Unveiling external debt dynamics: Interdependencies of macroeconomic variables in ASEAN-7

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Abstract

This study explores the interplay between external debt, infrastructure investment, epidemic response funding, net exports, and the consumer price index (CPI) in seven ASEAN countries—Indonesia, Myanmar, Thailand, Cambodia, Laos, the Philippines, and Vietnam—during the period from 2000 to 2020. Data were derived from the World Bank, OECD, and IMF. This research uses the autoregressive distributed lag model (ARDL) panel data approach to estimate the short-term and long-term relationships among the variables. Short-term results reveal that infrastructure investment, epidemic response funding, net exports, and the CPI do not significantly impact external debt. However, in the long-term analysis, epidemic response funding, net exports, and the CPI positively affect external debt. These findings have significant implications for policymakers in developing countries, especially within the ASEAN region.

Keywords: *Consumer Price Index, Epidemic budget, External debt, Infrastructure budget, Net exports*

JEL Classification: E62, F34, O19

INTRODUCTION

The COVID-19 pandemic has precipitated widespread ramifications for both global health and the economy, necessitating unparalleled responses from governments across the globe (Jakovljevic et al., 2020; Ali et al., 2022; Jensen et al., 2021; Viscusi, 2020). As nations endeavor to mitigate the virus's spread while simultaneously working to rejuvenate their economies (Webb et al., 2022; Narain, 2022; World Bank, 2020), a significant outcome has been the substantial rise in global debt levels, with the ASEAN-7 region notably affected. In the face of challenges brought on by the COVID-19 pandemic, various ASEAN countries have been compelled to revise fiscal deficit targets and enhance borrowing to finance expenses associated with managing the pandemic (Sahu et al., 2021; Karakosta et al., 2021). This encompasses budget allocations for the healthcare sector and efforts to mitigate the broader impacts on the economy and society (Zen & Kimura, 2020; ESCAP United Nations, 2022; OECD, 2021; Diptyanusa & Zablon, 2020; Djalante et al., 2020).

Despite widespread acknowledgment of the pandemic's economic repercussions,

there remains a crucial gap in understanding the dynamics of foreign debt within the ASEAN-7 countries—Indonesia, Myanmar, Thailand, Cambodia, Laos, the Philippines, and Vietnam—especially regarding increased borrowing for crisis management and economic recovery endeavors. The interrelation between foreign debt, infrastructure budget, epidemic budget, net exports, and the consumer price index has been the subject of various investigations. Dailami & Leipziger (1998) argue that the infrastructure budget poses a significant debt burden in developing countries, underscoring the necessity for substantial budgets to develop infrastructure and the emphasis on foreign investment in infrastructure development during the debt crisis of the 1980s. They observed that debt crises intensify with rising inflation, signaling monetary instability. Foreign debt can exert pressure on a country's balance sheet, indicating a complex relationship between inflation and debt levels. Mudzingiri (2014) explored the impact of the 2007-2009 global financial crisis, noting that declining commodity prices resulted in diminished exports in Zimbabwe, thereby restricting a vital source of revenue for servicing foreign debt. The accumulation of debt can lead to fiscal imbalances and excessive foreign borrowing, making a country more vulnerable to various shocks and crises (Alper et al., 2022; Dawood et al., 2021). Foreign debt acts as a financing mechanism for government initiatives across structural and sectoral areas such as infrastructure, health, education, and social protection (Law et al., 2021; Bogdan & Lomakovych, 2021; Gerard et al., 2020; Furlong, 2021). In developing countries, foreign debt plays a crucial role in economic development, particularly in funding infrastructure projects, with a significant portion of the infrastructure budget in these nations dependent on foreign borrowing (Jawaid & Saleem, 2018; Okolo & Chinanuife, 2018; Akinwunmi & Adekoya, 2018; Gokmenoglu & Rafik, 2018). Furthermore, the ongoing epidemiological conditions stemming from the COVID-19 pandemic have notably increased health spending in developing and low-income countries, including those in ASEAN (Malik et al., 2020; Khan et al., 2020). The surge in global foreign debt, including in ASEAN countries in 2020 due to the pandemic's impact and increased infrastructure budgets, has further exacerbated the foreign debt burden (Djankov & Panizza, 2020; Goel et al., 2021; Iyanda et al., 2020).

While previous studies have explored various aspects of economic dynamics during crises, such as infrastructure spending or health budgets, there is a noticeable lack of comprehensive analyses that delve into the complex interplay among foreign debt, infrastructure investment, epidemic response funding, net exports, and inflation across different economic contexts. This study seeks to fill this gap by examining these relationships within the ASEAN-7 nations. Existing literature has often concentrated on specific crises or singular facets of economic dynamics, omitting a holistic analysis of the interconnections between foreign debt, infrastructure investment, epidemic response funding, net exports, and inflation across varied economic situations.

The economic turmoil instigated by the pandemic has necessitated significant governmental interventions, leading to a marked increase in foreign debt levels across Southeast Asian nations (ESCAP United Nations, 2020). Amid the global economic instability triggered by the pandemic, the ASEAN-7 region has seen a noteworthy rise in foreign debt levels. According to IMF data, by 2020, loans had escalated from 28 percent to 256 percent of gross domestic product, with the public debt composition accounting for nearly 40 percent of the total global debt (Rahim et al., 2020; Mishra et al., 2022; Wilmarth, 2021; Gaspar & Pazarbasioglu, 2022). Furthermore, deviations from fiscal deficit targets have imposed significant limitations on the governments of

most ASEAN-7 countries, restricting their capacity to devise effective stimulus measures to alleviate the crisis (Fernández et al., 2021; Yoshino et al., 2020; Debuque-Gonzales et al., 2022; Alam & Mohammad, 2021).

This study aims to bridge this gap by analyzing the intricate relationships among these variables within the ASEAN-7 nations. Through an analysis of data over a specified timeframe, this research seeks to clarify how foreign debt dynamics have adapted in response to the pandemic, increased infrastructure spending, epidemic response funding, and other economic factors. By shedding light on the complex interactions between foreign direct investment (FDI), infrastructure budgets, epidemic response funding, net exports, and the consumer price index, this research intends to provide valuable insights for policymakers, economists, and stakeholders tackling the challenges of debt management and sustainable economic recovery in the ASEAN-7 region. Our research will offer insights into the long-term effects of increased borrowing and the challenges these countries face in effectively managing their debt burdens. Through a comprehensive exploration of these dynamics, we aim to enhance the understanding of the economic impact of the COVID-19 pandemic within the ASEAN-7 region and offer evidence-based recommendations to policymakers for navigating the intricate landscape of debt management and economic recovery.

METHODS

This research scrutinizes the interrelations among foreign debt, infrastructure budget, epidemic budget, net exports, and the consumer price index within the context of seven ASEAN member countries: Indonesia, Myanmar, Thailand, Cambodia, Laos, the Philippines, and Vietnam, spanning the period from 2000 to 2020. The variables of foreign debt, infrastructure budget, epidemic budget, net exports, and the consumer price index are pivotal in comprehending the dynamics of foreign debt within the ASEAN-7 countries. Foreign debt signifies the financial well-being of a country, while the infrastructure and epidemic budgets, along with net exports, play influential roles in economic growth and social stability. The consumer price index serves as an indicator of inflation and economic equilibrium. An in-depth understanding of these variables is instrumental in formulating effective economic policies, managing financial risks, and fostering sustainable economic development in the ASEAN-7 region (refer to Table 1).

Table 1. Variable definitions and data sources

No.	Variable/ symbol	Definitions	Unit	Data sources
1	External debt (ED)	Total external debt encompasses debts owed to nonresidents that must be repaid in currency, goods, or services. It includes the aggregate of public and publicly guaranteed debts, private non-guaranteed long-term debts, the use of IMF credit, and short-term debts. Short-term debts cover all obligations with an original maturity of one year or less, including interest arrears on long-term debts.	Current US dollars	World Bank
2	Infrastructure Budget (IB)	Total official infrastructure funding refers to the financial resources allocated to recipient countries to construct vital public infrastructure. The infrastructure	Millions of constant 2019	The Organization for Economic Cooperation

No.	Variable/ symbol	Definitions	Unit	Data sources
		budget is designated for projects such as roads, ports, airports, water supply systems, irrigation, and other significant capital investments offering extensive public benefits.	United States dollars	and Development (OECD)
3	Epidemic Budget (EB)	Funds allocated from domestic government revenues for healthcare include budget allocations dedicated to disease outbreak prevention, healthcare treatment, and efforts to mitigate the social welfare risks posed by pandemics.	United States dollars	OECD and IMF
4	Export net (EN)	Net trade in goods and services is determined by subtracting the value of goods and services imported from the value of exports. The calculation of exports and imports of goods and services includes all transactions that involve a change in ownership of goods and services between residents of one country.	Current US dollars	World Bank
5	Consumer price index (CPI)	The Consumer Price Index (CPI) measures fluctuations in the costs incurred by the average consumer in purchasing a predefined basket of goods and services. This basket can be either fixed or adjusted at specified intervals to reflect changes in consumption patterns.	Index	World Bank

The selection of data sources from the World Bank, the Organization for Economic Co-operation and Development (OECD), and the International Monetary Fund (IMF) is predicated on their consistency, extensive data coverage, and high level of accuracy. These institutions are acclaimed for their rigorous data collection standards, spanning numerous countries and economic dimensions, thus ensuring precise economic data. By leveraging these reliable data sources, the research benefits from consistent, comprehensive, and accurate data, enabling robust analysis and credible findings within economic research. The model is defined as follows to estimate foreign debt and government spending:

$$ED_{it} = \beta_{0i} + \beta_{1i}IB_{it} + \beta_{2i}EB_{it} + \beta_{3i}EN_{it} + \beta_{4i}CPI_{it} + \mu_i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where, ED_{it} is external debt at a time *t* in country *i*, IB_{it} is infrastructure budget at a time *t* in country *i*, EB_{it} is epidemic budget at a time *t* in country *i*, EN_{it} is export net at a time *t* in country *i*, CPI_{it} is consumer price index at a time *t* in country *i*, μ_i is the country-specific effect, and then ε_{it} is the error term.

This study utilizes the Autoregressive Distributed Lag Model (ARDL) approach to estimate the equilibrium relationship between short-term and long-term variables. The ARDL method offers flexibility in dealing with non-stationary data, enabling the simultaneous analysis of short-term and long-term dynamics and providing robust inference and a clear interpretation of variable relationships within economic research. The ARDL approach is particularly adept at addressing complex time series data issues

and enhancing the understanding of the dynamics of economic relationships (Pesaran & Shin, 1995; Pesaran et al., 1999). The ARDL cointegration technique is applicable when variables are of different integration orders, specifically I(0) and I(1).

The first step involves conducting unit root tests, such as the ADF Fisher chi-square test, to ascertain the integration order of the variables, thereby ensuring their stationarity and avoiding the risk of spurious regression results. This is critical for determining whether the variables are integrated of order I(0) or I(1). Notably, variables integrated at order I(2) are unsuitable for ARDL analysis, as ARDL models generally do not accommodate variables with higher levels of integration.

Following this, the Unrestricted Cointegration Rank Test is conducted to investigate the presence of cointegration among variables. The third step includes analyzing the short-term and long-term relationships among the variables. In the ARDL framework, cointegration between variables is tested post-verification of their stationarity. Should cointegration be established, the ARDL model is then distilled into an Error Correction Model (ECM), incorporating an Error Correction Term (ECT). The ECT is pivotal as it reflects the rate at which variables revert to their long-term equilibrium following disturbances, with positive values denoting rapid adjustment and negative values indicating a slower pace of adjustment. The ECT thus facilitates understanding how variables adjust in long-term equilibrium after imbalances.

The estimation of the ARDL model is typically conducted using software packages like Eviews. Selecting the optimal lag length is informed by information criteria such as the Akaike Information Criterion (AIC) or the Bayesian Information Criterion (BIC), alongside statistical tests like the F-test or t-test. Diagnostic tests, including stationarity tests using the Panel Unit Root Test and the Cointegration Test, are performed to ensure the adequacy of the model.

The ARDL approach for cointegration is written in the following equation (Pesanran, Shin & Smith, 2001):

$$\Delta ED_{it} = \beta_0 + \beta_{10i}\Delta IB_{it} + \beta_{20i}\Delta EB_{it} + \beta_{30i}\Delta EN_{it} + \beta_{40i}\Delta CPI_{it} + \beta_{11i}\Delta IB_{it-1} + \beta_{21i}\Delta EB_{it-1} + \beta_{31i}\Delta EN_{it-1} + \beta_{41i}\Delta CPI_{it-1} + \mu_i + \varepsilon_{it} \quad \text{.....(2)}$$

Error Correction Model (ECM) is obtained by using a single-vector autoregressive and using the lag length criteria:

$$\Delta ED_{it} = \beta_0 + \sum_{j=1}^{p}\beta_1\Delta ED_{it-j} + \sum_{j=0}^{p}\beta_2\,\Delta IB_{it-j} + \sum_{j=0}^{p}\beta_3\,\Delta EB_{it-j} + \sum_{j=0}^{p}\beta_4\,\Delta EN_{it-j} + \sum_{j=0}^{p}\beta_5\,\Delta CPI_{it-j} + \beta_6\Delta ECT_{it-j} \quad \text{..... (3)}$$

where ECT_{it-i} is the error correction term defined as Equation (4):

$$ECT_{it} = \Delta ED_{it} - \beta_0 - \sum_{j=1}^{p}\beta_1\Delta ED_{it-j} - \sum_{j=0}^{p}\beta_2\,\Delta IB_{it-j} - \sum_{j=0}^{p}\beta_3\,\Delta EB_{it-j} - \sum_{j=0}^{p}\beta_4\,\Delta EN_{it-j} - \sum_{j=0}^{p}\beta_5\,\Delta CPI_{it-j} \quad \text{..... (4)}$$

The methodology employed in this study faces several limitations, including the potential for bias arising from omitted variables, difficulties in establishing causality within complex macroeconomic datasets, constraints related to the completeness and accuracy of data sources, and the intricacies associated with estimation techniques like Panel ARDL, which necessitate specific assumptions and sophisticated interpretations.

RESULTS AND DISCUSSION

The descriptive analysis of variables utilized presents data from seven ASEAN countries from 2000-2020, as illustrated in Table 2. Descriptively, it is observed that, within the timeframe of 2000-2020, the seven ASEAN countries experienced a range in foreign debt from $2.01 billion to $215 billion, with an average debt of approximately $30.9 billion. The infrastructure budgets had an average allocation of $580 million. Epidemic budgets varied from $6.967 million to $154 million, with an average budget of approximately $12.4 million. The data on net exports revealed substantial variation, ranging from -$39.4 billion to $56.9 billion, with an average net export value of around $1.78 billion. The Consumer Price Index (CPI) varied from 15 to 159, with an average index of approximately 94.

Table 2. Descriptive statistics

Descriptive Statistics	External Debt (US$)	Infrastructure Budget (Milion US$)	Epinemic Budget (US$)	Net Export (US$)	CPI (Index)
Mean	30,900,000,000	580	12,377,944	1,780,000,000	94
Median	14,900,000,000	263	340,764	-346,000,000	96
Maximum	215,000,000,000	5,197	154,000,000	56,900,000,000	159
Minimum	2,010,000,000	0	6,967	-39,400,000,000	15
Std. Dev.	39,900,000,000	828	28,046,934	13,000,000,000	31

Furthermore, stationarity tests were performed using the Augmented Dickey-Fuller (ADF) Fisher chi-square, aligning with essential time series econometric analysis procedures. A critical condition for employing the Autoregressive Distributed Lag (ARDL) approach is ensuring data stationarity at either level or first difference. The Schwarz Bayesian Criterion (SBC) was utilized to determine the optimal lag for inclusion in the infinite error correction model. This methodology guarantees no evidence of serial correlation or instability within the model, adhering to the guidelines proposed by Pesaran et al. (1999), which recommend a minimum lag length of two (as detailed in Table 3). According to the ADF, the unit root test outcomes confirm stationarity at the level and first difference for all variables examined in this study.

Table 3. Unit root tests

Variables	ADF Fisher-Chi Square			
	Levels		First difference	
	Intercept	Trend and intercept	Intercept	Trend and intercept
ED_{it}	14.1227	14.3268	30.5868***	16.2491
IB_{it}	11.0269	32.4185***	65.6266***	46.0016***
EB_{it}	18.3013	9.61771	42.3805***	34.9199***
EN_{it}	28.3181***	27.6876***	66.2705***	44.0639***
CPI_{it}	27.4625**	9.24625	26.7619***	31.6404***

*Note: *** indicates 1%, ** 5% significance level, * 10% significance level.*

Based on the estimations from the ARDL model, it is observed that in the short term, variables such as the infrastructure budget, epidemic budget, net exports, and the consumer price index do not significantly affect external debt. However, in the long term, the epidemic budget, net exports, and the consumer price index positively influence external debt. The implications of the short-term estimations suggest that changes in the infrastructure budget, epidemic budget, net exports, and consumer price

index variables do not significantly impact the amount of a country's foreign debt within the observed period. This suggests that, in the short term, other factors may exert a greater influence on the magnitude of a country's foreign debt.

Conversely, the long-term findings indicate that increases in budget allocations for epidemic control, higher net exports, and a rising consumer price index correlate with an increase in a country's external debt. These observations suggest that these factors could serve as important predictors or indicators of the growth of a country's foreign debt over time.

Table 4. Long-run and short-run model

	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
IB	-0.015433	0.047983	-0.32163	0.74880
EB	1.281995	0.371471	3.451132	0.00100
EN	0.757778	0.193919	3.907696	0.00020
CPI	5.401164	1.037696	5.204956	0.00000
				Short Run Equation
COINTEQ01	-0.121304	0.062727	-1.933833	0.0575
D(IB)	0.019984	0.042393	0.471399	0.6389
D(IB(-1))	0.037107	0.021475	1.727931	0.0887
D(EB)	-0.071063	0.066566	-1.067549	0.2897
D(EB(-1))	-0.034974	0.102137	-0.342419	0.7331
D(EN)	-0.080514	0.057982	-1.388605	0.1697
D(EN(-1))	-0.023267	0.016979	-1.370396	0.1753
D(CPI)	-0.019291	0.582554	-0.033114	0.9737
D(CPI(-1))	-0.150305	0.758634	-0.198125	0.8436
C	-3.561414	1.755888	-2.028269	0.0466

**Note: p-values and any subsequent tests do not account for model selection*

In the decomposition analysis focusing on the growth of external debt over several years, it becomes evident that the independent variables contribute variably to fluctuations in external debt. Initially, forecast errors for external debt were solely attributed to external factors not incorporated into the model, highlighting the complexity of external influences on external debt. As time progressed, the influence of variables such as net exports and the consumer price index on explaining external debt fluctuations grew significantly. The year-on-year reduction in forecast error marks an enhancement in the model's capability to predict external debt fluctuations with greater accuracy as the economic factors influencing debt evolve. Gaining a deeper understanding of the relative contributions of various economic variables enables the alignment of policies more effectively to manage external debt and ensure overall economic stability. The findings from the variance decomposition and impulse response functions are presented in Table 9 and illustrated through five figures. These graphs delineate the responses of all variables to five distinct shocks: external debt, infrastructure budget, epidemic budget, net exports, and CPI. The diminishing response to these shocks over time indicates that the vector error correction model (VECM) is stable.

Table 5. Variance decomposition

Period	S.E.	ED	IB	EB	EN	CPI
Variance Decomposition of ED						
1	0.0985	100.0000	0.0000	0.0000	0.0000	0.0000
2	0.1694	97.2372	0.0240	0.2431	2.3778	0.1178
3	0.2359	96.1468	0.1595	0.5696	3.0268	0.0973
4	0.2953	95.6255	0.1990	0.8377	3.2658	0.0720
5	0.3492	95.1468	0.2688	1.0088	3.5210	0.0545
6	0.3978	94.7930	0.3544	1.1260	3.6842	0.0424
7	0.4423	94.5127	0.4483	1.2135	3.7912	0.0344
8	0.4832	94.2712	0.5481	1.2767	3.8752	0.0288
9	0.5212	94.0580	0.6533	1.3223	3.9416	0.0248
10	0.5567	93.8654	0.7629	1.3567	3.9932	0.0219
Variance Decomposition of IB						
1	0.5343	3.1632	96.8368	0.0000	0.0000	0.0000
2	0.6649	6.2255	91.4512	1.6171	0.2177	0.4885
3	0.8008	7.1182	84.8918	4.3385	0.9497	2.7018
4	0.9098	8.6634	81.4739	4.9895	0.8055	4.0677
5	0.9992	9.7986	79.0657	5.4664	0.7125	4.9568
6	1.0806	10.5866	77.1745	5.9830	0.7134	5.5425
7	1.1551	11.1802	75.8096	6.3636	0.6877	5.9589
8	1.2228	11.6815	74.6877	6.6394	0.6596	6.3318
9	1.2854	12.1021	73.6867	6.8884	0.6461	6.6768
10	1.3438	12.4639	72.8036	7.1125	0.6362	6.9839
Variance Decomposition of EB						
1	0.1968	0.2046	1.6428	98.1526	0.0000	0.0000
2	0.2741	0.1342	4.4924	94.9330	0.4404	0.0001
3	0.3296	0.0988	4.7830	94.1736	0.5451	0.3995
4	0.3757	0.0788	3.8384	94.4898	0.4207	1.1723
5	0.4193	0.0845	3.1073	94.7698	0.3544	1.6841
6	0.4571	0.1001	2.6188	95.0221	0.2984	1.9607
7	0.4915	0.1301	2.3250	95.1049	0.2582	2.1819
8	0.5243	0.1658	2.2024	95.0245	0.2273	2.3799
9	0.5554	0.2039	2.2307	94.8073	0.2026	2.5555
10	0.5852	0.2425	2.3977	94.4642	0.1825	2.7131
Variance Decomposition of EN						
1	0.9015	1.3088	3.1563	2.4823	93.0526	0.0000
2	1.0707	2.7372	4.5601	1.7599	90.9417	0.0011
3	1.2072	5.9095	4.3122	2.2520	87.4973	0.0291
4	1.3443	8.2330	4.1632	2.1593	85.3842	0.0603
5	1.4736	10.1835	4.0366	1.9510	83.7695	0.0594
6	1.5879	11.7817	4.0911	1.8375	82.2343	0.0554
7	1.6950	13.1109	4.1103	1.7636	80.9608	0.0544
8	1.7976	14.1641	4.1233	1.6827	79.9744	0.0554
9	1.8945	15.0410	4.1498	1.6149	79.1385	0.0558
10	1.9866	15.7789	4.1813	1.5623	78.4218	0.0558
Variance Decomposition of CPI						
1	0.0380	0.8198	2.7969	1.6478	0.4610	94.2745
2	0.0609	1.1075	2.4922	0.6694	0.4142	95.3167
3	0.0742	1.5419	2.0355	0.5359	0.2983	95.5883
4	0.0832	1.8343	1.7231	0.5465	0.2739	95.6222
5	0.0912	2.0519	2.5652	0.5371	0.2457	94.6002
6	0.0992	2.2644	4.3206	0.5270	0.2281	92.6600
7	0.1073	2.4743	6.8125	0.5340	0.2262	89.9531
8	0.1156	2.6775	9.9089	0.5448	0.2228	86.6461
9	0.1240	2.8606	13.4314	0.5530	0.2174	82.9377
10	0.1326	3.0181	17.1997	0.5606	0.2136	79.0079

The significance of model stability lies in its ability to produce consistent results, ensuring accurate predictions and validating long-term findings. A stable model offers a robust basis for interpreting analytical results that remain consistent over time, instilling confidence in making informed policy decisions. Furthermore, model stability signifies resilience to external shocks, enabling the model to maintain relevance and provide dependable insights across different scenarios. Therefore, model stability is crucial for validating long-term observations and underpinning precise economic analysis and informed decision-making processes. Variance decomposition delves into the variance of forecast errors for each dependent variable in the face of surprises in the independent variables, offering a detailed explanation of the volatility of external debt. Often, surprises account for a significant variation in forecast errors, though they also impact other variables.

Table 5 presents an intricate breakdown of how each independent variable influences fluctuations in the growth of external debt. In the initial one-year period, the error in estimating foreign debt accounts for 100% of the variation in external debt, with contributions from the infrastructure budget (IB), epidemic budget (EB), net exports (EN), and Consumer Price Index (CPI) at 0%. By the third year, the forecast error for external debt diminishes to 96.14%, with IB contributing 0.16%, EB 0.56%, EN 3.02%, and CPI 0.09%. In the tenth year, the error in estimating foreign debt accounts for a reduced 93.86% of the fluctuations in external debt, with contributions from IB at 0.76%, EB at 1.35%, EN at 3.99%, and CPI at 0.02%.

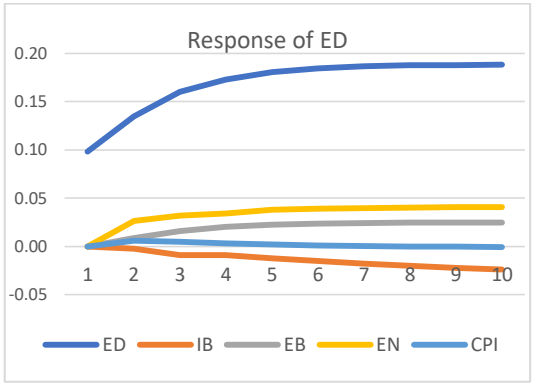

Figure 1. Response of external debt to Chilesky one S.D. innovations

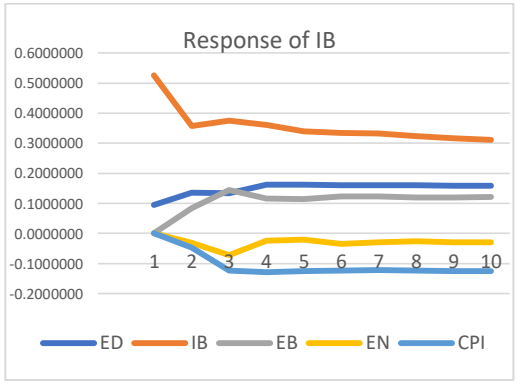

Figure 2. Response of infrastructure budget to Chilesky one S.D. innovations

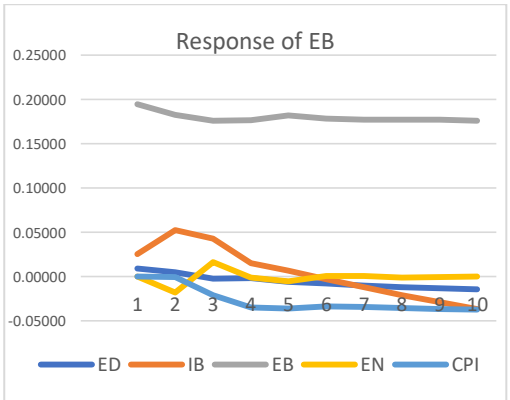

Figure 3. Response of epidemic budget to Chilesky one S.D. innovations

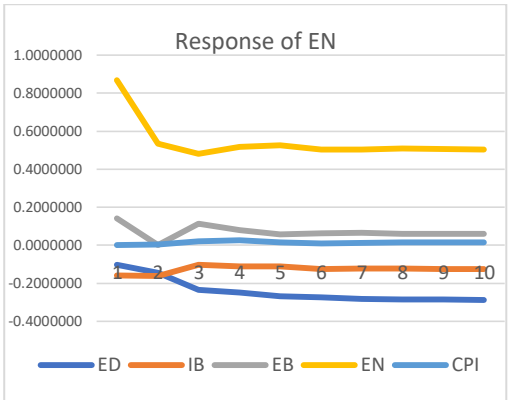

Figure 4. Response of export net to Chilesky one S.D. innovations

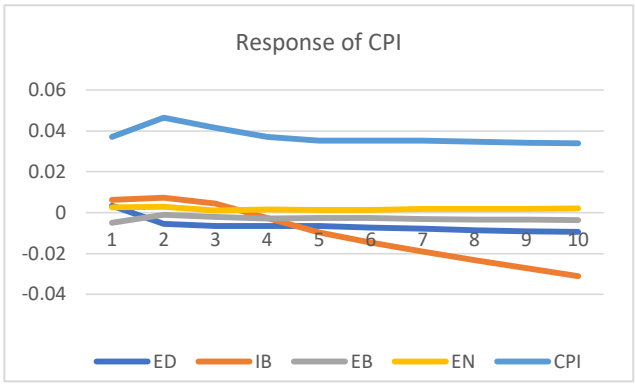

Figure 5. Response of consumer price index to Chilesky one S.D. innovations

Generally, in the first year, the independent variables did not significantly impact the fluctuations of external debt. However, in the third year, the fluctuations of foreign debt were influenced by investment balance (IB), export balance (EB), energy (EN), and the consumer price index (CPI), with the largest fluctuations primarily driven by energy (EN). By the tenth year, IB, EB, EN, and CPI all contributed to the fluctuations in external debt, with the greatest contribution coming from EN.

This type of debt can lead to fiscal imbalances and excessive reliance on foreign loans, rendering the country more susceptible to various shocks and crises. External debt plays a crucial role, among other functions, in financing a range of government programs that address structural and sectoral issues, including health, education, social protection, and infrastructure development. Specifically, external debt is a vital source of financing for economic development in developing countries, particularly through the accumulation of infrastructure. Such debt can result in fiscal imbalances and excessive foreign borrowing, with foreign debt being utilized to finance various government initiatives to improve structural and sectoral areas like health, education, social protection, and infrastructure.

The findings demonstrate that the budget allocated for epidemics, exports, and the Consumer Price Index (CPI) are significant determinants of the long-term increase in external debt. This long-term escalation in external debt, influenced by factors such as the epidemic budget, net exports, and CPI, carries profound implications for a country's economic landscape. A substantial investment in the epidemic budget underscores a commitment to public health, which, in turn, can enhance productivity and social stability. Although this investment can bolster economic growth, excessive dependence on external debt to finance such measures poses risks. Additionally, a surplus in exports signals a country's capability to produce more than its consumption, presenting an opportunity for positive cash flow. This surplus can be used to reduce foreign debt or further economic investments. However, an over-reliance on exports makes a country susceptible to fluctuations in the global market. An uptick in the CPI, indicating inflation or an increase in the cost of living, can impact economic growth by affecting real incomes. While controlled inflation can stimulate the economy, rampant inflation can lead to instability and compel countries to accrue debt to bridge budget deficits.

This broader analysis reveals the intricate connections between fiscal policy, international trade, and monetary stability, showcasing their collective impact on a

country's economic dynamics over the long term. A more profound comprehension of these elements not only elucidates the reasons behind the growth of external debt but also offers a comprehensive understanding of a nation's economic behavior over time. Theoretically, an uptick in government borrowing is posited to influence the flow of private savings through several mechanisms. An increase in private savings is expected as households allocate a portion of tax reductions for future consumption. Moreover, forward-looking consumers, anticipating higher future taxes due to increased government debt necessitating elevated interest payments, may save more.

Additionally, heightened government borrowing could influence interest rates and wages through general equilibrium effects, subsequently affecting private savings. Furthermore, government debt policy might impact capital tax distortions, influencing private savings. Collectively, these factors underscore that the magnitude of the budget deficit plays a crucial role in determining the level of private savings, as highlighted by Elmendorf & Mankiw (1998) and Qureshi & Liaqat (2020).

Therefore, understanding the long-term ramifications of future allocations for the epidemic budget is vital, as it can affect the state of the budget deficit by potentially increasing private savings. An increase in overall savings might mitigate the impact of higher taxes on exports. At the same time, the repercussions of an elevated interest rate could suppress the Consumer Price Index (CPI) but adversely affect overall economic conditions. The expansion of monetary policy about foreign debt can be observed through two strategies: Quantitative Easing and Quantitative Tightening. These approaches impact the overarching foreign debt policy by influencing budget allocations, export dynamics, and inflation, thereby affecting macroeconomic conditions, particularly within the country's economy, as discussed by Armas et al. (2014), Kolasa & Wesołowski (2020), Matikainen et al. (2017), and Meegan et al. (2018).

This research is in concordance with previous studies by Qureshi & Liaqat (2020), Kumar et al. (2019), Dailami & Leipziger (1998), Wijayanti & Rachmanira (2020), Lau & Lee (2016), Jones (2014), and Mudzingiri (2014), which investigated the dynamics of foreign debt about infrastructure and epidemic budget allocations, net exports, and the consumer price index. In developing countries, infrastructure budgets are still largely financed through foreign debt. Additionally, the ongoing epidemiological challenges posed by the COVID-19 pandemic have significantly elevated health expenditures in developing countries, including those with the lowest incomes, encompassing ASEAN nations.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study examines both the short-term and long-term relationships between infrastructure budget, epidemic budget, net exports, the Consumer Price Index (CPI), and external debt, employing the Autoregressive Distributed Lag (ARDL) Panel analysis tool. The short-term estimation results reveal that the infrastructure budget, epidemic budget, net exports, and CPI do not significantly influence external debt. However, the long-term epidemic budget, net exports, and CPI positively affect external debt. The stability of the Vector Error Correction Model (VECM) is affirmed through the responsiveness of all variables, including infrastructure budget, epidemic budget, net exports, and CPI, to changes in foreign debt.

Recommendations

These findings offer valuable insights for policymakers in developing countries, particularly ASEAN ones. Firstly, it is essential to recognize external debt management as a crucial instrument for economic development. Secondly, there is a pronounced need for robust monetary policies to control inflation effectively, thereby mitigating the risk of significant increases in foreign debt. Thirdly, optimizing state budget management, particularly in allocating funds for epidemic prevention and treatment, is critical in minimizing the risk of pandemics on social welfare. Viewing foreign debt management as a strategic tool for economic development necessitates a meticulous and well-planned approach. Given the evidence that factors such as the epidemic budget, net exports, and the consumer price index influence external debt in the long term, ASEAN-7 countries should employ specific strategies and actions to enhance their debt management practices, supporting sustainable growth: 1) Diversification of funding sources is imperative. By establishing partnerships with international financial institutions, issuing international bonds, or attracting new investors, countries can diminish the risk associated with relying on a single funding source, thereby enhancing financial stability; 2) The strategic use of debt for investments in productive sectors, notably infrastructure, education, and innovation, is crucial. Investments in these areas are anticipated to yield long-term positive outcomes, boosting income and enhancing economic competitiveness; 3) Enhancing transparency and accountability in managing external debt is also vital. Providing clear and accessible information regarding the purpose, amount, and terms of the debt not only fosters investor confidence but also curtails corruption and the inefficient allocation of resources; 4) Implementing effective risk management strategies, reinforcing fiscal and monetary policies, and ensuring cohesive coordination between economic policies are additional measures that can assist ASEAN-7 countries in optimizing their external debt management. By adopting a sustainable and inclusive growth-oriented framework, external debt management can significantly contribute to the robust and sustainable economic development of countries in the ASEAN region.

Future research should aim to conduct comparative analyses between countries within the ASEAN-7 group or with nations outside the region to discern differences in the patterns of relationships between economic variables and external debt. Furthermore, investigating best practices in debt management and performing policy simulations to understand the effects of changes in budget, export, or price policies on external debt could provide more nuanced and targeted policy recommendations for governments.

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