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Understanding the Middle-Income Trap in ASEAN-4 Through GNI and Macroeconomic Indicators

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Abstract
This study aims to analyze the long-term and short-term effects of several independent variables (Portfolio Investment, Remittances, Exchange Rate, and Inflation) on GNI Per Capita to determine its effect on the middle-income trap condition. The research utilizes secondary data, specifically annual quantitative indicators from 1994 to 2023, sourced from the World Bank database. The sample consists of four ASEAN countries, namely Malaysia, Thailand, Indonesia, and the Philippines. The method used in the study was the analysis of the Vector Autoregressive (VAR) Vector Error Correction Model (VECM) panel. The results indicate that in the long term, investment portfolio, exchange rate, and inflation have a positive effect, while the remittance variable has no effect on real GNI Per Capita. In the short term, the exchange rate exerts a negative effect, while inflation shows a positive effect on GNI per capita in ASEAN-4. Conversely, portfolio investment and remittance do not exhibit short-term effects.

Keywords: Middle Income Trap, GNI Per Capita, Macroeconomics

Menjelaskan Perangkap Pendapatan Menengah: Bukti dari PDB dan Kondisi Makroekonomi di ASEAN-4

Abstrak
Penelitian ini bertujuan menganalisa pengaruh jangka panjang dan jangka pendek setiap variabel independent (Portofolio Invesment, Remitansi, KURS, dan Inflasi) terhadap variabel dependen (GNI Per Kapita) untuk mengetahui pengaruhnya pada kondisi middle income trap. Menggunakan data sekunder meliputi data kuantitatif tahunan pada 1994 sampai 2023 bersumber dari website World Bank. Objek yang digunakan dalam penelitian adalah 4 negara ASEAN yakni Malaysia, Thailand, Indonesia, dan Philipina. Metode dipergunakan dalam penelitian yakni analisis panel Vector Autoregressive (VAR) Vector Error Correction Model (VECM). Hasil yang diperoleh penelitian dalam jangka panjang antara lain variabel portofolio invesmen, KURS, dan inflasi berpengaruh positif, sedangkan variabel remitansi tidak berpengaruh terhadap GNI Per Kapita Rill. Dalam Jangka pendek variabel KURS berpengaruh negatif dan Inflasi positif terhadap GNI Per Kapita di ASEAN-4. Variabel yang tidak berpengaruh dalam jangka pendek adalah Portofolio Invesment dan Remitansi.

Kata Kunci: Middle Income Trap, GNI Per Kapita, Makroekonomi

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INTRODUCTION

Developing countries worldwide, particularly middle-income countries, are experiencing rapid economic growth, especially across the Asian continent (Washington, 2016). This rapid economic growth is expected to exert a significant positive impact on per capita income across Asia (ADB et al., 2023; Roland-Holst et al., 2010). However, in reality, approximately two-thirds of developing Asian countries remain at risk of falling into a middle-income trap (Ha & Lee, 2018). According to the World Bank and ADB (2012), the middle-income trap refers to a situation where a country experiences income stagnation at the middle-income level and fails to progress to high-income status. The middle-income trap condition experienced by a country is most likely characterized by the stagnation of its per capita income, which is usually caused by the failure of the economic pattern undertaken within a country or from external influences that ultimately hinder development (Pardede & Aziz, 2022; William & Anastasi, 2023). The primary indicator for measuring this condition is GNI per capita, which determines the success of the country's transition from middle- to high-income status. GNI per capita levels play a crucial role for countries caught in middle-income conditions, as they determine the success of overcoming the middle-income trap (Feitosa, 2020). Furthermore, Cherodian and Thirlwall (2015), Kang (2021), and Naz (2013) explained that GNI per capita serves as an indicator for assessing a country's status and facilitating economic comparisons across populations.

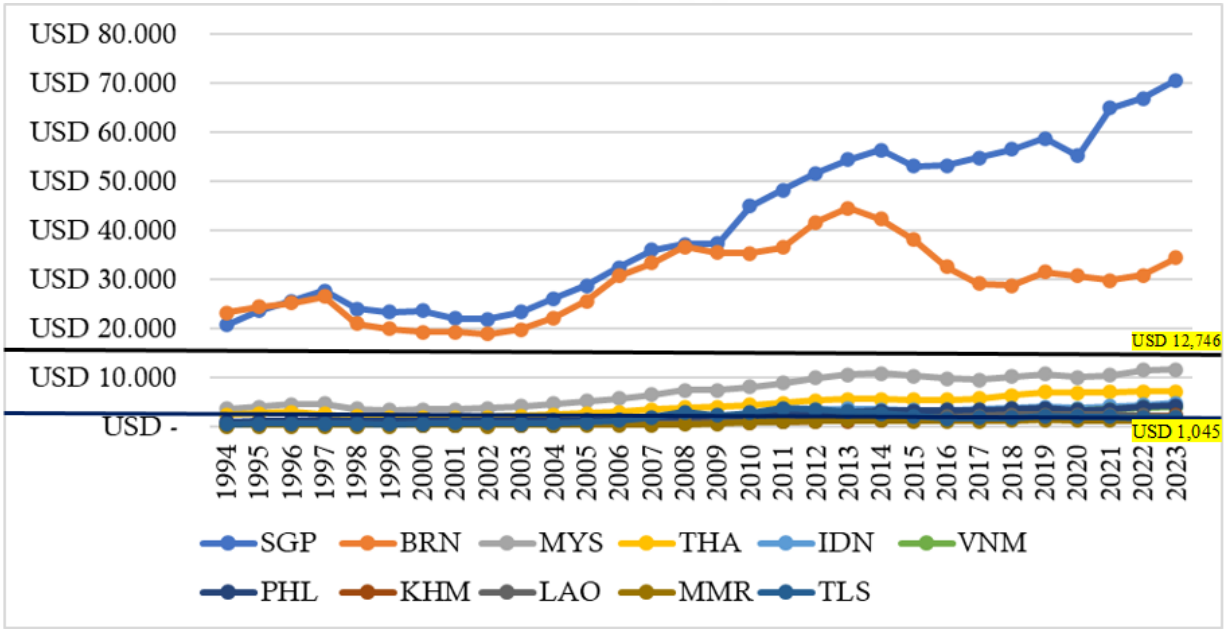

Figure 1. GNI Per Capita Value of ASEAN Countries for 30 years

Within the Asian continent, spanning Southern, Eastern, and Southeastern Asia, the highest concentration of developing countries is found in Southeast Asia, commonly referred to as ASEAN. ASEAN countries face a more pronounced middle-income trap compared to other Asian countries (Tran, 2013). Nevertheless, since the formation of ASEAN, member states have experienced significant improvements in economic development and resource wealth (Chowdhary et al., 2010). However, the economic growth remains relatively low because per capita income in most ASEAN countries primarily

persists at the middle-income level (Wau et al., 2022). This study focuses on four ASEAN countries, including Malaysia, Thailand, Indonesia, and the Philippines, which represent developing countries with the highest per capita incomes in ASEAN as of 2023 (Sanusi, 2023) and are currently positioned at the middle-income level, as shown in Figure 1.

Figure 1 illustrates the real GNI per capita in ASEAN countries from 1994 to 2023. It can be observed that Singapore and Brunei exhibit much higher GNI per capita growth rates, showing a significant disparity compared to other ASEAN countries. Specifically, the GNI per capita of Singapore and Brunei Darussalam is already above the middle-income trap threshold of US$ 12,746, indicating that these countries have reached a high-income level.

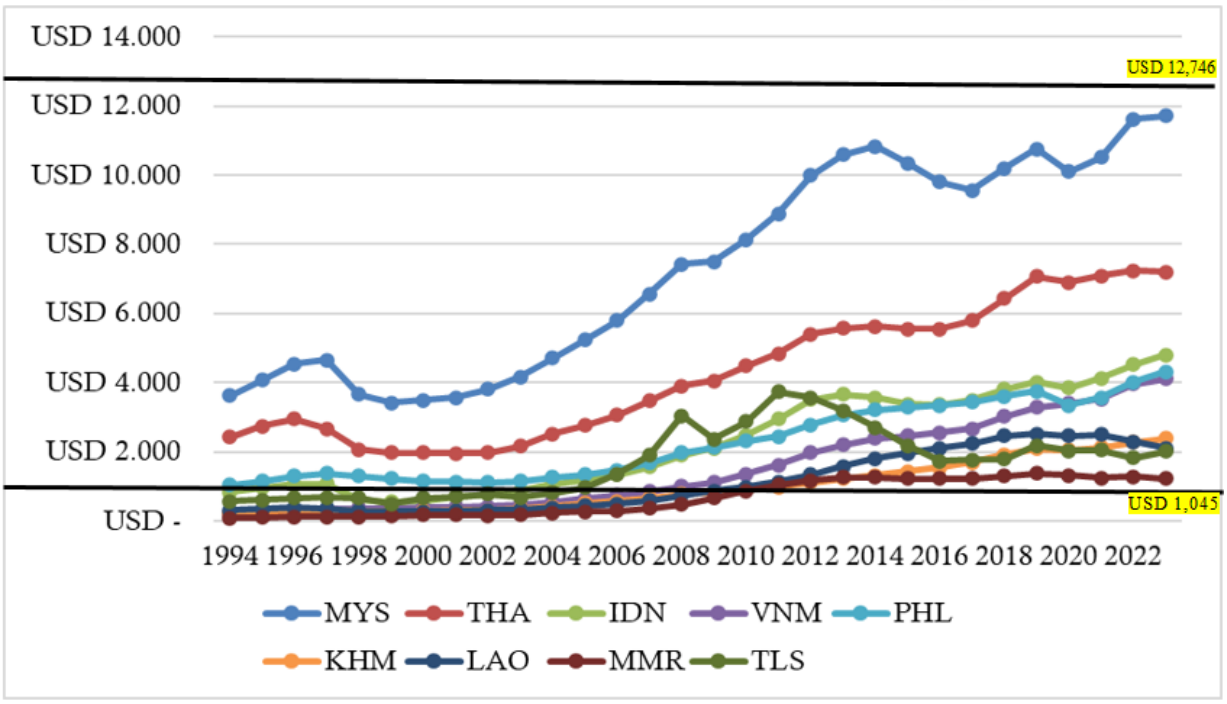

Figure 2. GNI Per Capita Value of 9-ASEAN Countries for 30 years

As illustrated in Figure 2, nine ASEAN countries have GNI per capita levels below the high-income category: Malaysia, Thailand, Indonesia, Vietnam, the Philippines, Cambodia, Laos, Myanmar, and Timor-Leste. Figure 2 specifically presents the GNI per capita of four ASEAN countries, namely Malaysia, Thailand, Indonesia, and the Philippines, over 30 years. Empirically, the World Bank and ADB (2012) state that the middle-income trap occurs due to GNI per capita stagnation, whereby it becomes difficult to transition toward high-income status. Making it difficult to switch from the category of middle-income countries to high-income countries. Operationally, this is often measured using Gross National Income (GNI) per capita based on the World Bank's classification, which establishes thresholds for low-, middle-, and high-income categories (Vaggi, 2017). This middle-income trap occurs when countries fall within the middle-income range, which is subdivided into the lower-middle and upper-middle-income levels. Specifically, the lower-middle-income category ranges from US$ 1,045 to US$ 4,125, while the upper-middle-income category spans from US$ 4,125 to US$ 12,746. Although these nine countries have

GNI per capita levels below US$ 12,746, Malaysia, Thailand, Indonesia, and the Philippines have experienced significant growth compared to their counterparts. While these four ASEAN countries have succeeded in increasing their GNI per capita over the past few decades, growth tends to slow as they approach the threshold of the middle-income category; consequently, they remain classified as countries trapped within the middle-income trap. Macroeconomic factors, such as portfolio investments, remittances, exchange rates, and inflation, may be the primary causes hindering the transition to high-income country status (Milojević et al., 2021).

Portfolio investment includes transactions in equity and debt securities that occur within a country. Portfolio investment contributes to economic growth by providing capital for businesses, which ultimately increases productivity and job opportunities, thereby boosting GNI per capita through increased economic output (Asmilia et al., 2023; Tjolleng & Manurung, 2013). In portfolio theory, Markowitz explained that by diversifying investments, investors reduce risk to achieve returns, which can subsequently lead to stable economic growth and the potential expansion of GNI per capita (Lala et al., 2024). Furthermore, the Solow-Swan Model incorporates these concepts into the Theory of Capital Accumulation and Investment, demonstrating that good productive investments, including portfolio investment directed toward sectors that enhance a country's production capacity, such as manufacturing and construction, can, in turn, increase GNI per capita (Menshikov et al., 2015). An effective investment strategy generates returns through risk management, which enhances investor confidence to commit further capital, contributing to economic growth and higher GNI per capita (Unsika, 2016).

Furthermore, remittances serve as a crucial economic indicator, particularly in developing countries, as they contribute significantly to improving universal economic conditions (Iordache et al., 2023). Macroeconomic theory explains the influence of remittances, positing that they serve as an additional source of income that increases household consumption and investment, which directly supports a rise in GNI per capita (Javaid, 2017). Remittances exert a significant impact on GNI per capita through transfers made by emigrants to their countries of origin. These funds are expected to stimulate the economy and improve the living standards of the community on the condition that the management of remittances is carried out in a place (Stojanov & Strielkowski, 2013).

Essentially, an exchange rate represents the price of one country's currency in terms of another, serving as a key macroeconomic instrument, whether measured in nominal or real terms (Bereslavska, 2022; Chitranka K, 2022; Kartono et al., 2021). Within the ASEAN region, exchange rate conditions are heavily influenced by foreign currency denominations caused by private debt, which significantly shape exchange rate stability (Sangaré, 2021). The Purchasing Power Parity (PPP) theory acts as the foundation that explains how changes in the exchange rate affect the purchasing power and real income of a country (Wen, 2024). Due to currency depreciation, export competitiveness tends to increase because domestic goods become cheaper on the international market (Ardian et al., 2024). While this potentially boosts export volumes and national income, it can simultaneously reduce GNI per capita values when converted to international currencies. Ultimately, exchange rate volatility hinders the ability of countries to be competitive and diversify their economy to

transition from middle-income countries to high-income countries (Caldentey et al., 2022; Gelir et al., 2019).

The final variable is inflation. The inflation rate experienced in ASEAN fluctuated significantly from 1989 to 2018, with ASEAN experiencing quite high inflation in 1998 at 21.8% due to the 1997 East Asian economic crisis (Lisani et al., 2020). Suginam et al. (2022) interpret inflation as a complex economic phenomenon characterized by a continuous increase in prices over a certain period. According to Monetary Theory, when the growth of GNI per capita is not balanced with money supply growth, it will cause inflation. When a country experiences inflation, it can negatively impact GNI per capita; specifically, if inflation increases, it can cause a decrease in per capita income, ultimately harming economic development and vice versa (Nguyen, 2019).

Various previous studies have discussed the middle-income trap experienced by some countries in ASEAN (Anggraeni, 2016; Pardede & Aziz, 2022; Paudel, 2022; Sujatmiko et al., 2021), relating the trap to GDP per capita, which is influenced by factors such as FDI, HDI, exports, education level, and technology. Previous research states that FDI, HDI, and education level can significantly affect GDP per capita within the context of the middle-income trap in ASEAN. However, research using the GDP per capita variable still needs to be explored further because reflecting the middle-income trap through GDP per capita may not fully capture the process of increasing income levels needed to move countries out of the middle-income condition. Therefore, analyzing the middle-income trap through the GNI per capita approach is much more appropriate because this income classification directly assesses how the per capita income of a country can lead it out of the middle-income trap.

The research gap in this study lies in the use of dependent variables (GNI per capita) and independent variables (Portfolio Investment, Remittance, Exchange Rate, and Inflation). In addition, this research analysis employs the Vector Error Correction Model (VECM) to examine the extent of the impact and influence on each variable in both the long and short term (Gao et al., 2023). The contribution of this research is to provide greater knowledge related to the middle-income trap and potential policies to solve problems occurring in four ASEAN countries. Based on this background, this study aims to examine the long-term and short-term effects of each independent variable (Portfolio Investment, Remittance, Exchange Rate, and Inflation) on the dependent variable (GNI Per Capita) as a solution to the middle-income trap that occurs in four ASEAN countries: Malaysia, Thailand, Indonesia, and the Philippines.

METHOD

This study utilizes secondary data, which comprises annual quantitative data from 1994 to 2023. The objects of the study are four ASEAN countries, namely Malaysia, Thailand, Indonesia, and the Philippines, as developing countries that have a GNI per capita level at the middle-income level. The data used in this study includes GNI Per Capita as a dependent variable, with Portfolio Investment, Remittance, Exchange Rate, and Inflation as independent variables sourced from the World Bank website. All variables used are real data that have been transformed into a natural logarithm (LN), except for data that are already in percentages.

Table 1. *Research variables*

Variable	Unit	Description
GNI per Capita	USD $	GNI per capita, Atlas method
Portfolio investment	USD $	Portfolio Investment
Remittance	USD $	Personal remittances
Exchange rate	USD $	Official exchange rate
Inflation	Persen	Inflation, consumer prices

Table 2. *Real GNI Per Capita Classification*

Low Income		<US $ 1,045
Middle Income	Low Middle	US $ 1,045- US $4,125
	Upper Middle	US $ 4,125 - US $ 12,746
High Income		> US $ 12,746

Table 2 presents the classification of the GNI per capita. The Middle-Income Trap is a condition in which a country has a per capita income level at the middle-income level and struggles to reach the high-income level. In this study, a sample of four ASEAN countries is used, each with a per capita income within the middle-income classification.

To address the research objectives, this study uses a panel Vector Autoregressive (VAR) Vector Error Correction Model (VECM) approach. Nugraheni and Inayah (2022) state that VAR analysis, as an econometric model, is based on relationships between variables to identify cause and effect when the variables are stationary at the level. Meanwhile, when the variable is not stationary at the level but exhibits a long-term relationship or cointegration, the Vector Error Correction Model (VECM) panel analysis is used (Hatmaja & Fuddin, 2023). There are several tests carried out in the processing of this research, including: 1) Stationarity test, 2) Optimal lag test, 3) Cointegration test, 4) VECM estimation test, 5) Impulse response function test, and 6) Forecast error variance decomposition. The general VAR VECM models used in this study include:

$$GNIK = 1 + C^1 + \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} PI_{t-k} + \sum_{i=1}^{K} RE_{t-k} + \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} KURS_{t-k} - \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} INF_{t-k} + \varepsilon^1 \quad (1)$$

$$PI = 1 + C^1 + \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} GNIK_{t-k} - \sum_{i=1}^{K} RE_{t-k} + \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} KURS_{t-k} - \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} INF_{t-k} + \varepsilon^1 \quad (2)$$

$$RE = 1 + C^1 + \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} GNIK_{t-k} - \sum_{i=1}^{K} PI_{t-k} + \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} KURS_{t-k} - \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} INF_{t-k} + \varepsilon^1 \quad (3)$$

$$KURS = 1 + C^1 + \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} GNIK_{t-k} - \sum_{i=1}^{K} PI_{t-k} + \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} RE_{t-k} - \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} INF_{t-k} + \varepsilon^1 \quad (4)$$

$$INF = 1 + C^1 - \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} GNIK_{t-k} - \sum_{i=1}^{K} PI_{t-k} - \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} RE_{t-k} - \mathrm{a}^1{}_\mathrm{i} \sum_{i=1}^{K} KURS_{t-k} + \varepsilon^1 \quad (5)$$

Where:
GNIK = Gross National Income Perkapita
PI = Portfolio Investment
RE = Remittance
KURS = Exchange Rate
INF = Inflation

FINDING AND DISCUSSION

GNI per capita, Portfolio Investments, Remittances, Exchange Rate, and Inflation in four ASEAN Countries (Malaysia, Thailand, Indonesia, and the Philippines) over the past 30 years have experienced various fluctuations that are not the same; some variables have shown changes that are not significant, while others have shown quite significant changes. GNI per capita averages 4061,083 over 30 years, ranging from 570 USD to 11,970 USD. The average values of the independent variables (Portfolio Investment, Remittances, Exchange Rate, and Inflation) are undoubtedly lower than the average of the dependent variable (GNI per capita). The average value of the independent variable, among others, is portfolio investment, with the lowest average compared to that of other variables, namely -8.8E+08. Then, the average Remittance is 7.78E+09; the Exchange Rate, which has the largest average value among the independent variable is 2502.432, and the average value of the Inflation Variable is 4.54332. The descriptive statistics of all variables used in this study are summarized in Table 3.

Table 3. Descriptive Statistics

Variabel	Obs	Mean	Min	Max	Std. Dev
GNIK	120	4061,083	570	11970	2871,592
PI	120	-8,80E+08	-2,60E+10	2,40E+11	7,60E+09
RE	120	7,78E+09	1,16E+08	3,91E+10	8,86E+08
KURS	120	2505,432	2,50440417	15236,8847	4691,075
INF	120	4,54332	-1,1387	545,1984	5,886931

The primary variable used to assess the condition of the middle-income trap in four ASEAN countries (Malaysia, Thailand, Indonesia, and the Philippines) is the GNI per capita value. The middle-income trap is characterized by stagnation in per capita income (Galvan et al., 2022), a condition in which a country experiences strong economic growth but still struggles to reach high income levels (Angelov, 2024). Judging from the minimum and maximum values ranging from 570 USD to 1,1970 USD over 30 years, the four ASEAN countries are experiencing middle-income levels, as their values are below the per capita GNI classification for the high-income.

The stationary test is the primary statistical step used to examine data to determine whether the stochastic process is stationary and whether its statistical properties change over time (Tzeng et al., 2024). Based on the results of the stationary test, a variable can be considered stationary when the Augmented Dickey-Fuller (ADF) p-value is less than 0.05. The GNI per capita variable at the level cannot be considered stationary because the ADF p-value is 0.9982, which is greater than 0.05. The next variable that is not stationary at the level is remittance, with an ADF p-value of 0.0708. Portfolio investment, exchange rate,

and inflation at the level can be considered stationary because the p-values are less than 0.05. After testing for stationarity at the first difference, all variables are stationary.

Table 4. *Data Stationary Test*

Variable		Prob ADF	Result
GNI per Capita	Level	0.9982	Non-stationary
	1st difference	0.0012	Stationary
Portfolio Investment	Level	0.0022	Stationary
	1st difference	0.0000	Stationary
Remittances	Level	0.0708	Non-stationary
	1st difference	0.0007	Stationary
Exchange Rate	Level	0.0031	Stationary
	1st difference	0.0001	Stationary
Inflation	Level	0.0019	Stationary
	1st difference	0.0000	Stationary

After assessing the data's stationarity, the next step is to determine the lag length. The determination of the optimal lag length is carried out to identify the appropriate benchmark for the maximum effect in the analysis. The optimal lag test is performed to ensure that there are no errors in the results regarding the causal effect and stability of the variables involved (Putra, 2017). The optimal lag test involves determining the exact length of a lag to minimize information criteria; the criteria used in this test include the Akaike Information Criterion (AIC), the Schwarz Criterion (SC), and the Hannan-Quinn Criterion (HQ; Gutierrez et al., 2009).

Table 5. *Optimum Lag Test*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1.913.848	NA	4.78e+13	4.568.685	4.583.154	4.574.501
1	-1.852.370	1.141.736	2.01e+13	4.481.832	45.68647*	45.16731*
2	-1.828.031	4.230.273	2.05e+13	4.483.407	4.642.568	4.547.388
3	-1.795.460	5.273.421	1.74e+13	4.465.381	4.696.887	4.658.444
4	-1.776.811	2.797.321	2.09e+13	4.480.502	4.784.335	4.602.648
5	-1.740.405	50.27522*	1.67e+13*	4.453.345	4.829.543	4.604.573
6	-1.740.405	2.419.003	2.08e+13	4.467.227	4.915.771	4.647.538
7	-1.698.129	2.640.685	2.44e+13	4.471.737	4.992.626	4.681.130
8	-1.665.076	3.384.004	2.36e+13	44.52563*	5.045.798	4.691.038

The results of the optimal lag test in Table 4 provide eight lag lengths based on the Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan-Quinn Criterion (HQ). The optimal lag length is determined by the minimum Akaike Information Criteria (AIC) value. The optimal lag value from the calculation of the test results is at lag eight (8), which gives the smallest Akaike Information Criteria (AIC) value among other lags, which is 44.52563. The lag length is used for further testing as a criterion for the lag length in data processing to achieve the desired data accuracy.

The next stage is the Johansen cointegration test. This Johansen co-interconnection test is a key component of the Vector Error Correction Model (VECM) analysis series. The

results of the Johansen correlation test are used to identify cointegration relationships between variables in a time series (Katoch & Batra, 2023; Alizade, 2024). Then the cointegration test will estimate the long- and short-term equilibrium relationships. However, the variables are not stationary at the level, which means stationary at the level of difference (Reichold, 2022).

Table 6. *Johansen Cointegration Test*

Hypothesized No.of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None*	0.529074	1.582.263	6.981.889	0.0000
At most 1*	0.474146	9.798.205	4.785.613	0.0000
At most 2*	0.305958	4.656.348	2.979.707	0.0003
At most 3*	0.112223	1.734.446	1.549.471	0.0260
At most 4*	0.093143	7.821.657	3.841.465	0.0052

The results of the Johansen cointegration test show the trace statistic, along with the critical value and p-value at each rank. Based on the results, the trace static value of 158.2263 exceeded the 5 percent critical value of 69.81889. Furthermore, the probability values for At Most 1, At Most 2, At Most 3, and At Most 4 have a p-value of < 0.05 or less than α (5%); thus, it is concluded that the null hypothesis (H_0) is rejected in the Johansen cointegration test for GNI per capita, Portfolio Investment, Remittances, Exchange Rate, and Inflation. It can be concluded that the data used possess a long-term relationship and are suitable for further VECM estimation.

After the data pass the Johansen cointegration test, the next step is to determine the relationship between the independent variables (portfolio investment, remittances, exchange rate, and inflation) and the dependent variable (GNI per capita). The relationships shown in the Vector Error Correction Model (VECM) include both long- and short-term relationships among the variables in the time series. The significance of each variable in each period, both long- and short-term, is seen from the t-statistic, which must be greater than the t-table value. The t-table value used in the calculation, derived from the TINV formula with 120 observations and a probability value of 0.05, is 1.980808.

Table 7 provides the results of the Vector Error Correction Model (VECM) estimation of the relationship between independent variables (Portfolio Investment X1, Remittance X2, Exchange Rate X3, and Inflation X4) and the dependent variable, namely GNI per capita (Y) in the long and short term. From the results of the long-term test (Long Run), three variables can affect GNI per capita: Portfolio Investment, Exchange Rate, and inflation, all of which have values greater than the t-table. Therefore, these three variables have a meaning when there is an increase in their value (Portfolio Investment, Exchange Rate, and Inflation) in the direction of increasing the value of GNI per capita in the long term in the ASEAN-4. However, there is one variable that does not have a long-term effect on GNI per capita, namely the Remittance variable, which has a value below the t-table. Changes in the remittance variable will not affect the value of GNI per capita in the ASEAN-4 in the long term.

Table 7. Estimation Vector Error Correction Model (VECM)

	Cointegrating Eq:					
	D(Y(-1))	D(X1(-1))	D(X2(-1))	D(X3(-1))	D(X4(-1))	C
Long-Term	1.000.000	3.28E-11	-0.075888	1.513.528	0.162852	-0.072984
		(1.1E-11)	(0.12213)	(0.33116)	(0.02390)	
		[3.10696]	[-0.62136]	**[4.57033]**	[6.81346]	
Short-Term	-0.011120	1.68E-14	-0.025523	-0.353742	0.004121	-0.014959
	(0.09878)	(1.4E-12)	(0.03035)	(0.11650)	(0.00152)	(0.00698)
	[-4.78752]	[0.88990]	[-0.84095]	[-3.03629]	**[2.71320]**	[2.14182]

The short-term VECM estimation results show that two variables have an impact on GNI per capita, namely the exchange rate and inflation. The exchange rate hurts GNI per capita, meaning that when the exchange rate increases, it will have the opposite impact on GNI per capita. In contrast to the exchange rate, inflation affects GNI per capita positively in the short term, meaning that any increase or decrease in inflation will be in the same direction as the changes experienced by GNI per capita. Meanwhile, the other two independent variables, namely portfolio investment and remittances, have no effect on GNI per capita in the short term; as a result, short-term changes in portfolio investment and remittances will not alter the value of GNI per capita.

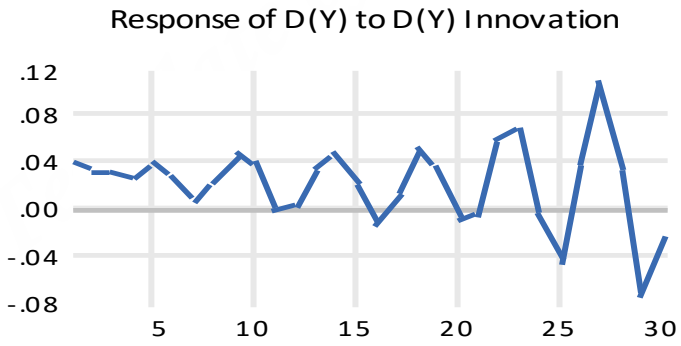

Figure 3. Test Impulse Response Function (IRF) GNI Per Capita to Self

The Impulse Response Function (IRF) test analyzes the impact of shocks in one variable on other variables over a specific period. Additionally, the IRF test also assesses the implicit impact of one variable on the value of other variables (Hafner & Herwartz, 2023). Figure 2 explains that GNI per capita tends to have a small but positive effect on its own value in the initial time. After some time, this influence rises sharply and then drops drastically, even becoming a negative response. This means that the current change in GNI per capita can have an unstable impact on GNI per capita in the future.

Figure 4 shows that shocks to portfolio investment cause the GNI per capita response to fluctuate and be unstable over time. Initially, the impact is small, but over time, there are sharp spikes and drastic declines, signaling a sensitive reaction. This indicates that portfolio

investments can have a significant, but not always positive, impact on national per capita income growth (Oyegoke & Aras, 2021).

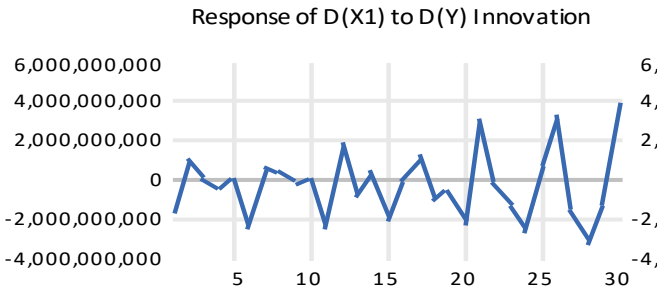

Figure 4. Test Impulse Response Function (IRF) of Investment Portfolio to GNI Per Capita

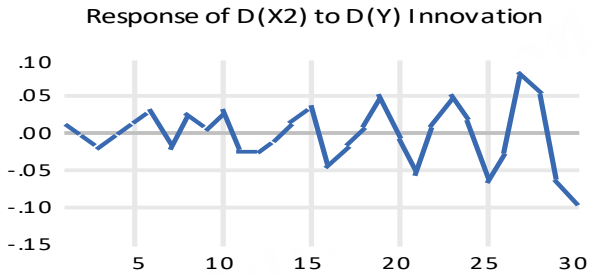

Figure 5. Test Impulse Response Function (IRF) Remittances to GNI Per Capita

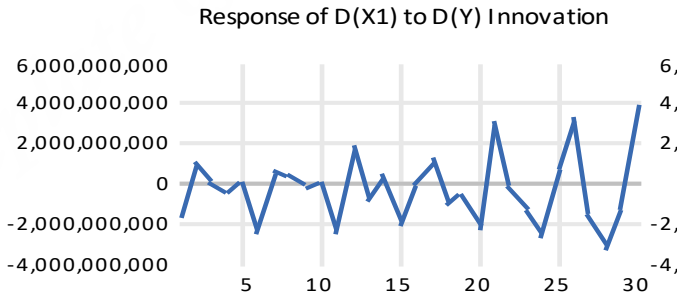

Figure 6. Test Impulse Response Function (IRF) Exchange Rate Against GNI Per Capita

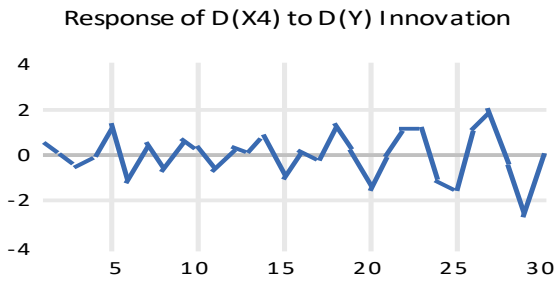

Figure 7. Test Impulse Response Function (IRF) Inflation to GNI Per Capita

The response of GNI per capita to remittances appears to fluctuate, with a relatively small initial effect that gradually increases over time. In the medium period, a surge signals the positive influence of remittances. Still, it then declines sharply at the end of the period. This indicates that remittances may initially drive per capita income growth; however, the effects are not sustainable in the long term.

The response of GNI per capita to exchange rate shocks exhibits significant volatility throughout the observation period. The impact oscillates between positive and negative territories, characterized by substantial spikes in specific intervals. This suggests that exchange rate fluctuations exert a potent yet inconsistent influence on national income per capita, contingent upon prevailing economic conditions (Meng, 2024).

Regarding inflationary shocks, the response of GNI per capita appears relatively marginal, showing only minor fluctuations throughout the period. The absence of significant spikes suggests that inflation's influence on GNI per capita remains weak and constrained. Consequently, this indicates that inflation has little impact on national income per capita in the short- to medium-term (Shitundu & Luvanda, 2024).

Table 8. *Forecast Error Variance Decomposition (FEVD)*

Response of D(Y):					
Periode	**D(Y)**	**D(X1)**	**D(X2)**	**D(X3)**	**D(X4)**
1	0.040615	0.000000	0.000000	0.000000	0.000000
2	0.031330	-0.003329	0.010135	-0.008233	-0.008233
3	0.030228	-0.007811	-0.002257	-0.028995	-0.010866
4	0.028169	-0.003156	-0.005898	-0.015617	-0.005172
5	0.041501	0.004839	0.000991	-0.008039	0.016536
6	0.026602	0.012633	0.006109	-0.023559	0.013882
7	0.008383	0.002057	-0.001366	-0.040062	-0.001243
8	0.024776	-0.009764	-0.005303	-0.026852	0.004467
9	0.049326	0.001195	0.008858	-0.014278	0.026607
10	0.041226	0.005618	0.015450	-0.014004	0.017695
11	-0.001292	0.004649	-0.010032	-0.028329	0.000569
12	0.004575	-0.004418	-0.024913	-0.025749	-0.003801
13	0.035404	0.004485	0.000790	-0.010964	0.015835
14	0.047691	0.012359	0.018977	-0.004207	0.023942
15	0.020957	-0.000607	1.62E-05	-0.019735	-0.001745
16	-0.010887	-0.013302	-0.023429	-0.034714	-0.014700
17	0.016039	-0.008656	-0.009388	-0.013739	0.002893
18	0.052191	0.013784	0.019498	0.008982	0.027787
19	0.034525	0.012434	0.018937	-0.004950	0.012784
20	-0.010151	0.008431	-0.015592	-0.044700	-0.017302
21	-0.004916	-0.016463	-0.026057	-0.038681	-0.015578
22	0.059593	0.004158	0.008255	0.010908	0.026830
23	0.069007	0.022530	0.030697	0.015257	0.038297
24	-0.002509	0.001859	-0.000570	-0.038339	-0.012456
25	-0.043439	-0.022102	-0.040345	-0.064527	-0.035998
26	0.039686	-0.008673	-0.012044	-0.006656	0.012356
27	0.110079	0.026407	0.046625	0.038395	0.060598
28	0.031613	0.019462	0.028619	-0.015873	0.015211
29	-0.071964	-0.026732	-0.049150	-0.082827	-0.056347
30	-0.022146	-0.026944	-0.051542	-0.040520	-0.021287

Forecast Error Variance Decomposition (FEVD) is a method to decompose variance in a multivariate stochastic process. FEVD is very important in a stationary process because it provides insight into the contributions of various factors to forecast errors (Gourieroux & Lee, 2024). From the results of the FEVD, it can be seen that in the initial period, the contribution to GNI per capita is 0.0039% from the variable itself. At the same time, other variables such as portfolio investment, remittances, the exchange rate, and inflation do not contribute. Then, in the second period, all variables contributed to GNI per capita: GNI per capita contributed 0.031330%, portfolio investment contributed -0.003329, remittance contributed 0.010135%, exchange rate contributed 0.018482%, and Inflation contributed 0.008233%. From the second period to the end of the period, independent variables, namely investment portfolios (X1), remittances (X2), the exchange rate (X3), and inflation (X4), have an effect on GNI per capita, with their values fluctuating every few periods.

Effect of Long-Term Estimation of Independent Variables on Dependent Variables

Based on the long-term estimation results, variables that affect GNI per capita are portfolio investment, the exchange rate, and inflation. Portfolio investment affects GNI per capita in the long term, as Rahmon (2022) indicates that a conducive economic environment attracts investment, thereby increasing GNI per capita. In addition, Markowitz's portfolio theory emphasized that diversifying investments reduces risks to achieve returns, which can lead to stable economic growth and the potential gains for GNI per capita (Lala et al., 2024). Then, the exchange rate variable can also affect GNI per capita as it fluctuates; ultimately, the exchange rate can change the trade balance and influence the level of economic activity and GNI per capita (Ozegbe, 2023). This is also supported by the Purchasing Power Parity (PPP) theory, which serves as a fundamental foundation for explaining how changes in the exchange rate affect a country's purchasing power and real income.

The third variable that can affect GNI per capita in the long term is inflation. While inflation generally hinders economic activity, its impact differs when it occurs in developing countries. Inflation can have a positive effect, especially on GNI per capita in developing countries, as a moderate inflation environment can stimulate economic activity by encouraging investment and expenditure, thereby generating income (Yilmazkuday, 2021). Imperfect market conditions in developing countries can also reflect how inflation suppresses demand in a way that drives driving growth and positively impacts GNI per capita (Benhamou, 2018). In contrast, the remittance variable does not affect GNI per capita in the long term. Cite et al. (2019) and Stojanov et al. (2019) show that remittances do not affect economic growth when there is high uncertainty about remittance flows, which can negatively affect the workforce by decreasing labor force participation, ultimately reducing a country's GNI per capita.

Effect of Short-Term Estimation of Independent Variables on Dependent Variables

The results of the VECM estimation test in the short term (short run) found that two variables influence GNI per capita, while the other two independent variables have no effect. The first variable that does not influence GNI per capita in the short term is portfolio investment. Hassan et al. (2021) and Mlambo (2022) examine how portfolio investment does not significantly affect GNI per capita in the short term, even though the impact is

positive in the long term. This is because the portfolio investment's contribution is limited by national economic policy strategies that are not yet managed adequately regarding capital flows. Then, the second variable is remittances. The role of remittances remains debated, especially regarding its short-term impact. Negative moral factors and asymmetric information can hinder productivity, which ultimately prevents remittances from impacting GNI per capita growth (Shera & Meyer, 2013).

Meanwhile, variables that affect GNI per capita in the short term include the exchange rate and inflation. The exchange rate negatively impacts GNI per capita in the short term. Hamida (2024) and Mensah et al. (2021) explained that the exchange rate can hurt GNI per capita in developing countries due to high inflationary pressures and unstable rates, which ultimately cause instability in the cost of capital and inputs. Furthermore, regarding the inflation variable, the effects of inflation vary widely across countries depending on the strength of institutions. Inflation can have a positive impact in the short term within weak institutions, suggesting that the relationship between inflation and GNI per capita is influenced by a country's institutional level (Yilmazkuday, 2021).

CONCLUSION

Based on the Vector Error Correction Model (VECM) panel analysis, this study concludes that GNI per capita in the ASEAN-4 (Malaysia, Thailand, Indonesia, and the Philippines) over a 30-period horizon is influenced by portfolio investment, exchange rates, and inflation in the long term. Thus, an increase in portfolio investment, the exchange rate, and inflation will also increase GNI per capita in these countries. However, changes in remittances values in the ASEAN-4 do not have affect GNI per capita in the long run. In the short term, portfolio investment and remittance in ASEAN-4 do not have a significant relationship or impact on GNI per capita. In contrast, the exchange rate and inflation still have an impact on GNI per capita. Although the exchange rate does not show a statistically significant effect in the short term, it still maintains a relationship with GNI per capita.

The results from this research offer a practical starting point for policies focused on innovation, economic diversification, and improvement of the quality of human resources to accelerate the transition to a high-income country. However, limitations of this study include the use of aggregate data that may not fully reflect regional or sectoral dynamics, as well as limitations in measuring institutional factors. Future research is recommended to explore the influence of institutional variables, such as governance quality and fiscal policies, as well as conduct microeconomic studies to uncover more in-depth sector differences.

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