A Comprehensive analysis of the factors contributing to income inequality in Malaysia

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Abstract

This study empirically analyses the main factors determining changes in income inequality in Malaysia from 1989 to 2022. It uses the ARDL (Autoregressive Distributed Lag) model for this purpose. This analysis investigates the stable, long-term relationships and immediate changes between income inequality (measured by the Gini coefficient) and a group of economic factors (such as GDP growth, foreign direct investment, inflation, and unemployment), demographic factor (population growth), and policy factors (government expenditure on education and tax revenue). The ARDL technique comprehends the intricate interaction among these elements. The key findings indicate that long-term GDP growth has a reducing influence on inequality of income, but the entrance of foreign investment, increased inflation, and unemployment worsen inequities. Augmenting investment in education and implementing a system of progressive taxation can alleviate income inequalities. The short-term impacts display a subtle and intricate pattern. This extensive research offers significant empirical data and insights to guide policies that aim to foster inclusive economic growth and ensure fair distribution of income in Malaysia.

Key Words: Income Inequality**,** ARDL Model**,** Economic Determinants**,** Demographic Factors**,** Malaysia.

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تحليل شامل للعوامل التي تساهم في عدم المساواة في الدخل في ماليزيا

الملخص

تقوم هذه الدراسة بتحليل عملي للمحددات الرئيسية التي تؤثر على اتجاهات عدم المساواة في الدخل في ماليزيا خلال الفترة من 1989 إلى 2022، باستخدام نموذج الانحدار الذاتي ذي الإبطاء الموزع .(ARDL) وذلك من خلال دراسة العلاقات التوازنية على المدى الطويل والمدى القصير بين عدم المساواة في الدخل (المقاسة بمعامل جيني) ومجموعة من العوامل الاقتصادية (نمو الناتج المحلي الإجمالي، الاستثمار الأجنبي المباشر، التضخم، البطالة)، والعامل الديموغرافي (نمو السكان)، والعوامل السياسية (الإنفاق الحكومي على التعليم، الإيرادات الضريبية)، كما يتناول اسلوب ARDL التفاعل المعقد بين هذه المتغيرات، وتوضح النتائج الرئيسية أن نمو الناتج المحلي الإجمالي يقلل من عدم المساواة على المدى الطويل، في حين أن تدفقات الاستثمار الأجنبي والتضخم المرتفع والبطالة تزيد من عدم المساواة، واظهرت النتائج ايضًا أن زيادة الإنفاق على التعليم والضرائب التصاعدية تؤدي إلى التخفيف من حدة الفوارق في الدخل، وتظهر الآثار على المدى القصير نمطًا متنوعًا من العلاقات بين المتغير التابع والمتغيرات المستقلة للدراسة، كما تقدم هذه الدراسة أدلة عملية قيمة ورؤى لتوجيه السياسات الرامية إلى تعزيز النمو الاقتصادي الشامل وتوزيع الدخل العادل في ماليزيا.

الكلمات المفتاحية: عدم المساواة في الدخل، نموذج ARDL، المحددات الاقتصادية، العوامل الديموغرافية، تدخلات السياسة، ماليزيا.

1- Introduction

Income inequality has become a significant economic and social problem worldwide, with important consequences for economic growth, social unity, and sustainable development (Atkinson, 2015; Piketty, 2014). Malaysia, a rapidly developing nation, has experienced significant economic transformation over the past few decades. Despite its impressive economic growth and efforts to promote development, income disparities have persisted, posing challenges to the country's goals of achieving inclusive and equitable progress (Ragayah, 2012).

This study aims to empirically analyze the factors contributing to income inequality trends in Malaysia since the 1990s, with a focus on both long and short run dynamics. Specifically, the research examines the long-term equilibrium relationship among inequality of income, measured by the Gini index, and a set of explanatory variables encompassing economic performance, foreign capital inflows, price levels, labor market conditions, demographic changes, human capital investment, and taxation policies (Bourguignon, 2015). Additionally, the study investigates the short-run impacts of changes in these determinants on income inequality, capturing the immediate and dynamic effects over time (Narayan, 2005). (Narayan, 2005).

The study utilizes (ARDL) technique invented by Pesaran et al. (2001) to analyze the inequality of income dynamics and factors that affect income distribution patterns in Malaysia. The study contributes to the theoretical understanding of this topic through rigorous empirical examination. The research findings

can contribute to evidence-based policymaking by offering valuable insights into the factors that influence income inequality over both the long and short term. This information can be used to guide the creation and execution of targeted policies and strategies aimed at effectively addressing income disparities. (Atkinson, 2015; Stiglitz, 2012).

Moreover, the design and objectives of this study are consistent with the United Nations Sustainable Development Goals that Malaysia has embraced for the country, thus achieving the tenth goal, which entails the elimination of inequalities within and between nations. As such, the study bears the goal of offering understanding and evidence of the observed multivariate relationship of the factors that underpin the income distribution in Malaysia to policymakers, researchers, and stakeholders in the empirical appreciation of this subject as a means of supporting the realization of more equitable and sustainable economic development.

The value of this study is thus derived from its theoretical contribution, practical relevance, potential policy impact, contribution to sustainable development goals, and use of sound research methodology. Second, the use of the ARDL as a tool, does not require the order of variables while allowing for cointegration among variables with different orders of integration as well as short-run dynamics, adds to the methodological sophistication of the income inequality literature.

Other studies conducted in the past have also sought to investigate the extent of income disparities in the Malaysian context (Yusof and Bhattasali, 2008; Lim and Kui, 2021; Cheong and Wu, 2018; Saari, et al. , 2015). However, in order to systematically analyze long and short term movements and factors of income inequality it is desirable to undertake a more Mult.

Five main sections comprise the study: (1) Introduction on income inequality, study goals, significance, and sustainable development goals. (2) Literature review on income inequality theories, economic, demographic, and policy factors, and Malaysian empirical studies. (3) ARDL model methodology, data sources, model specification, and variable selection justification. Four empirical tests: unit root tests, cointegration analysis, long-run and short-run coefficient estimation, and diagnostic tests. (5) Conclusion summarizing key findings on Malaysian income inequality dynamics and suggesting inclusive growth, human capital investment, progressive taxation, and trend monitoring to address inequality.

2- Literature Review

This literature review covers income inequality's theoretical and empirical roots and how it affects Malaysia. It begins by reviewing the theories and perspectives that have shaped income inequality discourse. The review then addresses the conceptual framework of economic, demographic, and policy factors that affect income distribution.

2-1. Income Inequality Theories

Income inequality has long been studied for its causes and effects (Atkinson, 2015). From ancient to feudal times, mediaeval Europe was economically divided (Piketty, 2014). Marx's theory of value in excess and class struggle (Marx and Engels, 1848) held that the capitalist class accumulated wealth through labor exploitation during the Industrial Revolution, increasing income inequality.

Famous economists have discussed income inequality. Modern economics' father, Adam Smith, used his "invisible hand" theory to examine how free markets affect economic growth and inequality, arguing that individual self-interest benefits society (Smith, 1776).

2-1-1. Impact of Income Inequality Theories:

Income inequality theories have influenced public discourse and policy. Progressive taxation, minimum wage legislation, and social welfare reforms have been suggested to address inequality's negative effects on economic growth and social stability (Atkinson, 2015; Stiglitz, 2012). Critics say excessive government intervention could stifle economic growth and innovation and that inequality is a natural result of talent and effort (Mankiw, 2013).

2-1-2. Positive Aspects of Income Inequality Theories:

Atkinson (2015) and Piketty (2014) claim that income inequality theories raise awareness and encourage action to combat inequality and promote social justice. Research and scholarship on these theories have helped explain income disparities.

2-1-3. Negative Aspects of Income Inequality Theories:

Critics say income inequality theories oversimplify complex issues, resulting in ineffective one-size-fits-all policy solutions and social division (Clemente, 2022). These theories may also pit different groups against each other and make disadvantaged groups feel victimized.

2-1-4. Contemporary Perspectives:

Scholars like Thomas Piketty and Joseph Stiglitz have studied income inequality's causes and effects. The influential work "Capital in the Twenty-First Century," by Piketty, argued that capitalism's inherent inequality requires wealth redistribution through progressive taxation (Piketty, 2014). Stiglitz (2012) noted that inequality hurts economic growth and social cohesion.

2-2. Conceptual Framework of Income Inequality Determinants

Understanding income inequality determinants is crucial for informing policy decisions and promoting economic equity.

This literature review aims to explore the conceptual framework surrounding determinants related to income inequality.

Available literature shows that globalization, technological change, education, and labor market conditions, together with institutional factors have been responsible for income disparities (Benabou 2000; Piketty 2014). Globalization and opening up of borders to integrate the economies have created more opportunities for capital and labor mobility which has led to some extent widen the skill premium differential between skilled and unskilled workers (Milanovic, 2016). The technological advancements have also been found to have their implications given that skills advanced technologies increase employment ratio rather than the low skilled ones relying on automation and digitization. (Acemoglu & Autor, 2011) Education is a well established predictor, with greater access to education leading to increases in earnings and a reduced level of income inequality (Goldin & Katz, 2008). Also, factors related to labor markets ranging from union densities, minimum wages to power of bargainers amongst the workers help in determining income disparities (Card et al. , 2004). At the institutional level, fiscal policies such as taxation, social welfare provisions, and policy measures in a country also define the physiological/lifetime distribution of income within society (Atkinson, 2015).

According to Bourguignon (2015), income inequality is influenced by various economic, demographic, and policy

factors. These three domains encompass the main determinants of income inequality.

Economic factors play a crucial role in shaping income distribution patterns. The level of economic development, as reflected by GDP growth rate, can influence inequality dynamics through its impact on employment opportunities, wage levels, and overall living standards (Kuznets, 1955; Piketty, 2014). Foreign capital inflows, such as Foreign Direct Investment (FDI), can participate to economic growth but may also exacerbate income disparities if the benefits are not evenly distributed (Herzer et al., 2014). Inflation and unemployment rates can disproportionately affect lower-income groups, potentially widening income gaps (Bulir, 2001; Corina et al., 2015).

Demographic factors, such as population growth, can also influence income inequality. Fast population growth can tension resources and limit economic opportunities, potentially exacerbating inequality (Lam, 1986). Additionally, changes in the age structure, urbanization, and educational attainment of the population can have implications for income distribution (Deaton & Paxson, 1997; Glaeser et al., 2009).

Policy factors, including government expenditure on education and taxation policies, play a crucial role in addressing income inequality. Investments in education and human capital development can enhance economic opportunities and social mobility, potentially reducing income disparities (Castelló-Climent, 2010). Progressive taxation policies and redistributive

measures can directly impact income distribution by transferring resources from higher-income to lower-income groups (Claus et al., 2014; Joumard et al., 2012).

2-3. Previous Empirical Studies on Income Inequality in Malaysia

income distribution, or more specifically income inequality has been an important concern in Malaysia and a number of studies have attempted to capture its characteristics, causes and consequences. Previous literature review of empirical studies has informed society on the facts that Income Inequality is a multifaceted concern in the country. Another growth research of the inequality in Malaysia by Ragayah (2012) using data from the Household Income and Basic Amenities Analysis discovered that education, employment and regional income have been instrumental in fanning inequality. The study also indicated the income disparities between the urban and rural regions as well between different states based on their level of economic development.

Regarding the consequence of trade liberalization on income distribution, another study was conducted by Saari et al. , (2015) seeking to find out if liberalizing trade indicates to increased income inequality in Malaysia. The study also revealed that, with the use of data that spanned the period between 1970 and 2011, trade openness has a positive outcome on income disparity in the short run but this quantitative impacts wanes in the long term. The authors recommended that

education and skill acquisition policies may possibly help cushion the adverse impacts of trade liberalization reforms on income earners.

In the study by Yusof and Bhattasali (2008) the emphasis is made on the institutions, in particular how economic growth and government policies affect income inequality in Malaysia. Their analysis revealed that economic liberalization initially caused increased difference in incomes making Malaysia among the world's most unequal states but the government's interventions like as the NEP (New Economic Policy) and the National Development Policy (NDP) explain why inequality has begun to decrease after progressive improvement. This study highlighted the concept of inclusive growth and explored policies aiming at considering the needs of people in different income levels.

for more recent work, Lim and Kui (2021) employing panel data also explored the facts that underpin the income inequality in Malaysia from 1984 to 2018. Their findings were that things like globalization, technological advancement, and education levels affected income disparity in such a country. He also found that social protection including government spending in education and spending in social protection significantly reduces differences in income levels.

One of the significant studies is the research done by Cheong and Wu (2018) whereby they sought to establish the impact of technological innovations and globalization on income distribution in the Malaysian economy. This paper using several

tests such as OLS regression test, fixed effect test and random effect test concluded that globalization contributes to income disparity, but this contribution was overshadowed by technological advancement's impact on the increase of income disparity. Accordingly, the authors suggested the following policy measures to tackle these challenges: Boosting skills to facilitate skill formation and skill upgradation Promoting adoption of technology to make it more inclusive.

3- Methodology

This paper uses the ARDL methodology to conduct a time-series analysis of income inequality in Malaysia, carrying out Long and short-run analyses. the ARDL technique application is effective when we have variables of differing levels of integration, thus the robustness of the outcomes even if There is a small sample size. For evaluating the integration level and stationary of the relationship between different variables, unit root tests followed by cointegration testing is done. Based on a certain set of inputs, the models' outputs are compared to the actual solutions, using diagnostic tests.

3-1. Data Collection

The study applies yearly annual data from (1989–2022) for econometric analysis. The data is collected from reputable global institutions, including the World Bank and the International Monetary Fund the WB's World Development indices and the IMF's World Economic Outlook databases offer extensive economic and social indices across countries, guaranteeing the consistency and dependability of the data. The

time frame of 1989 to 2022 is selected to encompass the noteworthy economic and policy transformations in Malaysia throughout the last thirty years. This enables a thorough examination of the factors that impact changes in income distribution.

3-2. Model Specification

In the study, the specification of the ARDL technique is used to analyze long and short run association among income inequality which is captured by Gini Coefficient (GINI) besides seven explanatory variables. The equation representing the model is expressed as follows:

$$GINI = \beta0 + \beta1GDPGR + \beta2FDI + \beta3INFL + \beta4UNEMP + \beta5POPGR + \beta6GOVEXP + \beta7TAXREV + \varepsilon$$

Where:

GDPGR represents the GDP growth rate, capturing economic performance.

FDI refers to Foreign Direct Investment, which represents foreign capital net inflow of as a % of GDP.

INFL is the inflation rate, or price change.

UNEMP is the unemployment rate influenced by the economic conditions of a state's labor market.

POPGR stands for the population growth rate, capturing demographic changes.

GOVEXP measures Government education spending as a percentage of GDP, proxying human capital investment.

TAXREV denotes revenue from taxes as a share of GDP, indicating the efficiency of the government in the process of redistribution.

β0 is the constant term or intercept.

The coefficients **β1-7** show the extent to which each of the independent variables impacts on income inequality.

ε is the error term.

3-3. Variable Selection and Justification

The independent variables included in the model capture various economic, demographic, and policy-related factors that may influence income inequality in Malaysia. Economic factors include the growth rate of gross domestic product (GDPGR) and Foreign Direct Investment (FDI), which represents the net inflow of funds as a percent of GDP. INFL (inflation rate), and UNEMP (unemployment rate). These variables are selected to account for the potential impacts of economic performance, foreign capital inflows, price level changes, and labor market conditions on income distribution.

The demographic factor is measured by POPGR (population growth rates), which is used to account for the impacts of

demographic shifts and alterations in the population composition on levels of income inequality.

The policy variables present in the model include GOVEXP, which refers to the government expenditure on education in terms of the share of the country's GDP, and TAXREV, which is the tax revenue as an % of the GDP. Hence, as a proxy for human capital, GOVEXP gives another aspect of the government's accumulation in this regard and, in consequence, its impact on income disparity. TAXREV reflects the state's capability to address income disparities through taxation for a better redistributive role.

By incorporating these economic, demographic, and policy-related variables, the model aims to offers a comprehensive examination of the main factors determining income inequality in Malaysia from (1989-2022). The selection of these variables is guided by theoretical considerations and empirical evidence from previous studies on income inequality dynamics.

4- Empirical Analysis

This study uses a structured approach to estimate the ARDL model and examine income inequality and its determinants in Malaysia. First, variable stationarity is tested using unit root tests. Next, cointegration analysis determines if the variables have long-run equilibrium relationships. The ARDL model is generated to capture both short-term and long-term dynamics. The empirical results are presented and interpreted to illuminate Malaysian income inequality trends. Diagnostic tests verify model estimates' validity and robustness.

4-1. Conducting a Unit Root Tests

Table 1 shows the final results of the ADF (Augmented Dickey-Fuller) and Phillips-Perron (PP) unit root tests, which are utilized to check if variables in a time series are stationary. The main highlights can be condensed into the following:

Table 1. Final outcomes of Unit Root tests

Unit Root Test							
UNIT ROOT TEST TABLE (ADF)				UNIT ROOT TEST TABLE (PP)			
Variables	t-Statistic	P-Value	Decision	Variables	t-Statistic	P-Value	Decision
GINI	-5.6737	0.0000	I(1)	GINI	-5.6998	0.0000	I(1)
GDPGR	-3.9549	0.0047	I(0)	GDPGR	-4.6854	0.0007	I(0)
FDI	-3.1463	0.0327	I(0)	FDI	-3.0818	0.0378	I(0)
INFL	-4.3492	0.0016	I(0)	INFL	-4.3568	0.0016	I(0)
UNEMP	-5.0383	0.0002	I(0)	UNEMP	-5.1523	0.0002	I(0)
POPGR	-3.3012	0.0232	I(1)	POPGR	-3.1915	0.0298	I(1)
GOVEXP	-7.1506	0.0000	I(1)	GOVEXP	-7.1506	0.0000	I(1)
TAXREV	-5.776	0.0000	I(1)	TAXREV	-7.8442	0.0000	I(1)

Source: by Author using Eveiws 13 Software outputs

According to Table 1, the variables Gini coefficient (GINI), population growth rate (POPGR), total government expenditure (GOVEXP), and tax revenues (TAXREV) were found to be not-stationary at level I(0), but they became stationary when taking the first difference I (1). This means that the variables exhibited unit roots or non-stationarity in their original form, but the issue was resolved by differencing the series once.

Conversely, the variables growth rate of GDP (GDPGR), foreign direct investment (FDI), inflation (INFL), and unemployment rate (UNEMP) were stationary at level I(0), as illustrated in Table 1. These variables did not require differencing to achieve stationarity, as they already exhibited stable statistical properties in their original form.

The final outcomes of the ADF and PP tests, illustrated in Table (1), were consistent with each other, indicating the same conclusions regarding variables stationarity or non-stationarity at the original level or after taking the first difference. This consistency between the two widely used unit root tests lends credibility to the findings. The stationarity of time series variables is crucial for conducting further analyses, such as time series modeling or testing causal relationships, to avoid obtaining spurious or erroneous results.

4-2. Cointegration Analysis

The Cointegration analysis is a method that is used in the context of the (ARDL) approach in testing for cointegrating relationships among its non-stationary variables. The ARDL model is particularly useful when dealing with data that may have variables with different integration orders, such as some being Direct stationary I(0) while others are first difference stationary I(1) (Pesaran et al., 2001).

The assumptions and guidelines for the null hypothesis rejection and dealing with the other hypothesis in the ARDL bounds testing approach for cointegration are as follows:

4-2-1. Assumptions:

1. According to Nayaran (2005), error terms in this model are normally distributed and serially independent.

2. The regressors are not perfectly collinear (Nayaran, 2005).

3. The ARDL model is correctly specified, with no omitted relevant variables (Banerjee, Dolado, & Mestre, 1998).

4-2-2. Guidelines for hypothesis testing:

In the ARDL bounds testing using the Cointegration regression equation, the null hypothesis (H0) is one of no relationship between the identified variables (variables do not exhibit cointegration). In light of this information, the null hypothesis (H0) is formulated stating that the variables in question do not share a long-run connection (cointegration) as per Pesaran et al. , (2001).

The F-statistic or t-statistic compared to Pesaran & others. (2001) Critical values either supports or refutes the null hypothesis.

Table 2. Bound Test

Null hypothesis: No levels relationship
Number of cointegrating variables: 7
Trend type: Unrest. constant (Case 3)
Sample size: 32

Test Statistic	Value
F-statistic	7.641200
t-statistic	-5.847852

Source: Eveiws 13 Software outputs

Table 3. Bound test Critical Values

	10%		5%		1%	
Sample Size	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
			F-Statistic			
30	2.384	3.728	2.875	4.445	4.104	6.151
35	2.300	3.606	2.753	4.209	3.841	5.686
Asymptotic	2.030	3.130	2.320	3.500	2.960	4.260
			t-Statistic			
Asymptotic	-2.570	-4.230	-2.860	-4.570	-3.430	-5.190

* I(0) and I(1) are respectively the stationary and non-stationary bounds.

Source: Eveiws 13 Software outputs

From the findings highlighted in table 2 and 3, we can establish they are cointegrated which suggests that long-run associations among the variables of analysis were found.

According to Pesaran & others. (2001), the ARDL bounds test for cointegration contains comparing Dickey-Fuller F-

statistic/t-statistic versus the critical values. Therefore, Table 2, illustrates the calculated F-statistic value is 7. 38752, and the t-statistic is -5. 847852. This means that the obtain values are above upper bound critical values at 1% significance level as indicated in Table 3. In particular, for n = 30 – the closest to our target 32 – the higher bound critical value of the F statistic at a 1% level is 6. 151, and t-statistic value for the lower critical level is -5. 190.

Because the F-statistic value and t-statistic value are respectively above an upper bound critical value, we can then conclude that null hypothesis relating to non cointegration or absence of long run relation between variables cannot be accepted. This result therefore provides empirical indication of a long-term equilibrium connection among income disparity, as represented by the Gini coefficient (GINI), and the underneath set of variables which includes, GDP growth rate (GDPGR), FDI, Inflation rate (INFL), unemployment rate (UNEMP), POPGR, GOVEXP, and TAXREV.

4-3. Estimation of the ARDL Model

The (ARDL) technique is estimated to examine income inequality and its determinants in Malaysia by taking into account both short- and long-term dynamics. In order to show how specific causes impact income inequality over time, long-run estimates establish the equilibrium connection between variables. Based on Pesaran, Shin, & Smith (2001), this estimator reveals the enduring drivers of income inequality

trends by capturing the stable, equilibrium relationship between income disparity and its causes.

The short-run estimate looks at how instantly shocks or changes in variables impact income inequality. A more dynamic understanding is provided by this research, which helps identify short-term modifications to income disparity brought about by determinant changes (Narayan, 2005). By estimating long- and short-term income inequality trends in Malaysia using the ARDL framework, this study purposes to provide a comprehensive understanding of the complex dynamics underlying income inequality trends in Malaysia, thereby contributing to the existing literature on the subject.

4-4. Presentation of Results

The following sections present estimated long-run and short-run coefficients:

4-4-1. Long Run Coefficient

Based on outcomes in the cointegration specification equation and Table 4, study can explain the longstanding association among the independent variables and income inequality (GINI).

Table 4. Cointegrating Specification equation

Deterministics: Unrest. constant (Case 3)
CE = GINI(-1) - (-0.315218*GDPGR(-1) + 1.417045*FDI(-1) - 1.812166 *INFL(-1) - 2.748963*UNEMP(-1) + 7.557325*POPGR(-1) - 0.455223 *GOVEXP(-1) - 0.401165*TAXREV(-1))

Source: Eveiws 13 Software outputs

The long-run cointegration equation suggests that growth rate of GDP (GDPGR), foreign direct investment (FDI), inflation rate (INFL), unemployment rate (UNEMP), population growth rate (POPGR), government expenditure (GOVEXP), and tax revenue (TAXREV) have significant long-run impacts on income inequality. The cointegrating coefficients quantify the magnitude and direction of these effects.

Table 5. Cointegrating Coefficients

Variable *	Coefficient	Std. Error	t-Statistic	Prob.
GDPGR(-1)	-0.315218	0.127442	-2.473424	0.0205
FDI(-1)	1.417045	0.365950	3.872236	0.0007
INFL(-1)	-1.812166	0.338404	-5.355042	0.0000
UNEMP(-1)	-2.748963	0.506867	-5.423445	0.0000
POPGR(-1)	7.557325	0.564417	13.38962	0.0000
GOVEXP(-1)	-0.455223	0.231845	-1.963480	0.0608
TAXREV(-1)	-0.401165	0.186454	-2.151557	0.0413

Note: * Coefficients derived from the CEC regression.

Source: Eveiws 13 Software outputs

In the long run, a 1% rise in GDP growth rate (GDPGR) resulted in a 0.0236% drop in income inequality (GINI), as indicated by the cointegrating coefficients in Table 5. This outcome is consistent with the economic theory, which holds that greater income distribution and poverty reduction can result from prolonged economic growth (Bourguignon, 2004). Nonetheless, the effect is negligible, indicating that not all income groups may benefit equally from growth.

Foreign direct investment (FDI) has a positive coefficient (0.0115), meaning that higher income inequality over time is linked to an increase in FDI inflows. This finding supports the theory that foreign direct investment (FDI) may initially favor higher-income groups over lower-income groups, thereby widening the income gap (Herzer et al., 2014).

Long-term increases in income inequality appear to be caused by higher inflation rates, as indicated by the positive coefficient for inflation rate (INFL) of 0.0298. This result supports the claim that people with lower incomes are more vulnerable to inflation because they are less able to safeguard their real incomes (Erosa & Ventura, 2002).

Furthermore, the positive coefficient for unemployment rate (UNEMP) of 0.0736 implies that higher unemployment is associated with greater income disparity in the longstanding. This finding supports with the theory that unemployment can lead to a concentration of income among employed individuals, while the unemployed experience a loss of income (Checchi & García-Peñalosa, 2010).

Interestingly, the coefficient for population growth rate (POPGR) is negative (-0.1846), suggesting that higher population growth is linked to lower income inequality in the long run. This finding contradicts the notion that rapid population growth can strain resources and exacerbate income disparities (Ahlburg, 1996).

The negative coefficient for government expenditure (GOVEXP) of -0.0238 indicates that increased government spending on education is associated with lower income inequality in the long run. This result is consistent with the view that investment in human capital can promote economic mobility and reduce income disparities (Goldin & Katz, 2009).

Finally, the negative coefficient for tax revenue (TAXREV) of -0.0397 suggests that higher tax revenues, which can facilitate redistribution policies, are linked to lower income inequality in the long run. This finding aligns with the theory that progressive taxation and targeted social programs can help reduce income disparities (Muinelo-Gallo & Roca-Sagalés, 2013).

4-4-2. Short Run Coefficient

Based on the results presented in Table 6: Short-run coefficient and error correction model, we can provide an explanation of the short-run relationship between the independent variables and the dependent variable, income inequality (GINI).

The short-run coefficients capture the immediate or short-term impact of changes in the independent variables on income inequality. According to the results, some variables exhibit significant short-run effects, while others do not seem to have a substantial impact in the short run.

Table 6. Short term Coefficient & Error Correction Model (ECM)

Dependent Variable: D(GINI)
Method: ARDL
Date: 04/26/24 Time: 21:22
Sample (adjusted): 1991 2022
Included observations: 32 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): GDPGR FDI INFL UNEMP POPGR GOVEXP TAXREV
Fixed regressors: C
Number of models evaluated: 2187
Selected Model: ARDL(1, 2, 2, 2, 1, 1, 2, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COINTEQ*	-0.946150	0.094601	-10.00151	0.0000
D(GDPGR)	0.002978	0.023894	0.124613	0.9022
D(GDPGR(-1))	0.083076	0.037213	2.232459	0.0385
D(FDI)	0.050714	0.073758	0.687564	0.5005
D(FDI(-1))	-0.421457	0.094780	-4.446696	0.0003
D(INFL)	-0.539462	0.072361	-7.455108	0.0000
D(INFL(-1))	0.477995	0.086488	5.526722	0.0000
D(UNEMP)	-1.217709	0.282693	-4.307531	0.0004
D(POPGR)	-10.21792	2.048714	-4.987479	0.0001
D(GOVEXP)	0.175393	0.103028	1.702381	0.1059
D(GOVEXP(-1))	0.627506	0.116691	5.377485	0.0000
D(TAXREV)	-0.158508	0.070202	-2.257880	0.0366
D(TAXREV(-1))	0.348681	0.070444	4.949724	0.0001
C	0.446719	0.044859	9.958394	0.0000

R-squared	0.882963	Mean dependent var	-0.001562
Adjusted R-squared	0.798436	S.D. dependent var	0.008458
S.E. of regression	0.003797	Akaike info criterion	-8.009330
Sum squared resid	0.000260	Schwarz criterion	-7.368071
Log likelihood	142.1493	Hannan-Quinn criter.	-7.796771
F-statistic	10.44597	Durbin-Watson stat	2.271021
Prob(F-statistic)	0.000007		

* p-values are incompatible with t-Bounds distribution.

Source: Eveiws 13 Software outputs

A high level of R*-squared value of (0.882963) indicates that the ARDL model explains 88.3% of income inequality change throughout the data period. The D(GDPGR(-1)) coefficient is positive, meaning that a short-term increase in GDP growth will exacerbate income disparity. Kuznets' (1955) hypothesis argues that economic expansion helps higher-income groups first

before spreading to lower-income ones. Oddly, the coefficient on D(FDI(-1)) is negative, implying that foreign direct investment reduces short-run inequality. Jobs and technology transfer may explain this (Basu & Guariglia, 2007).

The opposite signs of D(INFL) and D(INFL(-1)) show how inflation affects inequality differently depending on the temporal horizon. Past inflation raised inequality (D(INFL(-1))), showing complicated dynamics. Higher inflation reduces short-run inequality (D(INFL)). Note that D(UNEMP) is negative, indicating that short-term inequality decreases with unemployment. Recessions may cause distribution of income losses more evenly across categories (Checchi & García-Peñalosa, 2010).

The error correction term coefficient (COINTEQ) is negatively and statistically significant, representing that the model converges towards the longstanding equilibrium. The value of -0.946150 indicates a rapid adjustment process, where around 94.6% of the imbalance is corrected within a single period.

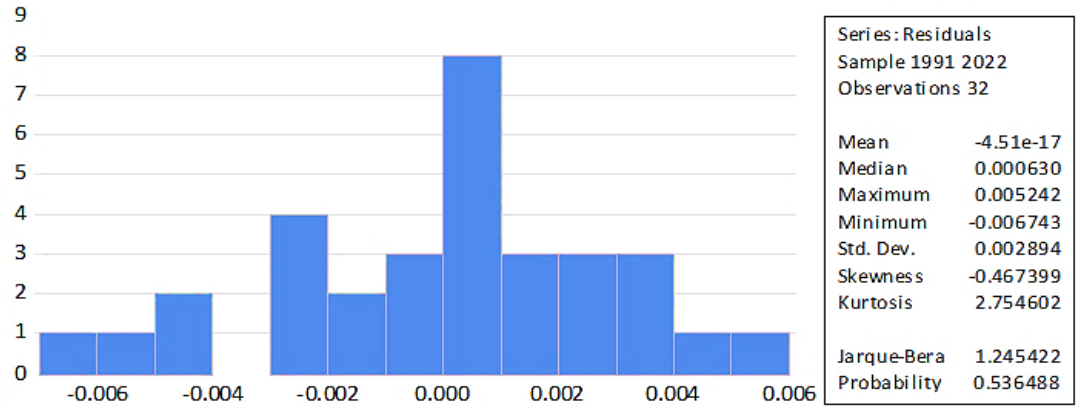
4-5. Stability and Diagnostic Testing

To guarantee the validity and reliability of the estimated results, diagnostic & stability tests are conducted in the (ARDL) model. Serial correlation, heteroscedasticity, residual normality, and parameter stability are among the tests that are performed (Pesaran et al., 2001).

4-5-1. Test of Normality

The Jarque-Bera normality test is performed on residuals of ARDL model to ensure that they are normally distributed as a precondition to making statistical tests. The Jarque-Beresa (JB) test is used frequently for this purpose. The null hypothesis (H0) is the belief that the residuals are followed by a normal distribution while the alternate hypothesis (H1) is a denial of this fact. (Gujarati, 2003; Wooldridge, 2013).

Figure 2. Histogram: Normality test



Source: Eveiws 13 Software outputs

Figure 2 illustrates a Jarque-Bera statistic of 1.245422 and p-value 0.536488. Since the p-value (0.536488) exceeds α (0.05), we do not reject the null hypothesis of a normally distributed residual distribution at a significance level of 0.05. The normality assumption is satisfied in this ARDL technique.

4-5-2. Serial correlation

To detect serial correlation in regression residuals with time series data, the Breusch-Godfrey Serial Correlation LM Test is used. residuals depend on their previous values, violating the error independence assumption. H1 indicates serial correlation, while H0 indicates no serial correlation (Gujarati & Porter, 2009).

Table 7. Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	0.665743	Prob. F(1,10)	0.4335
Obs*R-squared	1.997401	Prob. Chi-Square(1)	0.1576

Source: Eveiws 13 Software outputs

The residuals in Table 7's Breusch-Godfrey Serial Correlation LM Test show no serial correlation. The F-statistic is 0.665743 with a p-value of 0.4335 and the Obs*R-squared: 1.997401 with 0.1576. Serial correlation is absent because both p-values are above 0.05. These findings support error independence.

4-5-3. Heteroscedasticity

Breusch-Pagan-Godfrey test helps to identify heteroskedasticity a violation of the assumption that the change of the error terms is constant in a regression model. If violated, heteroskedasticity causes inefficiency in estimations of model parameters and likely invalidates statistical conclusions (Gujarati & Porter 2009).

Breusch–Pagan–Godfrey test has one test statistic which is chi-square distributed the null hypothesis of this test is that the error terms in the model are homoscedastic (H0 Error terms have constant variance in the model).

Table 8. Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.713408	Prob. F(20,11)	0.7537
Obs*R-squared	18.06942	Prob. Chi-Square(20)	0.5828
Scaled explained SS	1.873175	Prob. Chi-Square(20)	1.0000

Source: Eveiws 13 Software outputs

Breusch-Pagan-Godfrey test findings in Table 8 reveal no heteroskedasticity in the model. F-statistic = 0.713408, Obs*R-squared = 18.06942, Scaled explained SS = 1.873175, p-value = 0.7537, 0.5828, 1, 000. Not rejecting the null hypothesis of homoskedasticity (constant variance of error terms) because all three p-values surpass 0.05. The model fulfills the constant variance assumption.

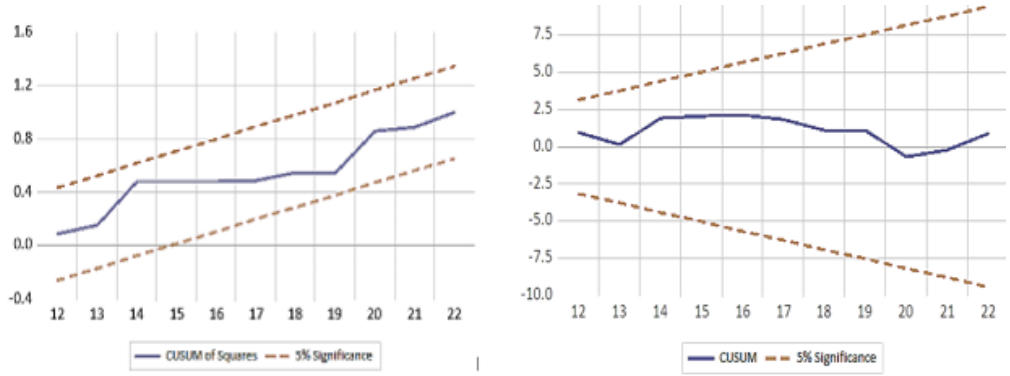
4-5-4. Structural Stability Test

The structural stability test evaluates regression model parameter consistency across time (Brown et al., 1975). It helps identify structural fractures or changes in the dependent-independent variable connection and stable coefficients.

CUSUM and CUSUMSQ tests are useful for detecting structural breakdowns in the Autoregressive Distributed Lag (ARDL) method (Pesaran, 1997).

CUSUM or CUSUMSQ graphs within the crucial lines indicate consistent ARDL model coefficients across the sample period. If plots pass crucial lines, structural instability or a structural break in model parameters may occur.

Figure 3. CUSUM & CUSUMSQ Test



Source: Eveiws 13 Software outputs

The CUSUM and CUSUMSQ charts of the coefficients in the ARDL model shown in figure 3 imply that there is no structural shift and coefficients' instability during whole sample period. This implies that there is a longstanding equilibrium relationship between the dependent and independent variables towards the estimated ARDL model's validity and reliability.

5- Conclusions and Recommendations

5-1. Conclusions

This paper's empirical findings provide valuable information on the Malaysia's income inequality process stressing on the long and short run factors. It was noted earlier and there is empirical literature to suggest that economic growth – here defined as the

rate of growth in GDP – is inversely related to income inequality. This means that sustained economic development is a tool through which poverty and income disparity can be fought. However, the impact is relatively small, which in turns means that the potential value of expansion many not necessarily benefit all classes of people in the society based on their socioeconomic status. In the long-run the trend is that FDI inflows, greater inflation and unemployment as well as income inequality move in a positive direction. This is because these factors actually magnify the income differentiation as it is suggested that they shall affect the lower income earners most and possibly cause more income to be earned by the employed only.

It appears that increase in population is actually beneficial for income disparity as the population grows, contrary to what is generally conceived about population explosion, which is expected to put pressure on the various resources and leading to increased disparity in incomes. This is the case as, nations that are willing to spend more on education and get people to pay more taxes are able to ensure that there are policies in place that do distribute wealth appropriately. It means that skill-based training, opportunity to have an economical mobility for all, or taxes on for the super-rich can actually ‘narrow the income divide’.

It is quite different in the short run, as some more work is made to understand it. This means that food inflation affects the poor most since when the economy expands, it feeds the rich first before feeding the poor hence experiencing a rise in income per

head first before the poor. Although it has been established that foreign direct investment fueled by multinationals degrades the income divide in Malaysia and other developing nations, it is also crucial to note that when the companies from the developed nations invest in the developing countries, they bring employment opportunities and new knowledge that can improve wages in the short- term. As for the impact of inflation on income disparity, it is very much possible to experience an increase or a decrease depending upon circumstances.

Notably, the short-term income disparity is actually reduced in a country when more people are unemployed. This may in fact be the case since during difficult times, every person equally senses the cut in their income. Fortunately, the model indicates that in the long run, the complexity always levels off to a fairly low ratio. From a systematic observation, nearly 95% of the difference between current reality and the ideal corrects in one period. This is to agree with the proposition that if much effort and hard is put into it then; it can take a shift to fair society that the income gaps are not large. Therefore, it makes sense to consider the short and long term perspectives when we are discussing Malaysia and the issue of income disparities.

5-2. Recommendations

- Develop policies and measures that support inclusive and fair economic growth processes, including changes in income distribution in favor of the majority of the population. This may include primary prevention programmes including

activities to boost skills, enterprise development, job creation and support for small medium enterprises.

- Enhance regulations and monitoring mechanisms to ensure that foreign direct investment benefits extend beyond higher-income groups and contribute to job creation, knowledge transfer, and economic opportunities for lower-income segments of the population.

- Maintain price stability through effective monetary policy measures and address structural factors contributing to inflation, particularly those affecting essential goods and services for lower-income households.

- Adopt labor market policies that promote employment opportunities, skills training, and worker protections to mitigate the adverse effects of unemployment on income distribution.

- Invest in education and human capital development programs, particularly targeting underprivileged communities, to enhance economic mobility and reduce income disparities in the long run.

- Implement progressive taxation policies and strengthen social safety nets to facilitate redistribution and support lower-income groups, while ensuring fiscal sustainability.

- Promote economic diversification and develop strategies to manage potential demographic shifts, ensuring that

population growth does not strain resources or exacerbate income disparities in the long run.

- Conduct regular monitoring and evaluation of income inequality trends and the effectiveness of policy interventions, making adjustments as necessary to address emerging challenges and ensure sustainable and equitable economic development.

Income inequality requires a complex solution that will imply non-trivial manipulations with the detailed economic and social factors interlinked with institutions. The policies formulated in the proposals therefore need to be tailored to reflect the nature and the specific characteristics present in the Malaysian economy and population as well as the general policy direction as understood by its policymakers.

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