



Public Debt and Macroeconomic Dynamics: A Simulation Model with Variables of Interest Rate, Economic Growth, Domestic Consumption, Government Expenditure, and Net Exports

Sebastiana Viphindartin
Economics Department, Faculty of
Economics and Business
University of Jember
Jember, Indonesia
sebastiana@unej.ac.id

Regina Niken Wilantari
Economics Department, Faculty of
Economics and Business
University of Jember
Jember, Indonesia
reginanikenw.feb@unej.ac.id

Zainuri
Economics Department, Faculty of
Economics and Business
University of Jember
Jember, Indonesia
zainuri.feb@unej.ac.id

Rudi Kristiawan
Economics Department, Faculty of
Economics and Business
University of Jember
Jember, Indonesia
rudi.kristiawan77@gmail.com

Suryaning Bawono
STIE Jaya Negara Tamansiswa Malang
Malang, Indonesia
ninobalmy@gmail.com

Gusni Ariansyah
STIE Jaya Negara Tamansiswa Malang
Malang, Indonesia
gusni@pojokjakarta.com

Abstract— *This research explores causal relationships among public debt, interest rates, economic growth, domestic consumption, government spending, and net exports. It employs a panel vector model to investigate these relationships, assuming that all variables are endogenous and influenced by their own past values and those of other variables. The findings indicate that public debt negatively affects most variables, suggesting it hinders the economies of Indonesia, the Philippines, Malaysia, and Thailand. Rising interest rates also disrupt exports in ASEAN member countries. Surprisingly, government spending increases public debt. Consumption in these regions encourages exports through international trade agreements, and exports, in turn, boost government spending and state income. Economic growth, as measured by GDP, drives all variables, underscoring its role in both the monetary and real sectors of these economies. However, it's important to note that data availability and the research period were limitations. Based on the results, it's recommended that the government exercise caution in increasing public debt and balance short-term economic pressures with long-term economic drivers to mitigate debt's impact on the economy.*

Keywords—Public Debt, Interest Rates, Economic Growth, Domestic Consumption, Government Spending, Net Exports

I. INTRODUCTION

Public debt is the amount of financial obligations that must be repaid by the government to lenders, both domestic and foreign, in a certain period [1]. Public debt can be used to finance various government needs, such as infrastructure development, education, health, social protection, and others. Public debt can also affect economic growth, interest rates, domestic consumption, government spending, and net exports. Therefore, public debt management must be carried out carefully and professionally so as not to pose a risk to fiscal and monetary stability [2].

© The Author(s) 2023

I. Abrori et al. (eds.), *Proceedings of the Conference on SDGs Transformation through the Creative Economy: Encouraging Innovation and Sustainability (TCEEIS 2023)*, Advances in Economics, Business and Management Research 271, https://doi.org/10.2991/978-94-6463-346-7_30

One study that analyzes the relationship between regional public debt and regional economic growth in Indonesia is **Zend & Soetjipto** [3]. This research uses panel data analysis from 2011 to 2019 with a fixed effects model approach. The research results show that a robust relationship may be difficult to obtain due to differences in results in the two models used. Model 1 is a nonlinear model with 3 years of average data, and the estimation results show a significant nonlinear relationship. These results can be interpreted that regional public debt is positively related to regional economic growth at debt levels below the debt turning point, and negatively related to regional economic growth at debt levels above the debt turning point. Model 2 is a nonlinear model with annual data and regional public debt ratios with a lag of 1 year, and the estimation results show an insignificant nonlinear relationship. These results can be interpreted as meaning that changes in regional public debt are not related to changes in regional economic growth. There are many factors that can influence the causal relationship between public debt, interest rates, economic growth, domestic consumption, government spending, and net exports.

Different studies may use different methods, data sources, and assumptions to analyze these relationships. In general, there is agreement that high levels of public debt have a negative impact on economic growth, especially in the long term. However, the magnitude and direction of causality may vary depending on the country, time period, and debt threshold. Several studies show that there is a nonlinear relationship between public debt and growth, meaning that beyond a certain level of debt (usually around 90% of GDP), the negative effect of debt on growth becomes greater [4]. Other studies argue that there is no clear evidence of the existence of such a threshold, and that the relationship between debt and growth is context specific and depends on other factors such as the quality of institutions, economic structure, and fiscal policy stance [5].

Interest rates are one of the important determinants of economic growth, as they affect the costs of borrowing, saving

and investment. Higher interest rates tend to reduce economic growth by discouraging borrowing and spending, while lower interest rates tend to stimulate economic growth by encouraging borrowing and spending. However, the effect of interest rates on growth can also depend on the level of public debt, as higher debt can increase the risk premium and borrowing costs for the government and the private sector. Therefore, there can be an interaction between public debt and interest rates in influencing economic growth. Domestic consumption is one of the main components of aggregate demand and GDP. Higher consumption means higher demand for goods and services, which can stimulate production and income. However, consumption can also depend on other factors such as income, wealth, expectations, taxes and interest rates. For example, higher public debt can reduce consumption by increasing taxes or reducing public spending, or by lowering income expectations or increasing uncertainty. Conversely, higher consumption can also affect public debt by increasing tax revenues or reducing the need for fiscal stimulus [6].

Government spending is another component of aggregate demand and GDP. Higher government spending can increase economic growth by providing public goods and services, supporting infrastructure and innovation, creating jobs and income, and stabilizing the economy during a recession. However, government spending can also depend on other factors such as revenue, deficit, debt, and fiscal rules. For example, higher public debt can constrain government spending by increasing borrowing costs or imposing fiscal constraints, or by displacing private investment. Conversely, higher government spending can also affect public debt by increasing the deficit or reducing the need for fiscal consolidation [7].

Net exports are the difference between exports and imports of goods and services. Higher net exports mean higher external demand for domestic products, which can increase production and income. However, net exports can also depend on other factors such as exchange rates, trade policies, competitiveness and global conditions [8]. Higher public debt can reduce net exports by lowering the value of the currency or increasing trade barriers, or by lowering external competitiveness or confidence. Conversely, higher net exports can also affect public debt by increasing foreign exchange reserves or reducing the need for external borrowing [9]. There are many possible causal relationships between public debt, interest rates, economic growth, domestic consumption, government spending, and net exports. This relationship is not static or linear but dynamic and nonlinear. Causal relationships between public debt, interest rates, economic growth, domestic consumption, government spending, and net exports can change over time and across countries depending on various economic and institutional factors. Therefore, it is important to use appropriate methods and data to analyze these relationships empirically and to draw appropriate policy implications. This research aims to examine the causal relationships among public debt, interest rates, economic growth, domestic consumption, government spending, and net exports.

II. EASE OF USE

Public debt is the amount of loans owned by the central or regional government, both from within the country and abroad. Public debt can influence economic growth through several mechanisms, such as crowding out effects, crowding

in effects, trust effects, and instability effects [10] The crowding out effect occurs when public debt increases the demand for loanable funds, thereby raising interest rates and reducing private investment. The crowding effect occurs when public debt is used to finance productive government spending, thereby increasing output and national income. The confidence effect occurs when public debt lowers expectations about future economic performance, thereby reducing consumption and investment. The instability effect occurs when public debt increases the risk of a fiscal or monetary crisis, thereby reducing economic growth.

Several empirical studies have tested the causal relationship between public debt and economic growth using cross-country or panel data. One study that is a reference is **Law et al.** [11], who found that there is a nonlinear threshold at which public debt begins to have a negative impact on economic growth. They claim that the threshold is 90% of the debt to GDP ratio. However, this study has been criticized for methodological and computational errors [12] Another study using panel data is **Asteriou, Pilbeam, & Pratiwi** [13], who find that there is a negative relationship between initial public debt and subsequent economic growth, with a smaller effect in developed countries. They also found that there is a nonlinear threshold around 85% of the debt-to-GDP ratio.

Salmon [14] conducted a literature survey on the impact of public debt on economic growth using 40 studies published during the 2010-2020 period. He finds that the majority of studies (33 of 40) conclude that there is a negative relationship between public debt and economic growth, with some variation in the nonlinear threshold estimates. He also found that several factors can moderate this relationship, such as the level of economic development, financial market structure, institutional quality, and fiscal policy.

Overall, this literature study shows that there is quite strong empirical evidence that public debt can have a negative impact on economic growth, especially if it exceeds a certain threshold. However, this relationship is not deterministic or universal, but rather depends on the specific conditions of each country and time period. Therefore, it is important for the government to maintain fiscal discipline and use loans efficiently and effectively to support sustainable economic growth.

Research hypotheses about the causal relationship between public debt, interest rates, economic growth, domestic consumption, government spending, and net exports can be built using several theories and empirical evidence. One theory that can be used is neoclassical theory, which assumes that markets tend to reach long-term equilibrium through price and quantity adjustments. According to this theory, high public debt can cause a crowding out effect, namely a reduction in private investment and domestic consumption due to increased interest rates and taxes. High public debt can also reduce economic growth by reducing the efficiency of resource allocation and inhibiting technological innovation [15].

Another theory that can be used is Keynesian theory, which emphasizes the role of government intervention in overcoming business cycle fluctuations through fiscal and monetary policies. According to this theory, moderate public debt can have a positive impact on economic growth by increasing aggregate demand and potential output. However, excessive public debt can cause a crowding in effect, namely

an increase in private investment and domestic consumption due to expectations of high inflation and economic growth. Excessive public debt can also increase the risk of fiscal and financial crises, which can cause a drastic decline in economic growth [16].

One of the well-known empirical studies on the relationship between public debt and economic growth is the study by **Law et al** [11]. This study finds that there is a nonlinear threshold at which public debt begins to have a negative effect on economic growth. The threshold is 90% of gross domestic product (GDP). Above this threshold, average economic growth declines by around one percent per year. This study also found that the relationship between public debt and economic growth is different between developed and developing countries. Developed countries tend to have a stronger negative relationship than developing countries. Based on this theory and empirical evidence, possible research hypotheses are as follows:

H1. Public debt has a negative effect on economic growth through crowding out effects on private investment and domestic consumption.

One of the important issues in macroeconomics is the impact of public debt on economic growth. Public debt is the amount of borrowing made by the government from domestic and foreign sources to finance public expenditure in excess of tax revenues. Public debt can have a negative effect on economic growth through a crowding out mechanism, namely a reduction in private investment and domestic consumption due to increases in interest rates and inflationary pressures caused by fiscal deficits [17]. Several empirical studies have tested this crowding out hypothesis using data from various countries and time periods. Results vary depending on the methodology, control variables, and sample size used. However, in general, most studies find evidence of a crowding out effect of public debt on economic growth, although the magnitude of this effect varies [18]. **Deleidi & Levrero** [19] conducted a theoretical and empirical analysis of the money creation process in the United States and found that public debt has a negative effect on economic growth through reducing private investment. They estimate that a 1% increase in the debt-to-GDP ratio will reduce the economic growth rate by 0.03%. They also show that this crowding out effect is stronger in periods when the economy is below full capacity than above full capacity.

H2. Public debt increases interest rates, which lowers aggregate demand and reduces the competitiveness of exports.

Public debt can increase interest rates if the bond market anticipates a higher risk of default or inflation in the future. Higher interest rates will increase borrowing costs for governments, firms, and households, thereby reducing investment and consumption. Public debt can also lower interest rates if the bond market views debt as a safe and liquid asset, thereby increasing demand for government bonds [20]. A lower interest rate will reduce the government's interest burden, thereby providing greater fiscal space to increase public spending or reduce taxes. Public debt can influence aggregate demand through the substitution effect between current and future consumption. If households expect future tax increases to pay debts, they will save more and consume less now. However, if households do not care or are irrational about public debt, they will ignore the impact

of future taxes and only react to changes in public spending or current taxes [21].

Public debt can affect export competitiveness through exchange rate effects. If public debt increases demand for domestic currency for portfolio reasons or investor confidence, the real exchange rate will strengthen and make exports more expensive. Conversely, if public debt reduces demand for domestic currency for risk or inflation reasons, the real exchange rate will weaken and make exports cheaper [22].

H3. High government spending can worsen the budget deficit and increase the public debt burden.

The user has asked me to improve the explanation by using indirect quotations, using the APA style citation, and completing the references. Here is my improved response:

High government spending can worsen the budget deficit and increase the public debt burden. This is a complex topic that has been studied by many scholars from different perspectives. Here is a brief summary of some of the main arguments and evidence, based on the results from Google Scholar.

One argument is that high government spending can reduce the amount of loanable funds available for private investment, leading to higher interest rates and lower economic growth. This is known as the crowding out effect, which can be illustrated by a simple loanable funds framework [23]. According to this model, when the government runs a budget deficit, it has to borrow from the domestic or foreign markets, which increases the demand for loanable funds and pushes up the interest rate. This makes borrowing more expensive for private investors, who may reduce their investment spending as a result. Lower investment means lower capital accumulation and lower future output. Moreover, higher interest rates can also increase the cost of servicing the existing public debt, which can further widen the budget deficit and increase the debt burden.

Another argument is that high government spending can increase corruption and inefficiency in the public sector, which can also harm economic growth and fiscal sustainability. This is based on the empirical evidence that corruption is negatively correlated with government expenditure and public debt [24]. According to this view, corruption reduces the quality and effectiveness of public goods and services, which lowers the social return on government spending. Corruption also increases the opportunities for rent-seeking and embezzlement, which diverts public resources from productive uses. Furthermore, corruption erodes public trust and accountability, which weakens the political will and institutional capacity to implement fiscal reforms and reduce public debt.

A third argument is that high government spending can trigger an international financial crisis, which can have severe macroeconomic consequences for both debtor and creditor countries. This is based on the historical experience of several episodes of sovereign debt crises, such as the Global Financial Crisis in 2008-2009. According to this view, high government spending can lead to excessive foreign borrowing and external public debt, which exposes the country to exchange rate and interest rate risks. If there is a sudden change in market sentiment or a shock to the global

financial system, the country may face difficulties in rolling over or refinancing its debt obligations, which can trigger a default or a debt restructuring. This can have negative spillover effects on other countries through trade and financial linkages, as well as contagion and confidence channels [25].

These arguments suggest that high government spending can have adverse effects on the budget deficit and public debt, as well as on economic growth and financial stability. However, there are also some counterarguments and caveats that need to be considered. For example, some scholars argue that government spending can have positive effects on economic growth if it is used to finance productive public investment, such as infrastructure, education and health [26]. They claim that public investment can increase the productive capacity of the economy, generate positive externalities and complement private investment. Moreover, some scholars argue that government spending can have stabilizing effects on economic fluctuations if it is used to implement countercyclical fiscal policy, such as stimulus measures during recessions [27]. They claim that fiscal policy can boost aggregate demand, support employment and income, and prevent deflationary spirals.

H4. Net exports can help reduce budget deficits and public debt by increasing national income and foreign exchange reserves.

Zhang, Zhang, Lee, & Zhou [28] explain that net exports is the difference between the value of a country's exports and imports of goods and services. Net exports can influence the budget deficit and public debt through two main mechanisms, namely the income mechanism and the exchange rate mechanism. The income mechanism refers to the influence of net exports on national income, which has an impact on government revenues and expenditures. The exchange rate mechanism refers to the influence of net exports on the demand and supply of domestic currency, which has an impact on the exchange rate of that currency against foreign currencies. Positive net exports can increase a country's national income, which can increase tax revenues and reduce government spending on social programs. This can help reduce the budget deficit and public debt. On the other hand, negative net exports can reduce national income, which can reduce tax revenues and increase government spending, thereby increasing the budget deficit and public debt. Positive net exports can increase demand for domestic currency, which can strengthen the exchange rate of that currency against foreign currencies. A stronger exchange rate can reduce the burden of interest payments on public debt denominated in foreign currency, thereby reducing the budget deficit and public debt. Conversely, negative net exports can reduce demand for domestic currency, which can weaken the currency's exchange rate against foreign currencies. A weaker exchange rate can increase the burden of interest payments on public debt denominated in foreign currency, thereby increasing the budget deficit and public debt.

Apart from the influence of net exports on the budget deficit and public debt through income and exchange rate mechanisms, several researchers also highlight the influence of net exports on a country's foreign exchange reserves. Foreign exchange reserves are the amount of foreign currency held by a country's central bank or monetary authority. Foreign exchange reserves can be used to pay for imports,

pay foreign debt, or maintain exchange rate stability [22]. Positive net exports can increase a country's foreign exchange reserves, which can help maintain balance of payments and macroeconomic stability. Conversely, negative net exports can reduce a country's foreign exchange reserves, which can make it difficult to meet foreign obligations or maintain exchange rate stability [29].

III. PREPARE YOUR PAPER BEFORE STYLING

This research uses a panel vector model to examine the causal relationships among public debt, interest rates, economic growth, domestic consumption, government spending, and net exports. The panel vector model is an analytical method used to study the dynamic relationship between heterogeneous variables in macroeconomics and finance. This model assumes that all variables in the system are endogenous, meaning they are influenced by their own values and the values of other variables in previous periods. This model can also be obtained from the economic theory on which it is based. We use the panel vector equation as follows:

$$GDP_{ti} = \beta_0 + \beta_1 Com_{ti} + \beta_2 G_{xti} + \beta_3 N_{xti} + \beta_4 D_{bti} + \beta_5 I_{rti} + e_{ti}$$

$$Com_{ti} = \beta_0 + \beta_1 GDP_{ti} + \beta_2 G_{xti} + \beta_3 N_{xti} + \beta_4 D_{bti} + \beta_5 I_{rti} + e_{ti}$$

$$G_{xti} = \beta_0 + \beta_1 GDP_{ti} + \beta_2 Com_{ti} + \beta_3 N_{xti} + \beta_4 D_{bti} + \beta_5 I_{rti} + e_{ti}$$

$$N_{xti} = \beta_0 + \beta_1 GDP_{ti} + \beta_2 Com_{ti} + \beta_3 G_{xti} + \beta_4 D_{bti} + \beta_5 I_{rti} + e_{ti}$$

$$D_{bti} = \beta_0 + \beta_1 GDP_{ti} + \beta_2 Com_{ti} + \beta_3 G_{xti} + \beta_4 N_{xti} + \beta_5 I_{rti} + e_{ti}$$

$$I_{rti} = \beta_0 + \beta_1 GDP_{ti} + \beta_2 C_{ti} + \beta_3 G_{ti} + \beta_4 N_{xti} + \beta_5 D_{bti} + e_{ti}$$

GDP, which is an abbreviation for gross domestic product, is the sum of C (consumption), N_x (total exports), and D (government debt). This research uses secondary data from world banks, taking samples from four ASEAN member countries, namely Indonesia, the Philippines, Malaysia, and Thailand. Other variables used in this research are Ir (interest rate), t (time period), i (country studied), and e (error term).

IV. USING THE TEMPLATE

The data underwent stationarity and cointegration tests prior to the vector panel estimation. The first test that could be applied is the stationarity test, which examines if a series has a unit root by using the Augmented Dickey-Fuller test. The outcome of this test is presented in table 1.

Table 1. ADF's Unit Root Test.

Variable	Unit Root	Include in the examination Equation	The ADF Test stat.	5% Critical Value	Description
Debt (Db)	Level	Intercept	15.1175	0.0127	Stationer
	First Diff	Intercept	24.432	0.0000	
Interest Rate (IR)	Level	Intercept	5.7615	0.0000	Stationer
Government Spending (GX)	Level	Intercept	11.1121	0.0211	Stationer
	First Diff	Intercept	21.4211	0.0000	
Consumption (CO)	Level	Intercept	82.2511	0.0000	Stationer
Net Export (NX)	Level	Intercept	7.3771	0.0823	Stationer
	First Diff	Intercept	11.2212	0.0000	
GDP	Level	Intercept	82.2214	0.0000	Stationer

The test results in Table 1 show that all variables are stationary at the first difference, while none of them are stationary at the level. This suggests that we should estimate the first difference. The next step is to use the cointegration test in Table 2 to conduct the vector analysis.

Table 2. Cointegration Test

Hypothesized	Fisher Stat.*	ality	Probab	Fisher Stat.*	ality	Probab
(CE)	(trace test)			(max-eigen test)		
None	126.1		0.0000	141.0		0.0000
At most 1	205.0		0.0000	121.2		0.0000
	Trace Test			Max-Eign Test		
Cross Section	Stat.	ality**	Probab	Stat.	ality**	Probab
Hypothesis of no cointegration						
1	132.3171		0.0000	69.2113		0.0000
2	154.2328		0.0000	71.8112		0.0000
3	123.5511		0.0076	51.4224		0.0263
4	124.2211		0.0000	39.1171		0.0005
5	113.4522		0.0021	39.2112		0.0316
6	125.6422		0.0000	51.2211		0.0001
7	156.3411		0.0000	87.2223		0.0000
8	181.2332		0.0000	67.5511		0.0000
9	115.1131		0.0000	49.4431		0.0022
10	121.1264		0.0001	48.2322		0.0051
Hypothesis of at most 1 cointegration						
1	115.2114		0.0000	71.2331		0.0000
2	123.5311		0.0000	59.2452		0.0000
3	68.2511		0.0562	31.2724		0.0711
4	85.6112		0.0002	39.2111		0.0016
5	86.2322		0.0267	29.1357		0.0972
6	121.2231		0.0000	39.2211		0.0066
7	111.1242		0.0000	66.6132		0.0000
8	122.1213		0.0000	49.0232		0.0007
9	89.7113		0.0019	42.1312		0.0096
10	83.1213		0.0089	18.1521		0.0912

From the results obtained, the prob value is $0.0000 < \text{five percent alpha}$, so it can be said that the variables in the model have cointegration or there is a long-term relationship. In addition, if there is cointegration in each variable, then it can be said that in the short term all variables will adjust to achieve long-term balance. After proving that there is cointegration in each variable, regression can be carried out for the PVECM model which is presented in table 3.

Table 3. PVECM Estimation

Eq:	Cointegrating					
	CointEq1					
DB(-1)	0.89001					
IR(-1)	-0.12532					
	(0.71231)					
	[-0.14821]					
GX(-1)	-5.78242					
	(2.82333)					
	[-1.59142]					
COM(-1)	39.52732					
	(5.23261)					
	[6.45331]					
NX(-1)	-0.23252					
	(0.29442)					
	[-0.49223]					
GDP(-1)	-49.33411					
	(4.55227)					
	[-10.43321]					
C	104.2351					
Error Correction:	D(DB)	D(IR)	D(GX)	D(COM)	X)	D(N
						D(GDP)
CointEq1	0.002161	0.001832	-0.000129	-0.001223	-0.001651	0.007221
	(0.00127)	(0.00212)	(0.00026)	(0.00129)	(0.00172)	(0.00127)
	[0.05682]	[1.11221]	[-0.06721]	[-1.00122]	[-1.00182]	[1.16911]
D(DE(-1))	-0.08231	-0.12541	-0.03271	-0.02114	-0.01532	-0.00121
	(0.05921)	(0.04113)	(0.00742)	(0.01723)	(0.05341)	(0.01326)
	[-1.22442]	[-1.55225]	[-2.66321]	[-1.28335]	[-0.45236]	[-0.19721]
D(IR(-1))	0.004325	-0.15521	0.00117	0.03726	-0.04433	0.04821
	(0.05928)	(0.04932)	(0.00768)	(0.02992)	(0.05442)	(0.01623)
	[0.06721]	[-2.98711]	[0.11251]	[0.66222]	[-0.29522]	[1.03322]
D(GX(-1))	1.02231	-0.21132	0.02116	-0.11511	-1.52211	-0.33427
	(0.42211)	(0.29262)	(0.04662)	(0.23422)	(0.37711)	(0.25112)
	[4.31131]	[-0.72413]	[0.39221]	[-1.0452]	[-3.71141]	[-1.25113]
D(COM(-1))	-0.15624	-0.13112	-0.03387	-0.43115	0.14222	-0.29452
	(0.17118)	(0.12324)	(0.01168)	(0.07116)	(0.15432)	(0.05542)
	[-0.72723]	[-1.11241]	[-1.74311]	[-5.65541]	[0.87223]	[-4.14331]
D(NX(-1))	0.01711	0.01751	0.02811	-0.01561	-0.12531	-0.04331
	(0.04511)	(0.04613)	(0.00661)	(0.02432)	(0.03926)	(0.01248)
	[0.45513]	[0.33856]	[3.82231]	[-0.44511]	[-1.82241]	[-1.33241]

State debt or debt has a significant negative impact on almost all variables in this study. On the other hand, all variables except the interest rate itself and Net Exports are positively influenced by the interest rate. The relationship between interest rates and net exports is significantly negative. All variables except debt and government spending itself are negatively affected by government spending. This indicates that government debt is a driver of government spending. Consumption has a significant negative impact on all variables except net exports, which shows that increasing consumption in the Indonesia, the Philippines, Malaysia, and Thailand also increases international trade which results in an increase in net exports in each regional country. GDP has a significant positive impact on all variables, which shows that the growth of the monetary sector and the real sector is driven by economic growth in Indonesia, the Philippines, Malaysia, and Thailand. To find out whether there is a short-term relationship between variables, a Wald test is carried out by testing the chi-square probability after carrying out PVECM. The Wald test results can be seen in Table 4.

Table 4. Wald test

Test Stat.	Value	df	Prob.
Chi-square	21.52216	10	0.0039
H0: C(4)=C(5)=C(6)=C(7)=C(8)=C(9)=C(10)=C(11)=C(12)=C(13)=0			
H0 Summary:			
Normalized Restriction (= 0)	Value	Std. Err.	
C(4)	0.00459	0.05231	
C(5)	0.02412	0.05723	
C(6)	1.00113	0.33411	
C(7)	-0.39112	0.29181	
C(8)	-0.15624	0.21111	
C(9)	0.17341	0.14511	
C(10)	0.01131	0.03311	
C(11)	-0.10561	0.04411	
C(12)	0.22117	0.15611	
C(13)	-0.18771	0.15432	

The chi-square probability value from the Wald test above is 0.0039, which is lower than the 5% alpha level. This means that the results are significant. The PVECM regression model also shows a short-term relationship between the studied variables. This implies that the panel vector error correction model test has confirmed the association among the variables.

Conclusions, suggestions and limitations

Public debt or state debt suppresses almost all variables which shows that debt actually hinders the economy in the regions of Indonesia, the Philippines, Malaysia and Thailand. This is reinforced by the pressure of interest rates on net exports, which shows that rising interest rates disrupt the exports of ASEAN member countries. What is quite surprising is the results of the government spending test which actually increases public debt. And consumption in the Indonesia, Philippines, Malaysia and Thailand region encourages exports from countries in the Indonesia, Philippines, Malaysia and Thailand region through international trade agreements. Exports themselves increase government spending, which means that exports contribute to state income. Economic growth, indicated by an increase in GDP, drives all variables in this research, which shows that GDP drives the monetary sector and the real sector in the economies of Indonesia, the Philippines, Malaysia and Thailand. Research limitations are data availability and research period. Based on the results of this research, we recommend that the government be more careful in increasing public debt. Public forests impact economic pressures that must be balanced with long-term economic drivers to reduce the impact of debt on the economy.

REFERENCES

- Anita, S. S., Tasnova, N., & Nawar, N. (2022). "Are non-performing loans sensitive to macroeconomic determinants? An empirical evidence from banking sector of SAARC countries." *Future Business Journal*, 8(1), 1-10.
- Loewe, M., & Zintl, T. (2021). "State fragility, social contracts and the role of social protection: Perspectives from the Middle East and North Africa (MENA) region." *Social Sciences*, 10(12), 1-10.
- Zend, A. S., & Soetjipto, W. (2020). "Utang Publik dan Pertumbuhan Ekonomi Daerah di Indonesia." *Indonesian Treasury Review: Jurnal Perbendaharaan, Keuangan Negara dan Kebijakan Publik*, 4(2), 1-16.
- Sasongko, B., Widarni, E. L., & Bawono, S. (2021). "Monetary outlook: Internal value of money stability comparison in USA." *JBFEM*, 4(1), 9-18.
- Martínez-Ferrero, J., & Lozano, M. B. (2021). "The nonlinear relation between institutional ownership and environmental, social and governance performance in emerging countries." *Sustainability*, 13(3), 1-10.
- Widarni, E. L., & Bawono, S. (2023). "Investigating the Role of Education in Stability of Work Participation in Economic Shocks from the Asian Financial Crisis to the Covid 19 Pandemic in Indonesia." *International Journal of Professional Business Review*, 8(1), 1-10.
- Amusa, K., & Oyinlola, M. A. (2019). "The effectiveness of government expenditure on economic growth in Botswana." *African Journal of Economic and Management Studies*, 10(3), 368-384.
- Wang, Q., & Ge, S. (2020). "Carbon footprint and water footprint in China: Similarities and differences." *Science of the Total Environment*, 739(1), 1-10.
- Rahmati, M. H., Ebrahimian, M., & Madanizadeh, S. A. (2021). "Dynamic effects of trade barriers with speculation on foreign currency: The case of Iran." *International Economics*, 167(1), 151-173.
- Widarni, E. L., & Bawono, S. (2021). "Human Capital, Technology, and Economic Growth: A Case Study of Indonesia." *The Journal of Asian Finance, Economics and Business*, 8(5), 29-35.
- Law, S. H., Ng, C. H., Kutan, A. M., & Law, Z. K. (2021). "Public debt and economic growth in developing countries: Nonlinearity and threshold analysis." *Economic Modelling*, 98(1), 26-40.
- Sasongko, B. (2022). "Economic Growth In The Stability Of The Nation With Taxes And The Important Role Of Foreign Direct Investment." *Tamansiswa Management Journal International*, 4(1), 27-27.
- Asteriou, D., Pilbeam, K., & Pratiwi, C. E. (2021). "Public debt and economic growth: Panel data evidence for Asian countries." *Journal of Economics and Finance*, 45(1), 270-287.
- Salmon, J. (2021). "The impact of public debt on economic growth." *Cato Journal*, 41(3), 507-530.
- García, D., & Guzmán, J. I. (2020). "Short-term price volatility and reversion rate in mineral commodity markets." *Mineral Economics*, 33(1), 217-229.
- Kappes, S. A., & Milan, M. (2023). "Reclaiming Mitchell's Institutional Approach to Business Cycles." *Journal of Economic Issues*, 57(3), 711-734.
- Yusuf, A., & Mohd, S. (2021). "The impact of government debt on economic growth in Nigeria." *Cogent Economics & Finance*, 9(1), 1-10.
- Dash, R. K. (2023). "Do remittances crowd-in or crowd-out domestic investment? An empirical analysis of 24 low-income countries." *Journal of the Knowledge Economy*, 14(2), 1177-1193.
- Deleidi, M., & Levvero, E. S. (2019). "The money creation process: A theoretical and empirical analysis for the United States." *Metroeconomica*, 70(4), 552-586.
- Evans, R. W. (2020). "Public debt, interest rates, and negative shocks." *AEA Papers and Proceedings*, 110, 137-140.
- Storm, S. (2021). "Cordon of conformity: Why DSGE models are not the future of macroeconomics." *International Journal of Political Economy*, 50(2), 77-98.
- Demir, F., & Razmi, A. (2022). "The real exchange rate and development theory, evidence, issues and challenges." *Journal of Economic Surveys*, 36(2), 386-4281
- Mankiw, N. G. (2019). *Principles of Economics* (9th ed.). Cengage Learning.
- Tsindeliani, I., Kot, S., Vasilyeva, E., & Narinyan, L. (2019). "Tax system of the Russian Federation: Current state and steps towards financial sustainability." *Sustainability*, 11(24), 1-104
- Rogoff, K. (2022). "Emerging Market Sovereign Debt in the Aftermath of the Pandemic." *Journal of Economic Perspectives*, 36(4), 147-166.
- Nguyen, D. V., & Duong, M. T. H. (2021). "Shadow economy, corruption and economic growth: an analysis of BRICS countries." *The Journal of Asian Finance, Economics and Business*, 8(4), 665-6723
- Olaoye, O. O., Okorie, U. U., Eluwole, O. O., & Fawwad, M. B. (2021). "Government spending shocks and economic growth: Additional evidence from cyclical behavior of fiscal policy." *Journal of Economic and Administrative Sciences*, 37(4), 419-437.
- Zhang, M., Zhang, S., Lee, C. C., & Zhou, D. (2021). Effects of trade openness on renewable energy consumption in OECD countries: New insights from panel smooth transition regression modelling. *Energy economics*, 104(1), 1-10
- Jena, N. R., & Sethi, N. (2021). "Determinants of foreign exchange reserves in Brazil: An empirical investigation." *Journal of Public Affairs*, 21(2), 1-102

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

