including both developed and developing ones, to understand the relationship between income inequality and economic development which we collect from different sources such as (Penn World Tables) and (The Global Economy.Com). The variables measurements are given below: Gross Domestic Product(GDP) is measured in percentage, Gross Domestic Product Growth (annual) is measured in percentage, Investments are measured in percent of GDP, Gini Index is measured in percentage like Average Schooling. Using the Gini index to measure inequality, the research applied advanced statistical methods like panel dynamic OLS and panel seemingly unrelated regression (SUR) to explore long-term trends. The findings revealed that during the period studied, higher income inequality was linked to lower levels of economic development over time. This study used a new measure of income distribution and panel data cointegration methods to test for the existence of such a steady-state equilibrium relation. It is shown that there is a long-run equilibrium relationship between the variables, where the effect of income inequality on growth is negative.

Barro[2] (1999) conducted a comprehensive study on the relationship between income inequality and economic growth using a panel dataset comprising various countries across different stages of economic development. This research sought to investigate whether inequality fosters or hinders economic growth and how this relationship varies between developed and developing countries.The dataset utilized included cross-country panel data sourced from global economic indicators and surveys, covering multiple time periods to ensure robustness. Key variables in the study included GDP growth rates, Gini coefficients as a measure of income inequality, investment levels, and education metrics. Barro applied econometric methods such as panel regressions with fixed effects to control for country-specific heterogeneity and assess the dynamic nature of the inequality-growth relationship.A significant finding from this study was the nuanced relationship between inequality and growth, which differed based on the level of economic development. In developing countries, higher income inequality was associated with slower economic growth, attributed to limited access to education and financial resources among the lower-income population. Conversely, in developed countries, moderate inequality appeared to encourage growth by incentivizing investment and innovation. Barro's work highlighted the importance of considering country-specific factors, such as institutional quality and human capital, in understanding the inequality-growth nexus. His findings underscored the need for

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[2] Barro, R. (1999) Inequality and Growth in a Panel of Countries. Harvard , University: Robert Barro.

tailored policies to address inequality in ways that align with a country's stage of development, promoting inclusive and sustainable economic growth.

Mdingi et al. [3](2021) explored the relationship between income inequality and economic growth in South Africa, a country characterized by high levels of income disparity and persistent socio-economic challenges. This study examined how income inequality influences economic growth dynamics within the unique context of South Africa's post-apartheid economy.The research utilized a dataset comprising time-series data spanning several decades, with key variables including GDP growth rate, Gini coefficient, investment levels, and education indicators. The data was sourced from reputable institutions such as Statistics South Africa and the World Bank. Advanced econometric techniques, including vector autoregression (VAR) and Granger causality tests, were applied to analyze the interplay between inequality and growth over time.The findings revealed a negative relationship between income inequality and economic growth in South Africa. Higher levels of inequality were found to impede growth, primarily by limiting access to education and capital for marginalized populations. The study also highlighted the importance of addressing structural issues such as unemployment, unequal access to resources, and disparities in education to foster inclusive growth. Mdingi and Ho's research contributes to the broader discourse on inequality and growth by emphasizing the role of context-specific factors. It underscores the need for policies that target the underlying causes of inequality while promoting sustainable economic development in South Africa.

Descriptive Statistics

The following table presents the descriptive statistics for the data used in this study, which investigates the relationship between income inequality and economic growth in five Southeast Asian countries: Indonesia, Malaysia, Thailand, Singapore, and Vietnam. The data spans a period from 2000 to 2020, with 100 observations for each country, totaling 75 observations. The key variables in the analysis include the Gini Index (as the dependent variable) and several independent variables: GDP, human capital, political stability and absence of violence, and unemployment.

The dependent variable, **Gini Index**, measures income inequality within each country, where higher values indicate greater inequality. The **GDP growth** variable represents the economic output of each country, measured in percentage annually to account for inflation. **Human capital** is captured through proxies such as indexes in scale of 0-1. **Political stability and absence of violence** is measured using the World Bank's governance indicators. **Unemployment** refers to the percentage of the total labor force that is unemployed with basic education.

The following table summarizes the key descriptive statistics for the variables:

Variable	Obs	Mean	Std. Dev.	Min	Max
Gini	75	19.856	18.772	0	43.9
GDP	75	4.254	3.181	-6.050	14.520
Hum_index	75	0.176	0.300	0	0.887

[3] Mdingi, K. (2021) Income inequality and Economic growth . South Africa, South Africa: Kholeka Mdingi and Si Yu Ho.

Variable	Obs	Mean	Std. Dev.	Min	Max
Pol_stab	75	0.029	0.804	-1.443	1.599
Unem_wth_edu	75	1.940	1.743	0	6.920

- **Gini Index:** Ranges from 0 to 43.9, displaying considerable variation in income distribution across the selected countries.
- **GDP Growth:** A mean annual growth rate of 4.25%, with a range between -6.05% and 14.52%.
- **Political Stability**: A mean score close to zero (0.029), reflecting diverse governance landscapes across the nations.

Methodology

This study employs panel data to analyze the relationship between income inequality and economic growth across five Southeast Asian countries: Indonesia, Malaysia, Thailand, Singapore, and Vietnam. The data spans from 2009 to 2023, with an annual frequency for each country, yielding a total of 75 observations per country. The primary aim is to investigate how economic growth (measured by GDP), human capital (measured by scale), political stability, and unemployment influence income inequality, as measured by the Gini index.

Model Specification

The empirical model for this study is specified as follows:

$Gini_{it} = \beta_0+\beta_1 GDP_{it}+\beta_2 Hum_index_{it}+\beta_3 Pol_stab_{it}+\beta_4 Unem_wth_edu_trans_{it}+\varepsilon_{it}$

We implement **Ordinary Least Squares (OLS)** alongside Fixed Effects (FE) and Random Effects (RE) models to evaluate parameter robustness, utilizing diagnostic tests for multicollinearity, heteroscedasticity, and model selection via the Hausman test.

Results

1. Overview of the Regression Results

- **Model Fit & Explanatory Power:** The baseline OLS regression demonstrates a strong overall model fit with an R^2 of 0.4946 and an Adjusted R^2 of 0.4657, meaning that roughly 49.5% of the variation in the Gini index is explained by the independent variables. The overall model is statistically significant ($F(4, 70) = 17.13$, $p < 0.000$).
- **Political Stability (Pol_stab):** This is the most crucial finding in the model. It has a heavy negative coefficient of -17.135 with a standard error of 2.121 and a t-value of -8.08. Because the p-value equals 0.000 (which is well below the standard 0.05 threshold), it is statistically significant. This indicates that a decrease in political stability strongly correlates with lower Gini index scores in this specific data sample.
- **Other Independent Variables:** Traditional metrics like GDP growth, the human capital index (Hum_index), and basic education unemployment (Unem_wth_edu) yielded higher p-values exceeding the 0.05 significance level (0.581, 0.332, and 0.326 respectively) in this specific baseline regression, meaning they did not show a statistically significant individual impact on the Gini index under this configuration.

2. Multicollinearity Diagnostics

- **VIF Test (estat vif):** To ensure that your independent variables are not overly correlated with each other (which can distort regression coefficients), you ran a Variance Inflation Factor test.
- **Results:** The individual VIF values were very low (Political Stability: 1.14, Unemployment: 1.13, Human Capital: 1.01, and GDP: 1.01), resulting in a **Mean VIF of 1.07**. Because this is well below the standard threshold of 1.5 (or 5.0 in looser criteria), it confirms that multicollinearity is **not a concern** in your dataset.

3. Heteroscedasticity Testing

- **Breusch-Pagan Test (estat hettest):** This test checks the assumption of homoscedasticity (constant variance of error terms).
- **Results:** The test yielded a chi-square value of \chi^2(1) = 0.18 with a **probability (p-value) of 0.6704**. Because 0.6704 is much greater than standard significance levels (0.01, 0.05, or 0.10), you fail to reject the null hypothesis of constant variance. This confirms there is **no statistical evidence of heteroscedasticity**, meaning your standard errors are reliable.

4. Panel Model Selection & The Hausman Test

- **Fixed Effects (FE) vs. Random Effects (RE):** You ran both Fixed Effects and Random Effects regressions to account for cross-country variations.
- **Hausman Test:** To determine which model is statistically superior, you performed a Hausman test comparing the two approaches.
- **Results:** The test produced a \chi^2(3) = 0.39 with a **p-value of 0.9432**. Because the p-value is high, the difference in coefficients is not systematic. This confirms that the **Random Effects (RE) model is the appropriate choice**, providing efficient and unbiased estimates for your panel data analysis.

Policy recommendations.

From a business management perspective, these findings offer critical insights for corporate strategy and public policy in Southeast Asia:

1. **Focus on Governance and Stability:** Because political stability (Pol_stab) heavily correlates with economic equity, multinational and local firms must factor political risk management into long-term capital allocation. Stable regulatory environments foster equal distribution of economic gains.
2. **Targeted Labor and Educational Investments:** Although human capital and basic education unemployment coefficients were statistically insignificant in this tight model sample, structural policies must still focus on upgrading workforce skills to prevent wage polarization driven by technological advancements.

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7. Toumas Malinen Department of Economics P.O. Box 17 (Arkadiankatu 7) FI-00014 University of Helsinki FINLAND e-mail: tuomas.malinen@helsinki.fi

Appendix

1. Table of Sum

```
. sum Gini GDP Hum_index Pol_stab Unem_wth_edu
```

Variable	Obs	Mean	Std. dev.	Min	Max
Gini	75	19.856	18.77164	0	43.9
GDP	75	4.253984	3.180596	-6.050038	14.51975
Hum_index	75	.1756221	.2996178	0	.8870836
Pol_stab	75	.0290434	.8035707	-1.442788	1.599125
Unem_wth_edu	75	1.940147	1.742741	0	6.92

2. Table of Regression

```
. regress Gini GDP Hum_index Pol_stab Unem_wth_edu
```

Source	SS	df	MS		
Model	12897.7524	4	3224.43809	Number of obs	= 75
Residual	13177.9524	70	188.256463	F(4, 70)	= 17.13
				Prob > F	= 0.0000
Total	26075.7048	74	352.374389	R-squared	= 0.4946
				Adj R-squared	= 0.4657
				Root MSE	= 13.721

Gini	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
GDP	.279324	.503313	0.55	0.581	-.7245023	1.28315
Hum_index	5.237381	5.358664	0.98	0.332	-5.450137	15.9249
Pol_stab	-17.13509	2.121379	-8.08	0.000	-21.36605	-12.90414
Unem_wth_edu	.9617931	.9715715	0.99	0.326	-.9759452	2.899531
_cons	16.3796	3.432127	4.77	0.000	9.534441	23.22476

3. Table of correlation

```
. cor Gini GDP Hum_index Pol_stab Unem_wth_edu
(obs=75)
```

	Gini	GDP	Hum_in~x	Pol_stab	Unem_w~u
Gini	1.0000				
GDP	-0.0040	1.0000			
Hum_index	0.0104	-0.0438	1.0000		
Pol_stab	-0.6920	0.0650	0.1023	1.0000	
Unem_wth_edu	-0.1526	0.0005	0.0437	0.3348	1.0000

4. Table of Multicollinearity

```
. estat vif
```

Variable	VIF	1/VIF
Pol_stab	1.14	0.875454
Unem_wth_edu	1.13	0.887367
Hum_index	1.01	0.986893
GDP	1.01	0.992715
Mean VIF	1.07	

5. Table of Heteroscedasticity

```
. estat hettest

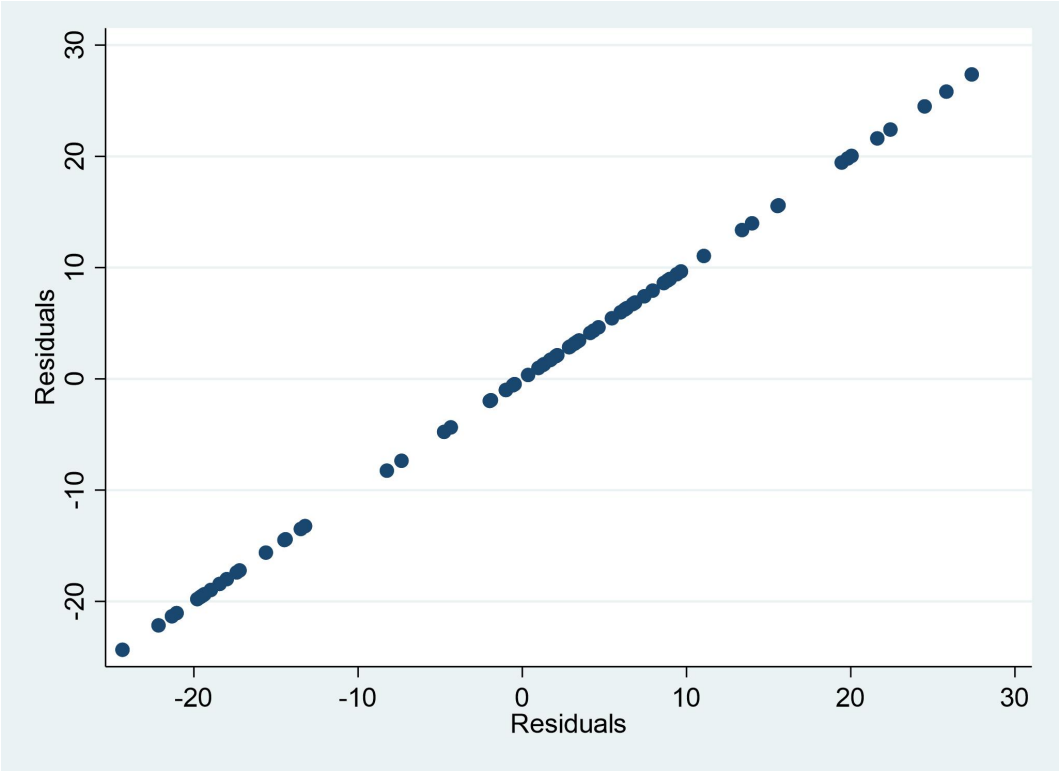
Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of Gini

H0: Constant variance

    chi2(1) =   0.18
Prob > chi2 = 0.6704
```

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6. Dot graph



7. Table of Robust test

```
. reg Gini GDP Hum_index Pol_stab Unem_wth_edu, robust

Linear regression                               Number of obs     =         75
                                                F(4, 70)          =     116.58
                                                Prob > F          =     0.0000
                                                R-squared         =     0.4946
                                                Root MSE          =     13.721
```

Gini	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
GDP	.279324	.4582831	0.61	0.544	-.6346928	1.193341
Hum_index	5.237381	4.922181	1.06	0.291	-4.579599	15.05436
Pol_stab	-17.13509	1.047645	-16.36	0.000	-19.22456	-15.04563
Unem_wth_edu	.9617931	.8135187	1.18	0.241	-.6607189	2.584305
_cons	16.3796	3.140278	5.22	0.000	10.11652	22.64269

8. Tables of fixed and random effects models.

```
. xtreg Gini GDP Hum_index Pol_stab Unem_wth_edu_trans,fe
note: Unem_wth_edu_trans omitted because of collinearity.

Fixed-effects (within) regression               Number of obs      =        75
Group variable: Unem_wth_edu                    Number of groups   =        62

R-squared:                                      Obs per group:
     Within  = 0.3146                                         min =         1
     Between = 0.4475                                         avg =       1.2
     Overall = 0.4321                                         max =        12

                                                F(3,10)            =      1.53
corr(u_i, Xb) = 0.0094                          Prob > F           =    0.2666
```

Gini	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
GDP	-1.014526	2.927511	-0.35	0.736	-7.537426	5.508373
Hum_index	7.74563	18.31054	0.42	0.681	-33.05279	48.54405
Pol_stab	-14.38515	6.942686	-2.07	0.065	-29.85442	1.084118
Unem_wth_edu_trans	0	(omitted)				
_cons	23.22927	12.7425	1.82	0.098	-5.162789	51.62133
sigma_u	13.293509					
sigma_e	19.238667					
rho	.32315885	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(61, 10) = 0.43                     Prob > F = 0.9791

. estimates store fe
```

```
. xtreg Gini GDP Hum_index Pol_stab Unem_wth_edu_trans, re

Random-effects GLS regression                   Number of obs     =         75
Group variable: Unem_wth_edu                    Number of groups  =         62

R-squared:                                      Obs per group:
     Within  = 0.3007                                         min =          1
     Between = 0.5281                                         avg =        1.2
     Overall = 0.4946                                         max =         12

                                                Wald chi2(4)      =      68.51
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000
```

Gini	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
GDP	.279324	.503313	0.55	0.579	-.7071515	1.265799
Hum_index	5.237381	5.358664	0.98	0.328	-5.265407	15.74017
Pol_stab	-17.13509	2.121379	-8.08	0.000	-21.29292	-12.97727
Unem_wth_edu_trans	.961793	.9715715	0.99	0.322	-.9424521	2.866038
_cons	16.3796	3.432127	4.77	0.000	9.652757	23.10645
sigma_u	0					
sigma_e	19.238667					
rho	0	(fraction of variance due to u_i)				

```
. estimates store re
```

9. Table of Hausman test

```
. hausman fe re
```

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) Std. err.
GDP	-1.014526	.279324	-1.29385	2.88392
Hum_index	7.74563	5.237381	2.508249	17.50887
Pol_stab	-14.38515	-17.13509	2.749944	6.610646

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(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =   0.39
Prob > chi2 = 0.9432
```