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STIMULI AND PUBLIC DEBT IN ASEAN LISTED D-8 MEMBERS: A HARROD-DOMAR MODEL WITH AN ISLAMIC PERSPECTIVE ON DEBT SUSTAINABILITY

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ABSTRACT

The D-8 member countries have failed to achieve sustainable economic growth, despite various fiscal stimuli, due to structural inefficiencies and imbalances in savings and investment dynamics. This study employs the Harrod-Domar growth model to analyze the impact of fiscal stimuli on public debt specifically narrowing the scope to the ASEAN-listed D-8 members, using panel data from 1996 to 2023 sourced from the World Bank. The findings reveal stark contrasts between member countries, particularly Malaysia and Indonesia. Malaysia, with a higher savings rate (LGDS = 1.711), demonstrates better fiscal discipline and debt management, reflected in a negative model intercept. In contrast, Indonesia, with a lower savings rate (GDS = 0.876), struggles with a smaller domestic savings base, relying heavily on borrowing, which exacerbates its public debt burden. The study highlights systemic issues across D-8 countries, including insufficient investment in productive sectors, low savings rates, and a dependence on debt-financed expenditures. The Harrod-Domar model illustrates that these nations' growth strategies are inadequate for ensuring long-term economic sustainability. These findings underscore the urgent need for policy reforms to enhance domestic savings mobilization, improve investment efficiency, and reduce reliance on external debt to foster sustainable development.

Keywords: Public Debt; Harrod-Domar; Savings; Investment

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INTRODUCTION

The D-8 countries form a global alliance spanning two continents, Africa and Asia. Within the ASEAN region, Malaysia and Indonesia serve as representatives (Khalid, Ferguson, & Asadullah, 2023). It means that, the strategic movement and cooperation between Malaysia and Indonesia are not merely through the ASEAN however the endeavour brought forward through the alliance of D-8. The primary objectives of the D-8 (Developing-8) countries focus

on fostering economic development, cooperation, and sustainable growth among its member nations consist of Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey (Othman, Acar, & Jafari, 2013). Established in 1997, the alliance aims to promote sustainable economic growth and improve the standard of living within member states. A key goal is to strengthen trade relations by reducing barriers and encouraging mutual benefits, while also fostering technological collaboration to enhance industrial and technological capacity. The D-8 prioritizes reducing social and economic disparities within and between member nations, striving for inclusive development. Additionally, the group seeks to amplify the collective voice of its members on global economic platforms, increasing their influence in international decision-making. By focusing on key sectors such as agriculture, industry, health, energy, trade, and technology, the D-8 endeavours to achieve shared progress and bolster the global standing and resilience of its member countries. Therefore, all members have the opportunity to expand the market excess which in turn could increase the possibility of economic growth.

Despite numerous efforts to rejuvenate economic growth, including the establishment of strategic alliances such as the D-8 and ASEAN, a significant obstacle continues to hinder progress which is called as public debt. These alliances were formed to promote regional cooperation, enhance trade, and facilitate sustainable development among member nations, offering platforms for collaboration and economic advancement (Arisman, Arif, & Harahap, 2021). However, the persistent burden of public debt remains a critical challenge that undermines these initiatives. Persistent and abundant of public debt would contribute to the adverse effect on economic growth (M.Reinhart & Rogoff, 2010). Public debt, which refers to the financial obligations incurred by governments to fund expenditures beyond their revenues, has far-reaching implications for economic stability. Its impact is multifaceted, straining fiscal budgets, reducing the availability of funds for development projects, and increasing vulnerability to external economic shocks.

This study focuses specifically on the ASEAN member countries within the D8 alliance, namely Malaysia and Indonesia, rather than the D-8 group as a whole. The selection of these two countries reflects their dual participation in both ASEAN and D8 frameworks, providing a unique context for examining the interaction between regional cooperation and debt dynamics. While the D-8 alliance encompasses nations from diverse regions with varying economic systems and policy orientations, focusing on the ASEAN members allows for a more coherent and contextually relevant analysis. This approach ensures that the study captures the economic, institutional, and financial characteristics shared by Malaysia and Indonesia, particularly within the framework of Islamic economic principles and regional integration. Therefore, the investigation into the stimuli and public debt under the Harrod Domar model with an Islamic perspective is intentionally limited to the ASEAN listed D-8 members to generate region specific insights that contribute meaningfully to both Islamic economic discourse and ASEAN's sustainable fiscal policy development. Figure 1 depicted in the detail the trends of public debt for Indonesia and Malaysia over 1996-2023.

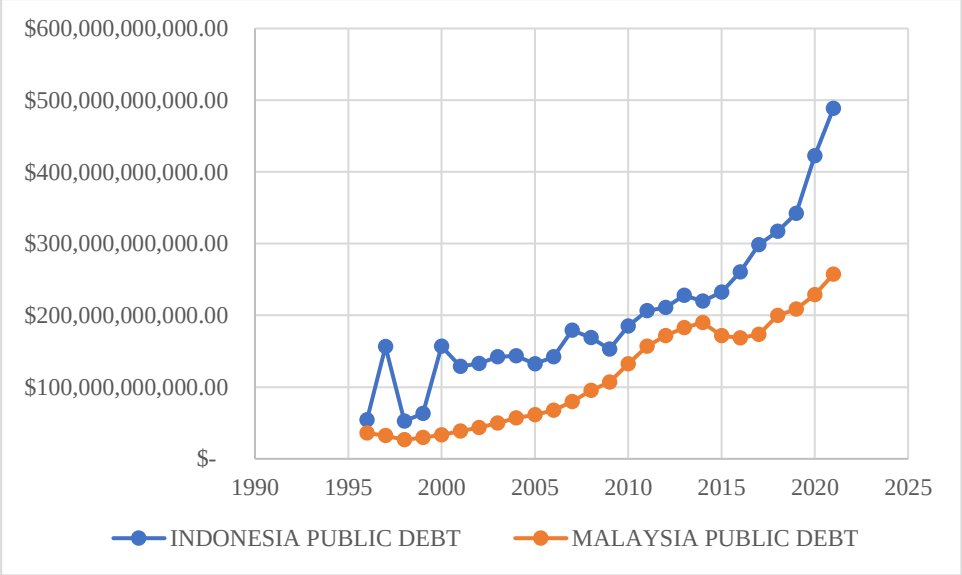

Figure 1: Public debt in Malaysia and Indonesia (US Dollars)
Source: World Bank (2024)

These alliances are designed to drive economic growth by implementing the objectives outlined under both the D-8 and ASEAN frameworks. However, as evidenced by the rising trend of government debt illustrated in Figure 1, it becomes clear that these objectives have not been successfully achieved. Moreover, the failure of the D-8 alliance has been outlined by Özkan (2017). This shortfall has hindered economic progress, leaving it misaligned with the intended targets. Consequently, public debt has emerged as an unavoidable recourse to meet national needs, reflecting the inability of these alliances to fully address the economic challenges their member nations face. In this study, public debt is identified as a significant impediment that undermines the potential benefits of these strategic partnerships and casts doubt on the efficacy of current policies in fostering long-term economic resilience and sustainable growth. Therefore, it is essential to delve deeper into the factors contributing to the escalation of public debt in these countries. By isolating the effects of economic growth, this analysis seeks to uncover new and underlying factors driving the accumulation of public debt, providing a clearer understanding of the issue and informing strategies to address it effectively. Under an Islamic understanding of the problem, the problem of the public debt of the ASEAN D8 countries, and especially Malaysia and Indonesia, is not merely about the fiscal and macroeconomic factors but it also relates to the concepts of ethical financial management and socioeconomic justice. Islam points out the need to be financially responsible and not fail into indebtedness because the repercussions of being too reliant on debt are that one can adopt instability, inequity and extortion, which are contrary to the aims of Maqasid al Shariah, which aim at safeguarding wealth, societal wellbeing, and economic equilibrium. Islamic financial system encourages the risk sharing and asset-based financing rather than interest-based borrowing because *riba'* or usury is highly prohibited owing to its exploitative character and predisposition towards involving economic injustice. In this respect, state debt management must be based on the Islamic concept of *adl*, or justice, as the government borrowing must promote constructive and equal development instead of putting a financial strain on the subsequent generations. In the case of Malaysia and Indonesia, where Islamic finance has been established to a large extent, the implementation of Islamic economic principles in both the D8 and ASEAN will offer a chance to promote sustainable and inclusive growth. This paper will combine Islamic fiscal ethics and the Harrod Domar model to determine the stimuli that can

enhance sustainability of debt and at the same time respect the moral and economic balance that the Islamic economic thought is all about.

LITERATURE REVIEW

Concept of Public Debt

Public debt refers to the total amount of money that a government owes, which includes both international and domestic debts (Ngotana, 2021). Karazijiene (2015) highlighted that governments have various methods to accumulate public debt, such as issuing securities, entering into debt agreements with other entities, and utilizing financial leases, among other strategies. In the existing literature, public debt is generally classified into two categories: internal and external debt (Peng-Lee & Ng, 2015). Internal debt refers to the debt the government incurs in the local currency or through domestic borrowing, while external debt pertains to the debt incurred in foreign currencies (Dawood, Baidoo & Shah, 2021).

Harrod-Domar Model

Sulong et al (2023) adopted the Harrod-Domar model in examining the specific debt factors in ASEAN-5 countries. The Harrod-Domar model was developed and introduced by Roy Harrod in 1939 and Evsey Domar (1944). The Harrod-Domar model, a framework rooted in neo-classical economic growth theory, asserts that the rate of economic growth is determined by the interaction between saving and investment rates. In this model, economies generate the necessary capital to fund investments, which, in turn, drive further growth. The core premise of the Harrod-Domar model is that economic growth is closely linked to the level of investment within an economy (Drăgoi, 2019). The model suggests that an increase in investment leads to a corresponding rise in economic output and employment. Its primary focus is to examine how investment contributes to job creation and overall economic expansion.

The Harrod-Domar theory highlights the importance of saving and investment as the foundational elements of economic growth, forming the central focus of the framework developed by Harrod and Domar (V.K. Chetty & Pradhan, 2016). According to this theory, there are two key factors that determine a country's growth rate. The first factor explores the relationship between changes in capital stock and investment. The second factor examines how the ability to save can empower a nation to finance its investments. Consequently, the need for savings to meet investment requirements leads to what is known as the saving-investment gap.

Gross-Domestic Savings

Previous research has primarily examined savings as an independent variable in the study of public debt, with notable contributions from scholars such as Ozata (2017), Sagdic and Yildiz (2020), Adamu and Rasiah (2016), and Khan et al. (2017), who explored the relationship between domestic savings and public debt. Using the Autoregressive Distributed Lagged (ARDL) approach, Jagadeesh (2015), Adamu and Rasiah (2016), and Ozata (2017) also confirmed a negative link between savings and public debt. On the other hand, research by Saungweme and Odhiambo (2019) in Zambia found no significant relationship, while Onafowora and Owoye (2019) highlighted a positive impact of savings on revenue in the Caribbean. Other studies, including those by Soares, Figueiredo, and Figueiredo (2020), Obeidat et al. (2022), Aliyu and Usman (2013), and Chigeto, have contributed to the ongoing

debate, providing varied insights into the dynamics between savings and public debt across different regions.

Investment

Numerous studies have examined the relationship between public debt and investment, utilizing various methodologies across different regions. Researchers such as Asghar, Amjad, and Hafeez-ur-Rehman (2022), Danish, Jamshaid, and Shahzaidi (2022), Hilton (2021), Fatás, Ghosh, Panizza, and Presbitero (2019), and Tiruneh (2004) have included investment as an independent variable in their analyses of public debt trends. By applying the Generalized Method of Moments (GMM), Veiga and Veiga (2014), Mendonca and Brito (2021), and Dawood et al. (2021) found links between investment and public debt. The Panel Fixed Effect regression method, commonly used by researchers like Salotti (2012), Babu, Gisore, and Lawrence (2014), Abbas and Wizarat (2018), Alzahrani (2018), and Anyanwu (2021), consistently reveals a negative relationship between investment and public debt. Additional studies using the ARDL method, such as those by Saungweme and Odhiambo (2019), Getinet and Ersumo (2020), and Haughton (2020), support this inverse correlation. However, some studies, including those by Yoong, Latip, Sanusi, and Kusairi (2020), Jarju (2021), and Were and Mandete (2022), argue for a positive link between investment and public debt. In an attempt to clarify this discrepancy, Liaqat (2019) applied a Panel Autoregression model, finding a negative association. Furthermore, Toth, Tkacova, Gavurova, and Pechova (2022) explored the factors influencing public debt in the EU, emphasizing the important inverse relationship between investment and public debt.

Islamic Perspective on Public Debt, Saving and Investment

In this discussion, Islamic finance as an investment founded on social-economic justice and the ethics of investing has presented a unique solution to these macroeconomic variables, specifically by forbidding the use of interest (*riba'*) and focusing on risk-sharing (Aysan and Unal, 2024) (Hernawati et al., 2021). The fast development of the Islamic finance services market, which reached the value of 2.2 trillion in the world, supports the growing importance of these principles in modern financial debates (Kok and Filomeni, 2020). One of the main distinguishing features of Islamic banking is the prohibition of interest-based transactions that radically changes the way of financing the public debt, personal savings and investments (Ghouse et al., 2022). This restriction results in the emergence of other financial instruments, including Sukuk, that are asset-backed or asset-based securities of ownership in real assets or services, and thus the investment is consistent with the actual activity of the economy instead of speculative financial profits (Hernawati et al., 2021). This distinctive feature of Islamic finance, the focus on the real economy activity, is also applied to its approach to the state debt, which contributes to the creation of the system that does not encourage over-leveraging and encourages the fair allocation of risk and reward (Kok and Filomeni, 2020). In turn, the Islamic economic principles suggest a policy of managing the debt to the country in which productive investments and wealth generation take precedence over the financial arbitrage, which guarantees that financing the government is based on Sharia-compliant goals of social good and the economy (Risydiyani, 2024). Additionally, the inherent connection between the concepts of Islamic finance and sustainable development goals makes it even stronger, and it may be used to create healthy and ethical economic development, reducing the risks of financial practices by being responsible (Raimi et al., 2024). This framework promotes mobilization of gross domestic savings by participatory models such as Mudarabah and Musharakah that

promote a direct relationship between providers of capital and entrepreneurial projects thus increasing economic growth and an equitable wealth distribution (Ashary & Aisyah, 2025). These and other instruments such as Islamic Green Sukuk and Islamic Social Impact Bonds are examples of the ways Islamic finance tries to attain sustainable growth with more social inclusion by shunning practices such as *riba'* (interest) and gharar (excessive uncertainty) (Bandura, 1997) (Raimi et al., 2024). Islamic banks work with the collection of the money of society and its subsequent distribution by profit-sharing financing schemes, including, but not limited to, *mudharabah* and *musyarakah*, as well as different buying and selling agreements, such as *murabaha*, salam and istishna (Medyawati and Yunanto, 2019). This is a stark difference of traditional banking where the primary mode of banking is primarily based on charges and borrowing, thus establishing a unique risk profile and a banking business model of Islamic financial institutions (Raouf & Ahmed, 2020). Moreover, Islamic finance incorporates the concepts of asset-backed finance, ethical aspects, equitable risks distribution, and proper governance to align the financial operations with the overall welfare of society and its sustainability (Robinson, 2024). This compliance with the Shariah principles is the primary difference between Islamic financial institutions and conventional banks, as it requires the efficient use of tangible assets in every deal by the fact that its outlaws' interest and enforces the use of profit-and-loss sharing systems (Abdulrahman et al., 2023). This inherent distinction serves as the source of financial stability, as it discourages over leveraging and speculative investments, and instead, it encourages investments in the actual sector and equity-based financing (Wijayanti and Setiawan, 2022). Such emphasis on practical economic functioning and common risk reduction is a better area of protection of systemic weaknesses of interest-based systems and a healthier financial ecosystem (Ashary & Aisyah, 2025). The central maxim, *al-ghunm bi al-ghurm* (gain accompanies liability), emphasizes one of the main principles of Islamic finance in which the right to profit is intrinsically connected to the risk-taking, which is not typical of traditional debt-based financing theory (Ghazali et al., 2024).

METHODOLOGY

This study seeks to explore the factors from the Harrod-Domar model that influence public debt in the ASEAN-listed D-8 member countries. The model's key components—savings and investment—will be analyzed using panel data from the World Bank, covering the period from 1996 to 2023. To assess the long-term relationships between these variables, the research will utilize the Fully Modified Ordinary Least Squares (FMOLS) method for panel data analysis.

The study will focus specifically on Malaysia and Indonesia, the two ASEAN member states in the D-8 alliance. These countries were chosen due to their significant economic roles within ASEAN, as well as their representation in the D-8 organization. Additionally, both countries provide reliable and consistent data for the entire study period. The variables involved in this analysis are detailed in Table 1, with the basic functional equation to examine the relationship between these variables and public debt provided in Equation 1, and the empirical model outlined in Equation 2.

$$PD = f(GDS, INV) \quad (1)$$

Where:

- PD represents the level of public debt in the ASEAN-listed D-8 countries.

- f indicates the functional relationship between the dependent and independent variables.
- GDS refers to Gross Domestic Savings in the ASEAN-listed D-8 countries.
- INV stands for Investment in the ASEAN-listed D-8 countries.

$$PD = \alpha + \beta_1 GDS + \beta_2 INV + \varepsilon \quad (2)$$

The following variables and parameters are defined as:

- PD represents the level of public debt in the ASEAN-listed D-8 countries.
- GDS refers to the Gross Domestic Savings in the ASEAN-listed D-8 countries.
- INV denotes the Investment in the ASEAN-listed D-8 countries.
- α is the intercept.
- β_1 and β_2 are the coefficients to be estimated.
- $\boldsymbol{\varepsilon}$ is the error term.

Table 1: Variables description

Variable	Proxy	Unit of Measurement	Source	Previous studies
Gross Domestic Savings (GDS)	Gross Domestic Savings (Current US$)	US Dollar	The World Bank Development Indicators	Waheed (2017), Abdullahi et.al (2015)
Investment (INV)	Gross fixed capital formation (formerly gross domestic fixed investment) (% of GDP)	% of GDP	The World Bank Development Indicators	M.Ekouala (2022), Dawood et. al (2021), Waheed (2017)
Public Debt	General government gross debt (current US$)	US Dollar	The World Bank Development Indicators	Manalo et. al (2022), Dirir (2022), Hlongwane & Daw (2022), Bese et. al (2021), Swamy (2015)

Estimation Procedures

Descriptive Statistic

Descriptive statistics for panel data provide a summary of key characteristics within a dataset that spans multiple entities observed over time. These statistics offer valuable insights into the data's central tendencies, variability, and distribution. Commonly used measures include the mean, which reflects the average value; the median, representing the middle value; and the standard deviation, which quantifies the extent of variation or dispersion from the mean. Together, these metrics provide an essential overview of the data's structure and underlying patterns.

Panel Unit Root Test

In this study, a panel unit root test was utilized instead of performing individual tests for each country to account for cross-sectional dependence and heterogeneity within the sample. By aggregating the data across countries, the estimates of the unit root process became more efficient, providing better control over shared factors influencing all countries in the panel. Moreover, the panel unit root test enabled the distinction between a unit root at the individual country level and a common stochastic trend affecting all countries. As a result, this method yielded more robust and reliable outcomes compared to conducting separate unit root tests for each country. To assess the stationarity of the time-series data, three widely used unit root tests were employed: Levin-Lin-Chu (LLC), Im, Pesaran, and Shin (IPS), and the Augmented Dickey-Fuller (ADF) test.

Pedroni Co-integration Test

Once stationarity of the data is confirmed, a co-integration test is essential to examine the long-term relationship between variables. In this study, the Pedroni co-integration test is applied to detect any co-integrating relationships, accounting for heterogeneous intercepts and trend coefficients. Introduced by Pedroni (1999), this test uses seven statistics to evaluate the panel co-integration relationships both within and across dimensions. The seven statistics included in the Pedroni test are: Panel v-statistic, Panel p-statistic, Panel pp-statistic, Panel ADF-statistic, Group v-statistic, Group rho-statistic, and Group ADF-statistic. The corresponding estimators are as follows:

Panel v-statistic

$$Z_V = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{1\,1i}^{2} \hat{e}_{i,t\ 1}^{2} \right)^{-1} \tag{3}$$

Panel p-statistic

$$Z_P = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{1\,1i}^{2} \hat{e}_{i,t\ 1}^{2} \right)^{-1} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{1\ 1i}^{2} (\hat{e}_{i,t\ \ 1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \right) \tag{4}$$

Panel pp-statistic

$$Z_p = \hat{\sigma}^2 \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{1\ 1i}^{2} \hat{e}_{i,t\ 1}^{2} \right)^{-1/2} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{1\ 1i}^{2} (\hat{e}_{i,t\ 1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \right) \tag{5}$$

Panel ADF-statistic

$$Z_p = \hat{\sigma}^2 \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{1\,1i}^{2} \hat{e}_{i,t\ 1}^{2} \right)^{-1/2} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{1\ 1i}^{2} (\hat{e}_{i,t\ \ 1} \Delta \hat{e}_{i,t}) \right) \tag{6}$$

Group v-statistic

$$\tilde{z}_t = \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{e}_{i,t\ 1}^{2} \right)^{-1/2} \left(\sum_{t=1}^{T} (\hat{e}_{i,t\ \ 1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \right) \tag{7}$$

Group pp-statistic

$$\tilde{z}_t = \sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{e}_{i,t\ \ 1}^{2}\right)^{-1/2}\left(\sum_{t=1}^{T}\left(\hat{e}_{i,t\ \ 1}\Delta\hat{e}_{i,t} - \hat{\lambda}_i\right)\right) \quad (8)$$

Group ADF-statistic

$$\tilde{z}_t^{*} = \sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{s}_i\,\hat{e}_{i,t\ \ 1}^{2}\right)^{-1/2}\left(\sum_{t=1}^{T}\left(\hat{e}_{i,t\ \ 1}\Delta\hat{e}_{i,t}\right)\right) \quad (9)$$

Pedroni (1999) suggests that the seven test statistics used in the co-integration analysis can be rescaled to follow a standard normal distribution. This transformation helps standardize the co-integration statistics, allowing for more consistent comparison and interpretation of the results across different datasets and conditions. The process of standardizing the statistics can be expressed as:

$$\frac{K_{NT}\ \ \mu\sqrt{N}}{\sqrt{v}} \Rightarrow N\ (0,1) \quad (10)$$

Where:

- K_{NT} represents the standardized form of the test statistic, adjusted for the number of cross-sectional units (N) and the number of time periods (T).
- N denotes the number of cross-sectional units or entities in the dataset.
- T refers to the number of time periods or observations.
- μ is the mean value of the statistic.
- ν represents the variance of the statistic.

Fully Modified Ordinary Least Square (FMOLS)

Fully Modified Ordinary Least Squares (FMOLS) is an econometric technique used to estimate co-integrating relationships and perform long-run analyses while addressing issues such as endogeneity and serial correlation. This method is particularly useful for analyzing non-stationary variables and dynamic economic interactions (Heriqbaldi et al., 2022). FMOLS is advantageous over other econometric techniques like the Generalized Method of Moments (GMM) and Autoregressive Distributed Lag (ARDL) models, as it addresses several key limitations. These include handling endogeneity, reducing bias from simultaneous equations, enhancing efficiency, incorporating lagged dependent variables, and managing issues related to asymptotic distribution—challenges that are effectively managed by FMOLS.
The FMOLS estimator model is expressed as:

$$\hat{\beta_{FM}} = \left[\sum_{i=1}^{N}\sum_{t=1}^{T}(\varkappa_{it} - \varkappa_i)'\right]^{-1}\left[\sum_{i=1}^{N}\left(\sum_{t-1}^{T}(\varkappa_{it} - \varkappa_i)'\right)\hat{y}_{it} + T\,\hat{\Delta_{it}}\varepsilon\mu^{*}\right] \quad (11)$$

Where:

- $\hat{\beta_{FM}}$ = Estimated coefficient matrix

- $\sum_{i=1}^{N}\sum_{t=1}^{T}(\varkappa_{it} - \varkappa_i)'$ = Sum of squared demeaned regressors for each entity and time period. This term is inverted to get the covariance matrix.
- $\sum_{i=1}^{N}(\sum_{t-1}^{T}(\varkappa_{it} - \varkappa_i)')\,\hat{y}_{it} + T\,\hat{\Delta}_{it}\varepsilon\mu^{*}$ = The sum of adjusted regressors multiplied by fitted values and the lagged first differences of the dependent variable.
- $\hat{y}_{it}$= Fitted values from the model.
- εμ = Error term.

Hence, Panel FMOLS equation for the study can be written as:

$$\mathrm{PD} = \alpha + \beta_1 \mathrm{GDS}_{it} + \beta_2 \mathrm{INV}_{it} + \alpha_i + \delta_t + \gamma_1\,(\varkappa_{it} - \bar{x}_{it}) + \mathcal{E}_{it} \quad (12)$$

Where:

- PD= Public Debt.
- GDS= Gross Domestic Savings.
- INV= Investment.
- α= Intercept representing the baseline level of public debt when both GDS and INV are zero.
- $\beta 1$= Coefficient for GDS, indicating the impact of gross domestic savings on public debt.
- $\beta 2$= Coefficient for INV, indicating the impact of investment on public debt.
- α_i= Entity-specific fixed effects capturing unobserved heterogeneity.
- δ_t= Time-specific fixed effects capturing common time effects.
- $\gamma_1\,(\varkappa_{it} - \bar{x}_{it})$= Panel FMOLS adjustment term. This term accounts for the difference between the regressors $\varkappa_{it}$ and their entity-specific means $\bar{x}_{it}$.
- $\mathcal{E}_{it}$= Error term capturing unobserved factors influencing public debt.

FINDINGS

Descriptive Statistic

The descriptive statistics results in Table 2 summarizes the key characteristics of the variables used in the analysis: logarithm of public debt (PD), savings (GDS), and investment (INV) across 52 observations. PD has a mean value of 25.56, while GDS and INV average 25.33 and 3.25, respectively. INV shows the least variability (standard deviation of 0.1968), while GDS has slightly higher variability (0.7718). PD is negatively skewed (-0.5513), indicating a tail to the left, whereas GDS and INV are positively skewed. None of the variables show significant deviations from normality based on the Jarque-Bera test, as all probabilities exceed 0.05. This suggests a reasonably well-behaved dataset suitable for econometric analysis.

Table 2: Descriptive statistic results

	PD	GDS	INV
Mean	25.5592	25.3333	3.2496
Median	25.7773	25.3261	3.2271
Maximum	26.9149	26.7578	3.7639
Minimum	23.9985	23.9547	2.9597
Std. Dev.	0.7345	0.7718	0.1968
Skewness	-0.5513	0.3208	0.5507
Kurtosis	2.3885	2.0811	2.7486
Jarque-Bera	3.4447	2.7214	2.7648
Probability	0.1786	0.2565	0.2510
Sum	1329.0770	1317.3300	168.9799
Sum Sq. Dev.	27.5151	30.3833	1.9749
Observations	52.0000	52.0000	52.0000

Panel Unit Root Test

Table 3 displays the results of the unit root tests. At their levels, none of the variables are stationary. However, when first-differenced, all variables achieve stationarity at the 1% significance level, indicating that each variable is integrated of order I (1). This suggests that all variables become stationary after differencing. Consequently, a panel co-integration test can be conducted to examine the co-integrating relationship between GDS and INV.

Table 3: Panel unit root test

Intercepts						
Variables	LLC		IPS		ADF	
	Level	1st Diff	Level	1st Diff	Level	1st Diff
GDS	0.14468	-8.5021	1.9907	-7.3162	2.0075	64.9669
	0.5575	0.0000***	0.9767	0.0000***	0.9963	0.0000***
INV	0.50374	-4.4367	-1.2119	-4.3863	13.4453	38.3823
	0.6928	0.0000***	0.1128	0.0000***	0.1998	0.0000***
PD	1.49719	-4.5095	4.1296	-8.1815	0.7579	73.1204
	0.9328	0.0000***	1.0000	0.0000***	1.0000	0.0000***

(Note:*,**,*** is significant at 10%,5% and 1%)

Pedroni Co-integration Test

Table 4 presents the panel co-integration results, highlighting a significant long-term relationship among the variables in the panel data. In panel co-integration analysis, within dimensions refers to variations within each cross-sectional unit over time, examining co-integration for each entity individually. On the other hand, between dimensions focuses on variations across different cross-sectional units at a single point in time, allowing for the exploration of co-integration relationships across entities.

The analysis considers both with trends and without trends scenarios. The "without trends" case tests for co-integration without accounting for systematic long-term patterns, while

the "with trends" case incorporates such patterns to assess whether a shared long-term relationship exists among variables across entities. The results reveal strong evidence of co-integration in both cases, as indicated by significant v-Statistic, rho-Statistic, and PP-Statistic values, suggesting a stable long-term relationship among the variables. However, in the between-dimension analysis without trends, co-integration is not evident, becoming significant only when trends are considered (based on v-Statistic and PP-Statistic). Notably, the Panel ADF-Statistic lacks significance in the "without trends" dimension, indicating the need for further exploration. Overall, the findings demonstrate a robust and consistent long-term relationship among the panel variables, with six out of seven statistical tests supporting evidence of co-integration.

Table 4: Pedroni co-integration test

	Within Dimension	
	Without Trend	**With Trends**
Panel v-Statistic	2.4550* 0.0070	5.2625*** 0.000
Panel rho-Statistic	-1.5901* 0.0559	-3.66189*** 0.0001
Panel PP-Statistic	-1.8657** 0.0310	-6.3413*** 0.0000
Panel ADF-Statistic	0.5483 0.7082	-4.0415*** 0.0000
	Between Dimension	
	Without Trend	**With Trends**
Group rho-Statistic	-0.3883 0.3489	-1.0274 0.1521
Group PP-Statistic	-0.8966 0.1850	-3.1972*** 0.0007
Group ADF-Statistic	0.8941 0.8144	-2.2032** 0.0138

(Note:*,**,*** is significant at 10%,5% and 1%)

Fully Modified Ordinary Least Square

The Fully Modified Ordinary Least Squares (FMOLS) results in Table 5 indicate a significant relationship between the explanatory variables and public debt. The coefficient for GDS (log of gross domestic savings) is 1.2938, with a highly significant t-statistic of 14.7246 (p-value = 0.000), suggesting that a 1% increase in savings is associated with a 1.29% rise in public debt, potentially reflecting higher savings being channeled into government borrowing. This situation is due to the role which played by interest rate which create the tussle for savings and in the meantime creating cost for borrowing which then created the positive link between savings and public debt. Conversely, INV (log of investment) shows a negative coefficient of -1.1985, with a t-statistic of -3.8503 (p-value = 0.0004), indicating that a 1% increase in investment is associated with a 1.1985% reduction in public debt, highlighting the role of

productive investments in reducing fiscal burdens. Both variables are statistically significant, demonstrating their critical influence on public debt dynamics.

Table 5: Fully Modified Ordinary Least Square results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDS	1.2938	0.0879	14.7246	0.0000
INV	-1.1985	0.3113	-3.8503	0.0004

(Note:*,**,*** is significant at 10%,5% and 1%)

The individual coefficient results in Table 6 highlight key differences between Indonesia and Malaysia regarding the impact of savings (GDS) and investment (INV) on public debt. For Indonesia, the GDS coefficient is 0.8761, indicating a positive relationship between savings and public debt, while the INV coefficient is -1.8807, showing that increased investment significantly reduces public debt. The constant C for Indonesia is 9.6618, reflecting higher baseline public debt. In contrast, Malaysia has a higher GDS coefficient of 1.7115, suggesting a stronger association between savings and public debt, and a smaller negative INV coefficient of -0.5162, implying a weaker impact of investment on reducing debt. Malaysia's constant C is -15.9097, indicating lower baseline public debt compared to Indonesia. These results emphasize distinct fiscal dynamics in each country.

Table 6: Individual Coefficient results

	GDS	INV	C
Indonesia	0.87609	-1.8807	9.66184
Malaysia	1.7115	-0.5162	-15.91

DISCUSSION

The study highlights critical point as it is found the positive connection between Gross Domestic Savings and public debt as consistent to the study by Onafowora and Owoye (2019) that highlighted a positive impact of savings on public in the Caribbean. While Indonesia shows a moderate reliance on savings and a significant inverse relationship between investment and debt, Malaysia's stronger dependency on savings suggests a need to balance domestic resource allocation. Both cases reveal the importance of aligning savings mobilization and investment strategies to manage public debt effectively. All in all the negative relation between investment and public debt is parallel to the study implemented by Abbas and Wizarat (2018), Alzahrani (2018), and Anyanwu (2021) those consistently reveals a negative relationship between investment and public debt.

To address these dynamics, lessons can be drawn from other countries that have successfully mitigated public debt while promoting savings and investment. For instance, countries in the Nordic region have implemented strong fiscal discipline, coupled with transparent governance, to ensure that public borrowing is directed toward high-yield public investments rather than recurrent expenditure (Jackson, Lindberg, Ronkainen, & Stahl, 2024). Such an approach ensures that investments generate sufficient returns to reduce debt over time. Similarly, East Asian economies like South Korea and Singapore have focused on fostering robust private-public partnerships (PPPs) to attract private capital for infrastructure projects, reducing the need for public borrowing.

In the context of Indonesia and Malaysia, several actionable strategies can be suggested. First, governments could strengthen fiscal policies to improve debt sustainability, such as implementing targeted taxation reforms and reducing inefficiencies in public spending. Second, fostering environments conducive to private sector investments could help lower reliance on public debt by allowing private enterprises to play a larger role in funding capital-intensive projects. Third, diversifying sources of funding, including international bonds or green financing, could reduce overreliance on domestic savings, especially for Malaysia, where the correlation between savings and debt is strong. Lastly, promoting financial literacy and inclusive financial policies can encourage household savings to flow into productive investments, indirectly easing public debt pressures.

By adopting a combination of these proven solutions and tailoring them to their unique economic structures, both Indonesia and Malaysia can address the challenges of rising public debt while maintaining a balance between savings and investment. A regional framework for knowledge-sharing and policy coordination among ASEAN countries could further enhance these efforts, providing mutual support in achieving sustainable debt levels, roving the overall business climate to encourage both domestic and foreign investment.

In summary, while both Indonesia and Malaysia demonstrate positive relationships between Gross Domestic Savings and the dependent variable, the negative relationship with investment warrants deeper attention. Policy efforts should focus on optimizing investment by targeting high-value sectors, improving the investment climate, and ensuring efficient public investment. These measures, coupled with initiatives to bolster GDP growth through innovation, diversification, and stability, could help both countries overcome existing challenges and unlock more sustainable, inclusive growth in the future.

POLICY IMPLICATION

Based on the FMOLS results from the study, policy implications indicate that increasing domestic savings can boost economic growth in Indonesia, as evidenced by the positive relationship between Gross Domestic Savings (GDS) and growth (0.87609). Policies to encourage higher savings, such as tax incentives and promoting Islamic financial instruments like Sukuk, can be effective, similar to Singapore's Central Provident Fund (CPF), which has successfully increased national savings rates. However, the negative relationship between investment (INV) and growth in both Indonesia (-1.8807) and Malaysia (-0.5162) suggests inefficiencies in investment allocation. Structural reforms to improve investment efficiency, reduce corruption, and focus on productive sectors are needed. For instance, South Korea's strategic investment in export-oriented industries could serve as a model. Additionally, an Islamic perspective on finance, emphasizing ethical, risk-sharing investments, can support sustainable growth, following the example of Saudi Arabia's Vision 2030. Prudent fiscal policies that avoid non-productive borrowing, like Turkey's approach to maintaining sustainable public debt levels, are essential for ensuring that debt contributes to productive growth. Therefore, both countries should consider leveraging Islamic finance principles, enhancing investment efficiency, and encouraging domestic savings to achieve sustainable growth.

CONCLUSION

Both Indonesia and Malaysia exhibit a positive relationship between savings and public debt, suggesting that higher savings are associated with increased public debt in both countries. This could imply that, despite efforts to save, both nations may be relying on debt to finance their expenditures, potentially due to insufficient revenue generation or fiscal policies. On the other hand, both countries show a negative relationship between investment and public debt, with investment seemingly not having the expected positive impact on reducing debt. This could be due to inefficiencies in how investment is being utilized, or it could reflect the challenge of managing debt while simultaneously encouraging productive investments. The differing strengths of these relationships between Indonesia and Malaysia suggest that while savings play a stronger role in the dynamics of public debt in Malaysia, both countries face challenges in leveraging investment to reduce their public debt burdens. To address these issues, both nations could benefit from policies aimed at improving fiscal discipline, enhancing the efficiency of public spending, and ensuring that investments contribute to long-term economic sustainability. Additionally, both countries should focus on boosting revenue generation, improving debt management strategies, and optimizing the allocation of savings to reduce reliance on debt financing.

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