Effect of Trade Surplus on External Debt in Developing Countries: Evidence from General-to-Specific Model

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ABSTRACT

This paper examines the impact of trade openness towards external debt levels in low- and middle-income countries from 1980-2021. Using panel estimation of Fixed Effects (FE) and the General-to-Specific (GETS), the researchers segregated into Model 1 and Model 2, which Model 2 purposely to identify the interaction of international reserves as a potential medium to relate the impact of trade openness and external debt. The finding suggests that independent variables such as GDP growth rate, current account balance, and trade openness are highly significant variables that influence the external debt in the 50 LMICs. The researchers also found a robust interaction between trade openness and international reserves in determining external debt. The result confirms that the positive direct relationship of trade openness increases its coefficient from 0.10% to 0.14% after incorporating the interaction of international reserves in Model 2. The statistical evidence suggests that the inverse interactions of international reserves on trade openness significantly negatively affect external debt. Moreover, the result prevails, continuing to be positive and highly significant. Hence, the researchers can relate that an inverse impact of trade openness on international reserves has negatively affected external debt.

Keywords: external debt, trade openness, international reserves, remittance inflows, general-to-specific model
JEL Classification: F10, F34, F40

INTRODUCTION

Over the last four decades, it has painted a different picture of the external debt for developing countries. The poor current account motivates more external borrowing aid to finance government expenditure and is essential in maintaining economic stability in low and middle-income countries (Beyene & Kotosz, 2020). The study of Karia (2021) revealed that the main contributor to external debt is insufficient tax revenues to finance excessive government expenditure. Dawood et al. (2021) add that the motivations of developing countries are to rely upon a considerable amount of external borrowing due to their budget deficits, trade deficits, and savings-investment gaps. An increase in external borrowing by households, commercial banks, international financial institutions, and government does not purely enhance negative growth. External borrowing aids are also vital to finance the domestic development and other needs of vast sectors of the economy (Karia, 2021; Siddique et al., 2016; Sugeng et al., 2024).

One of the primary concerns of the economist is that the uncompetitive rise in the external debt could risk insolvency over a more extended period (Adiningsih, 2009; Dupuis & Vachon, 2017; Zhu et al., 2018). The uncompetitive rise in external borrowing will harm economic activity in many ways. As an example, the study of Feldstein (2015) and Zhu et al. (2018) revealed that an increase in external debt would slow down economic activity, mainly on social expenditure. The government's spending on pensions and health programs will contribute more to government expenditure, motivating them to seek financial assistance and aid. Such a dilemma leads the government to consider more external borrowing. Further evidence from the study of Wang et al. (2021) revealed that the outcomes from the harmful external debt and growth relationship are driven by the public component of debt, such as public or publicly guaranteed external debt. The growing amount of external borrowing and debt servicing is contesting policymakers for developing countries as it is a more persistent problem for the whole world (Baidoo et al., 2021; Duodu & Baidoo, 2022; Ofori-Abebrese et al., 2021).

According to WorldBank (2024), the total external debt stock of low- and middle-income countries (LMIC) rose from USD 2.25 trillion in 2004 to 8.84 trillion in 2023. Over the 20-year period, this reflects an average total external debt stock of USD 5.5 trillion and an average annual growth rate of 7.7%. Meanwhile, WorldBank statistics also reported that the global trade openness surged, with trade-to-GDP ratios depicts an increase from 38% in 1991 to 63% in 2022. This parallel rise address concerns on does increased trade opennes reduce external debt or does it pradoxically encourage greater borrowing capacity?

The urgency of examining external debt lies in the recurring global shocks over the observation period, including the 1980s debt crisis, the Asian financial crisis of 1997-1998, global financial crisis of 2008, commodity price fluctuations of the 2010, and COVID-19 pandemic in 2019. These episodes revealed that the vulnerability of LMICs to external borrowing and highlighted the need for a clear picture to address the effect of trade surplus towards the external borrowing.

A past study by Harsono et al. (2024) found that the surplus in terms of trade will contribute more to external borrowing. Whereby their study concludes that imbalances in the government sector will create more debt and a surplus from other sources such as domestic and private sectors and foreign balance balances. The surplus in trade openness is considered to provide financial resources to repay external debts. However, previous

studies like Brafu-Insaidoo et al. (2019) find an ambiguous relationship between trade openness and external debt. Therefore, a surplus in trade will not promise to cover fiscal budget shortfalls or even financial resources to repay external debts. It is proven with an anomaly in scholarly activity showing that trade openness and external debt have an inverse relationship (Beyene & Kotosz, 2020; Bittencourt, 2015; Brafu-Insaidoo et al., 2019). Meanwhile, other researchers found that trade openness and external debt have a direct relationship (Dawood et al., 2021; Ebiwonjumi et al., 2023; Mijiyawa, 2022; Omar & Ibrahim, 2021).

Personal remittance, also known as the repatriated earnings by emigrant workers, has increased significantly in recent decades, proving it plays an essential role in developing countries. The remarkable growth in personal remittance, less volatile than the exchange rate, has become the primary financial external inflow, such as foreign direct investment. Repatriated earnings sent by emigrants to their country of origin are used to purchase real estate or invest in local businesses. These are classified as remittances or foreign direct investments, depending on the nature of the investment. The remittance by the emigrant can improve the standard of living of their family as well as the income-receiving countries. On the one hand, the remittance may also induce government incentives in a non-growth-friendly way, as the government is said to be less sensitive in maintaining fiscal policy discipline. The system that currently stresses an increase in price level needs to find a way to finance an increase in government expenditure, leading to additional public borrowing internally or externally. According to Jones (2018), personal remittance could affect external debt through the relationship between the exchange rate and international reserves. However, an ambiguous effect from different countries as it is a source of foreign exchange earnings and personal remittance that significantly raise the nation's international reserves. Therefore, systematic analysis of personal remittance yields an essential caveat to the question.

Considering the argument discussed in the scholarly activity, this research provides one of the most recent contributions in developing countries, to identify the specific variables that influence external debt. This research addresses an important empirical gap in the existing trade surplus and external debt literature. Although previous works have examined the relationship between trade surplus and external debt, the findings remain inconclusive due to limited country coverage, shorter time spans, and the exclusion of mediating macroeconomic factors such as international reserves. Therefore, this research offers a more comprehensive on effects of trade surplus and external debt as it utilize a long-span dataset covering 50 LMICs from 1980 to 2021 that will provides a broader regional representation that previous research. Second, this study applies the General-to-Specific (GETS) modelling which enables systematic identification of the most influential macroeconomic variables affecting external debt. Third, this research introduces international reserves as a potential mediating mechanism linking trade openness and external debt, which a dimension that has not been explicitly tested in previous empirical research.

The structure of the paper is as follows: Section 2 reviews the trends in external debt in LMICs. Section 3 outlines the methodology and data used in the study. Section 4 presents the analysis of the results and further elaborates on the argument discussed in the scholarly activity. Finally, Section 5 concludes the paper with key findings and recommendations.

LITERATURE REVIEW

Theoretical Framework

The relationship between trade surplus and external debt can be explained through two complementary perspectives, 1) Debt sustainability theory and 2) International finance theory. Debt sustainability theory emphasizes borrowing is considered sustainable if a country can generate sufficient resources, in this case, current account surpluses to service its debt obligations. Whereby, a trade surplus strengthens the external position of an economy by providing foreign exchange earnings, which can be used to meet repayment commitments and reduce reliance on additional borrowing.

Meanwhile, International finance theory introduces a paradoxical dimension to the trade and debt relationship. A trade surplus improves a country's liquidity and repayment capacity, whereby it signals greater creditwothiness to international lenders, lowering borrowing costs and encouraging more external debt. Thus, trade surplus can act both as a buffer and as an enabler of borrowing, which explains the mixed findings in prior studies ((Beyene & Kotosz, 2020; Dawood et al., 2021; Harsono et al., 2024).

Figure 1 shows yearly historical external debt levels in LMIC stretching from 1980 to 2021. On the right axis is a line chart showing the external debt level, and on the left is the bar chart of external debt shares of gross domestic product (GDP) by LMIC. It is quite revealing that the external debt level shows an upward movement in developing countries from 1980 to 2021. The overall analysis of the percentage year-on-year of the external debt level shows that the average growth rate for 50 selected LMICs is 6.73%. The highest rate of external borrowing among all LMICs was in 2009 by Botswana, which is equivalent to 266.33 per cent, while the lowest was -817.52 per cent by South Africa in 1989. The study distinguished two distinct periods based on analysing trends in external debt levels. The first periods, from 1980 to 1999, show the going-to-a-roof movement of the external debt level for an overall LIMC.
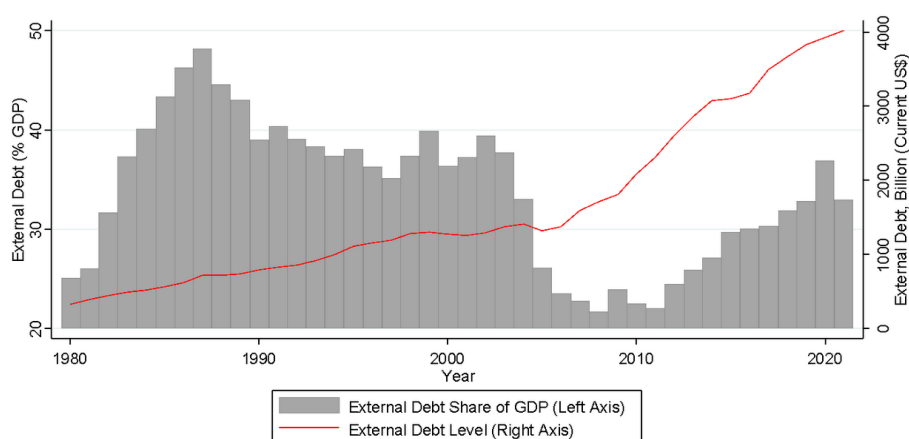

Figure 1. Yearly Historical of External Debt in Low- and Middle-Income Countries, 1980 to 2021

Moreover, the sharp increase in external borrowing is depicted in the second period, 2000 to 2021. Figure 1 illustrates the bar chart of the external debt share of GDP, which contradicts the line chart. The first period from 1980 to 2003 depicted the share of external

debt to GDP as approximately 25% to 48% for LIMCs. According to the study of Mijiyawa (2022), a notably significant jump in the first period coincided with declining commodity prices in the 1980s and government efforts to stimulate consumption in the household sector and economic growth by increasing external borrowing to cope with the crisis.
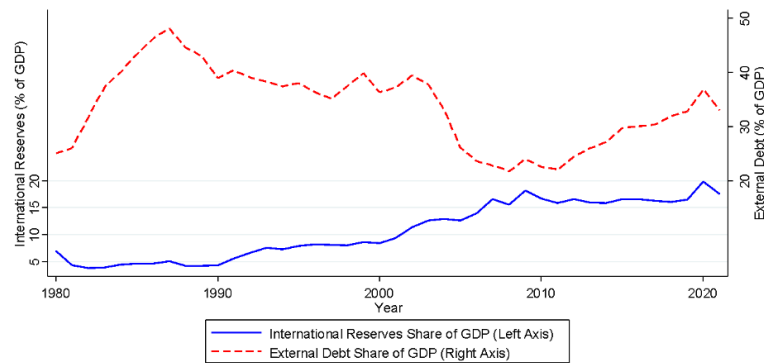

Figure 2. Comparative Trends of International Reserves and External Debt as a Percentage of GDP from 1980 to 2021

International reserves and external debt are crucial factors in fostering the growth and development of national economies. Whereby the international reserve is one of the alternative instruments that countries may use to meet the external balance. The debtor has also used the international reserves for the country's ability to repay the debt, which includes debt servicing (Kebede et al., 2023). The government needs appropriate planning to deal with an increase in external liabilities to prevent external imbalances that may be costly in the long run, as such vulnerabilities will directly slow down economic growth. Figure 2 illustrates the trends in the share of international reserves relative to GDP on the left axis and the share of external debt relative to GDP on the right axis for LMICs from 1980 to 2021. The data for the selected 50 LMICs revealed that the average international reserves shares of GDP is 14.66%. Kebede et al. (2023) revealed that developing countries experiencing growing international reserves shares of GDP have a condition of higher capital productivity and economic growth rate. If supported by competitive external borrowing, it will lead to quasi-fiscal operations.
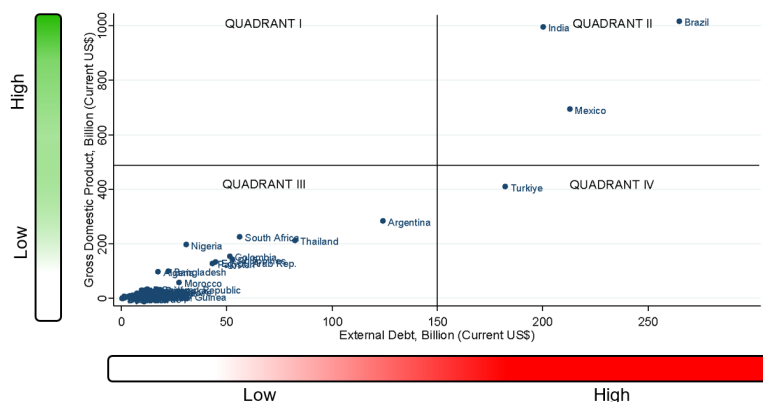

Figure 3. Quadrant Matrix of Average External Debt and GDP in Low-and Middle-income countries from 1980 to 2021

Figure 3 depicts a quadrant matrix analysis of average external debt, billion (current US$) and GDP (current US$) in LMICs from 1980 to 2021. The study classified the relationship between external debt and GDP into four interpretations based on quadrant analysis. The Quadrant I is the condition of low external debt and high GDP based on 50 LMIC data. In comparison, Quadrant II has high external debt and GDP. Meanwhile, Quadrant III has low external debt and GDP. Lastly, Quadrant IV has high external debt with low GDP. Among the selected 50 developing countries, 46 are developing countries in Quadrant III with low external debt and GDP. Furthermore, Brazil, India, and Mexico are in Quadrant II, with high external debt and GDP classifications. The macroeconomics imbalances, such as deficits in current accounts, worsen more of Turkish banks' refinancing risks accumulated, leading to classification as Quadrant IV with high external debt with low GDP.
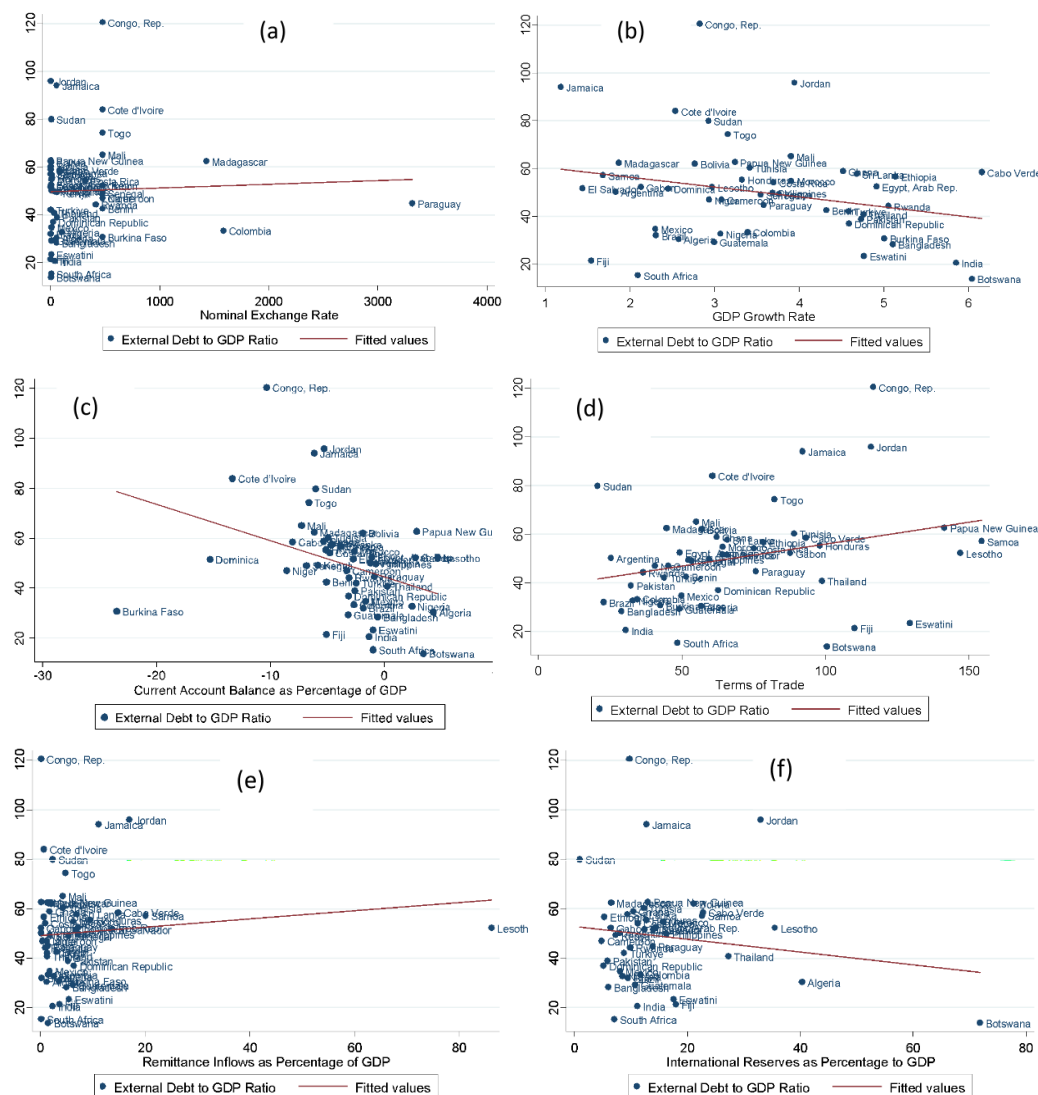

Figure 4. Average External Debt and (a) Exchange Rate; (b) GDP Growth Rate; (c) Current Account Balance; (d) Terms of Trade; (e) Remittance Inflows; (f) International Reserve

Figure 4 shows the scatter plots of the average data from 1980 to 2021 for the external debt against independent variables, further explained in regression analysis. Figure 4(a) demonstrates the scatter plots of the external debt-to-GDP and official exchange rate for selected 50 LMIC data. It is particularly essential in LMIC, which has a remarkable dependence on foreign currency-dominated debt. As outlined in the variable definition section, the official exchange rate is established by national authorities regulating the exchange market. It is calculated as the annual average based on monthly averages. According to Fisera et al. (2021) and Bernoth and Herwartz (2021), undervalued domestic currency may reduce the sustainability of external debt. Specifically, the domestic currency depreciation will increase the external debt-to-GDP ratio in a more extended period. However, the preliminary analysis of the scatter plots in Figure 4(a) revealed contradicting results supported by the study of Mijiyawa (2022). For example, Paraguay shows a high average between 1980 and 2021 for the official exchange rate, depicting a low external debt-to-GDP ratio compared to Congo, Rep, Jordan, and Jamaica.

Meanwhile, the scatter plots of an average external debt-to-GDP ratio and GDP growth are shown in Figure 4(b). According to the study of Mijiyawa (2022), an inverse relationship between external debt-to-GDP and GDP growth is expected. An increase (decrease) in GDP growth will significantly generate more (less) tax revenues, with less (more) public spending leading to less (more) external borrowing. Domestic factors, such as GDP growth by the selected 50 LMICs, are consistent with the findings of Mijiyawa (2022), which show a negative relationship with the external debt-to-GDP ratio, as indicated in Figure 4(b).

Based on existing scholarly literature, to the best of the researchers' knowledge, there is insufficient conclusive evidence to determine the impact of current assets and external debt. The effects may vary depending on the specific country and sector under consideration. Figure 4(c) shows scatter plots of an average external debt-to-GDP and current account balance as a percentage of GDP in an inverse relationship. An analysis of 50 LMICs revealed that a higher amount of current account will reduce the external debt. Although the regression analysis does not confirm this result, Silva (2020) study advised reducing external debt through a positive current account.

Previous scholarly research has indicated that the terms of trade are regarded as a key external factor that can influence external borrowing in LMICs. The study of Mijiyawa (2022) revealed that by default, favourable terms of trade stimulate more government revenue with less fiscal deficit, leading to less external borrowing. However, with such an expectation, Mijiyawa (2022) predicts that it could lead to an excess in government spending, which accumulates more external financial aid. As a result, Dawood et al. (2021) and Harsono et al. (2024) found that the surplus in terms of trade will contribute more to external borrowing. The expected positive relationship between terms of trade and the external debt-to-GDP ratio is depicted by the scatter plots of selected 50 LMICs in Figure 4(d). However, the study by Brafu-Insaidoo et al. (2019) claims that the components of export and import have an ambiguous direction between terms of trade and the external debt-to-GDP ratio. Therefore, this study will investigate the regression analysis further.

Figure 4(e) illustrates the scatter plots of an average external debt-to-GDP ratio and personal remittance is a direct relationship. An increase in personal remittance is expected to burden the selected 50 LMICs as the external debt-to-GDP ratio increases. Scatter plots analysis revealed that personal remittance from LMICs will contribute more to the external debt. The initial result from the scatter plots analysis is supported by the

recent studies of Mijiyawa and Oloufade (2023) and Mijiyawa (2022). The momentum of the positive relationship between the personal remittance and external debt-to-GDP ratio is said to be controlled by the negative relationship between international reserves as a percentage of GDP and external debt-to-GDP ratio. The international reserves are considered a medium of self-insurance mechanism in the foreign aid to the LMICs (Mijiyawa & Oloufade, 2023). Moreover, international reserves play a crucial role in influencing the external debt. The scatter plots depicted in Figure 4(f) of external debt-to-GDP ratio and international reserves as a percentage of GDP in the selected 50 LMICs depict a negative relationship consistent with our prior discussion. However, this needs to be further clarified in the regression analysis section.

Moreover, this study therefore proposes three testable hypotheses H1: Specific variables influence external debt in LMICs; H2: Trade openness increases external debt in LMICs; H3: Does International reserves as potential medium variable which can relate to trade openness and external debt in LMICs.

METHODS

This section presents the data, sources and empirical model employed in this study. The analysis is based on a comprehensive secondary longitudinal dataset covering a 42 years period stratching from 1980 to 2021 that encompasses 50 LMICs. This extended time span provides a broader temporal perspective that captures multiple global economic cycles and structural shifts in external borrowing patterns. The data were collected from World Bank Database. Table 1 shows the variable definition for each selected dependent and independent variable. Based on the existing literature, we select the external debt to GDP ratio as the dependent variable in our model regression.

Table 1. Definition of variables

Variable	Proxy	Notation
External debt	The ratio of debt owed to nonresidents (foreign debt) by residents of a country to its Gross Domestic Product (GDP). An increase in the external-debt indicates a rise in external borrowing as a percentage of GDP.	ED
Exchange rate	Monthly averages of the domestic currency relative to the foreign currency (USD).	ER
GDP growth rate	Annual percentage change in the GDP. This study is expected to have a negative relationship between the GDP growth rate and external debt, as a positive growth rate will generate more income and tax revenues with less public spending, resulting in less external borrowing.	GDP
Current account balance	The total net export is generated from goods and services, as well as both net primary and secondary income.	CA
Trade Openness	The sum of exports and imports is divided by a country's GDP in terms of percentage value.	TRADE

Personal remittance	Personal remittance, also known as repatriated earnings, is transferred between residents and nonresidents. It comprises personal transfers and employee compensation. Personal remittance consists of all current transfers in cash or in kind made or received by resident households to or from nonresident households.	PR
International reserves	It is in US dollars, and the selected 50 LMICs hold monetary gold, special drawing rights, reserves of IMF members held by the IMF, and foreign exchanges under the control of monetary authorities. Researchers then divide each country's total reserves as a percentage of GDP.	IR

Model Specifications

The following panel data model is specified to reveal the potential correlation among trade surplus and external debt in developing countries:

$$ED_{it} = c + \alpha TRADE_{it} + \beta X_{it} + u_i + v_t + \varepsilon_{it} \qquad (1)$$

where ED_{it} is the dependent variable (external debt to GDP ratio), while $TRADE_{it}$ is the trade openness as an independent variable in a country i at period t. The set of control variables is represented by X_{it} which includes the nominal exchange rate (ER_{it}), GDP growth rate (GDP_{it}), current account balance (CA_{it}) and personal remittance (PR_{it}). Researchers then estimate the equation (1) by including the international reserves (IR_{it}) as a potential medium to relate with trade openness and external debt, which can be shown below:

$$ED_{it} = c + \alpha TRADE_{it} + \beta X_{it} + \sigma IR_{it} + u_i + v_t + \varepsilon_{it} \qquad (2)$$

In this case, a change in trade policy may affect the trade pattern, which can influence the behaviour of international reserves. Vacaflores and Kishan (2014) found that the most significant and vital indicator that negatively influences the international reserve comes from government policy on the trade balance in countries with relatively small shares of remittance as a percentage of GDP. Furthermore, a study done by Narayan et al. (2011) reveals that if the domestic currency appreciated, it would make the country's exports relatively expensive for foreign countries. This adverse impact of export activities affects the trade balance and the accumulation of international reserves. A recent study by Yang and Peng (2024) found the negative effect of international trade on exchange rates through the international reserves. According to their study, after controlling the international reserves, an inverse relationship exists between trade openness and exchange rate. Nevertheless, the true impact of trade openness on foreign reserves remains unclear. Thus, researchers added Eq (2) in this study by including international reserves. Researchers expected that the coefficient of trade openness would be greater (smaller) if the result showed a negative (positive) impact of trade openness on international reserves.

Estimation Methods

This study applies two panel data econometrics methods, namely the panel data Fixed

Effects (FE) estimation and the General-to-Specific or General-to-Simple (GETS) to estimate the regression results as outlined in Equation (1) and (2). The purpose of applying FE estimation is to control the country-fixed effects (ui) and time-invariant country-specific factors (vt), which is believed will be able to influence the level of external debt in a country (endogeneity). The commodity prices crisis and global financial crisis in 2008 can be considered as external shocks that simultaneously influence the amount of debt across nations (Mijiyawa, 2022). In this case, the time-fixed effects (FE) could capture these external shocks to avoid biases in the estimation results. Two estimation possibilities are involved when dealing with static panel data analysis: fixed effects (FE) and random effects (RE) models. Under the assumption of Fixed Effects estimation, the independent variables are interconnected with the country-fixed effect, whereas Random Effects estimation does not allow the explanatory (independent) variables to be correlated with the group-specific components. In this case, if explanatory variables correlated with the country-fixed effect (endogeneity), high possibility of unbiased and consistent results and findings can be produced by selecting the FE estimation. The selection between RE and FE can be done by applying the Hausman specification test as suggested by Townsend et al. (2013).

Many applied statistical researchers are confronted with the issue of selecting the most appropriate explanatory variables in their model regressions. This issue may lead to the problem of bias and inaccuracy in the results and findings. In this study, researchers also applied the General-to-Specific or General-to-Simple (GETS) modelling stimulated by Hoover and Perez (1999) for panel data analysis, as suggested by Clarke (2014). It enables an unbiased identification of potential factors or explanatory variables that can influence the external debt from an initial comprehensive model containing numerous variables, including trade openness and international reserves. An early study conducted by Hendry and Mizon (1978) mentioned that the GETS methodology involves the identification of a restricted or parsimonious model, in which the utilization of this method is highly recommended in cases where the existing literature has not provided definitive or ambiguous conclusions. It enables a fair comparison of potential explanatory variables and treats competing theories equally to determine the most accurate explanation. In this case, the results generated from GETS method will provide us the suggestion on which explanatory variables are correlated and give a significant impact on dependent variable without losing the important and valuable information from the model regression (Bermejo Carbonell & Werner, 2018). Additionally, to test for the validity of the panel data either to apply Pooled Ordinary Least Squares (POLS) or Fixed and Random effects estimation, the Breusch and Pagan Lagrange Multiplier (BPLM) test is also applied in this study as suggested by Breusch and Pagan (1980).

RESULTS

The regression results in Table 2 shows the effect on the trade openness, international reserves and control variables on external debt for the selected 50 LMICs using the FE estimation and GETS model. Based on the results provided by BPLM test, all the model regressions able to reject the null hypothesis indicates that applying Fixed or Random Effects estimation is necessary instead of POLS. Similarly, the Hausman specification test results strongly suggest that applying the FE estimation is the most effective and suitable method for both models, compared to the RE estimation. The results without any inter-

action between international reserves, trade openness and external debt are reported in columns (1) and (2) under Model 1, while Model 2 includes the results with interactions among these variables in columns (3) and (4). According to the results generated from the GETS model in column (2), excluding the international reserves, researchers found three highly significant (1% significance level) variables that can strongly influence the external debts, which are GDP growth rate (GDP), current account balance (CA) and trade openness (TRADE). This finding provides robust empirical support for Hypothesis 1 (H1), which depicts evidence of specific variables significantly determine external debt in LMICs. Meanwhile, by including the international reserves (IR) in Model 2, the GETS model reveals consistent, highly significant findings from GDP, TRADE and IR (column 4). Therefore, this indicates that international reserves (IR) can be considered a potential medium for trade openness and external debt.

Table 2. Regression results using the Fixed Effects (FE) estimation and General-to-Specific (GETS) model

	Fixed Effects (FE)	General-to-Specific (GETS)	Fixed Effects (FE)	General-to-Specific (GETS)
		Model 1		Model 2
	(1)	(2)	(3)	(4)
Exchange Rate (ER)	-0.0016 (0.0015)		-0.00043 (0.0014)	
Gross Domestic Product	-0.6102*** (0.1332)	-0.6018*** (0.1331)	-0.5440*** (0.1361)	-0.5515*** (0.1358)
Current Account Balance	-0.3693*** (0.0800)	-0.3439*** (0.0774)	-0.1328 (0.0893)	
Trade Openness	0.0996*** (0.0268)	0.0990*** (0.0267)	0.1446*** (0.0266)	0.1426*** (0.0265)
Personal Remittance	0.0846 (0.0559)		0.0135 (0.0549)	
International Reserves			-0.5302*** (0.0617)	-0.5390*** (0.0609)
Constant	43.95*** (2.0327)	44.15*** (1.9912)	48.28*** (2.1044)	48.94*** (2.0168)
BP LM test	4186.52*** (0.0001)		3712.46*** (0.0001)	
Hausman test	11.09** (0.0496)		14.85** (0.0215)	
F-test	21.40*** (0.0001)	21.42*** (0.0001)	22.33*** (0.0001)	23.93*** (0.0001)
VIF	1.07		1.13	
No. of country	50	50	43	43
Observations	2100	2100	1806	1806

Notes: *Both models are estimated using the Static Panel Fixed Effects (within) regression and General-to-Specific (GETS) modelling. Values in the parentheses are standard errors except for the BP LM test, Hausman test and F-test, which are p-values. ***, ** and * indicate significance at 1%, 5% and 10% levels, respectively.*

Based on the table it indicates the present of a significant relationship between trade openness, international reserves and external debt. In all specifications, the coef-

ficients of the trade openness and international reserves are statistically significant but have mixed effects on the external debt. Specifically, the external debt-to-GDP ratio has significantly and positively influenced by the changes in trade openness on the selected 50 LMICs. The coefficient results suggest that the external debt-to-GDP ratio will rise (fall) by 0.14% for a 1% rise (decrease) in the trade openness (surplus) as a share of GDP.

The positive effect of trade openness (surplus) on external debt can be related to the fact that trade surplus will encourage a nation to apply for more loans from other countries, where it can be regarded as a means to generate financial resources for the re-payments of external debts. Moreover, trade openness facilitates borrowing and lending, resulting in countries with high levels of trade openness engaging in significant borrowing and lending with one another. The rationale is that an open economy can readily bor-row from foreign countries or international organizations and subsequently lend to other countries. As a result, a positive and significant relationship between trade openness and external debt aligns with the past studies done by Omar and Ibrahim (2021) and Harsono et al. (2024). This outcome provides strong empirical support for Hypothesis 2 (H2), con-firming that higher levels of trade openness are associated with increased external debt in LMICs.

The evidence from the scholarly activity indicates that external debt significantly and negatively impacts international reserves. In contrast, the external debt ratio falls by 0.54% for a 1% rise in international reserves. The inverse relationship among these two variables may due to the intention of countries to hold international reserves for safety or precautionary motives, which could increase the liquidity to support foreign exchange interventions and international transactions without demanding more debts from foreign countries. Moreover, effective government policies are also expected to positively impact international reserves, where a country does not have to rely on external debt. In this case, if the government policies are effective, they will generate more revenue, increase foreign investment, and increase the international reserve. Hence, higher international reserves could increase the precautionary motive and reduce external borrowing if external shocks impact a country. Several studies conducted by Cain et al. (2012), , and Mijiyawa and Olo-ufade (2023) have reported a similar relationship.

The interactions between trade openness and international reserves can be re-vealed from the results generated in columns (2) and (4). When considering internation-al reserves, trade openness's impact on external debt becomes stronger from 0.10% to 0.14%. Moreover, based on the results, it continues to be positive and highly significant. The interaction implies an inverse correlation between international reserves and trade openness, as researchers discussed in the model specification of this study. In other words, while trade openness raises external debt, international reserves act as buffer that reduces debt vulnerability. This dynamic provides strong empirical evidence support for Hypoth-esis 3 (H3), confirming that international reserves function as potential medium variable that links trade openness and external debt in LMICs. Hence, researchers can relate that an inverse impact of trade openness on international reserves has negatively affected ex-ternal debt.

Regarding the other control variables, the FE estimation and GETS model results reveal a significant and inverse relationship between external debt and economic growth in the selected 50 LMICs. After controlling the international reserve, the results remain negative and highly significant, showing that economic growth is essential in influencing the external debt of LMICs. Table 2 reveals that the external debt tends to fall by 0.55%

due to increased economic growth by 1%. This finding concludes that a country needs to achieve higher economic growth to reduce external debt. When a country experiences favourable economic growth, it generates more income and does not rely on foreign debt to stimulate its economy. This significant outcome is consistent with previous studies (Beyene & Kotosz, 2020; Dawood et al., 2021; Mijiyawa & Oloufade, 2023). Based on the results from Model 1, without the presence of international reserves in the model, researchers find a significant and negative correlation exists between the current account balance and external debt for both FE estimation and the GETS model. The coefficients indicate that a 1% increase in current account balance will lead to a 0.34% fall in the external debt-to-GDP ratio. In this case, the dependency on foreign debt could be reduced by raising the current account balance in LMICs.

CONCLUSION

This study used panel data from the selected 50 LMICs from 1980 to 2021. The researchers employed the Fixed Effects (FE) and the General-to-Specific (GETS) estimations. Moreover, the researchers segregated these estimations into Model 1 and Model 2. Model 1 is the reported result for Fixed Effects and General-to-Specific estimations without interacting with international reserves, trade openness, and external debt. Meanwhile, Model 2 includes such interaction with the listed variables.

Analysis from the GETS in Model 1 confirmed that GDP growth rate, current account balance, and trade openness are highly significant variables which can give a significant impact on the external debt in the 50 LMICs. However, after the researchers deepened the analysis in Model 2, the GETS estimation revealed highly robust findings from GDP growth rate, trade openness, and international reserves. This study confirmed that the international reserves can be considered as a potential medium to relate with trade openness and external debt. Furthermore, the researchers believed the surplus of trade openness could influence a country to apply more loans from other countries as a financial resource to cover the external debts. This phenomenon will be an encouraging factor for the selected 50 LMICs to apply for more financial aid.

The findings prove that international reserves significantly negatively impact external debt. An increase in international reserves by 1% could lead to a reduction of 0.54% in external debt. This study suggests that adequate government policies will contribute more to international reserves, reducing countries' reliance on foreign aid. Moreover, the results prove that an effort to include negative international reserves in Model 2 confirm that trade openness exerts a positive and significant influence on external debt in LMICs. A 1% increase in trade openness is associated with approximately a 0.10% to 0.14% rise in the external debt. As a result, it implies that expanding trade can improve access to international financing but may simultaneously increase debt exposure if not matched with sound fiscal and reserve management. Therefore, maintaining adequate international reserves and implementing prudent external borrowing policies are essential to mitigate the debt risks associated with higher trade. Moreover, the robust interaction of trade openness and international reserves in determining the external debt should not be disregarded, as it implies the presence of an inverse correlation, as discussed in the model specification. Therefore, the study confirmed that the inverse interactions of international reserves on trade openness significantly negatively affect the external debt. As a recommendation,

further investigation should focus on this negative interaction, and the scope should be beyond the LMICs.

The findings provide several implications for policy and further research, From a policy standpoint, maintaining a sustainable level of trade openness while strengthening international reserve management is crucial in reducing debt vulnerability among developing countries. These results align with current regional initiatives such as the African Debt Action Plan and the ASEAN Financial Integration Framework, which emphasize macroeconomic coordination and prudent external borrowing. For researchers, future studies could extend this analysis using dynamic panel methods to capture adjustment effects or examine regional heterogeneity in the trade openness and external debt relationship. Such directions would deepen understanding of how trade openness, international reserves, and debt interact under varying macroeconomic regimes.

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APPENDIX I

Country Classification by Income Level

Algeria	Colombia	Fiji	Madagascar*	Rwanda*
Argentina	Congo, Rep.	Gabon	Mali*	Samoa
Bangladesh	Costa Rica	Ghana*	Mexico	Senegal*
Benin*	Cote d'Ivoire*	Guatemala	Morocco	South Africa
Bolivia*	Dominica	Honduras*	Niger*	Sri Lanka
Botswana	Dominican Republic	India	Nigeria	Sudan
Brazil	Egypt, Arab Rep.	Jamaica	Pakistan	Thailand
Burkina Faso*	El Salvador	Jordan	Papua New Guinea	Togo*
Cabo Verde	Eswatini	Kenya	Paraguay	Tunisia
Cameroon*	Ethiopia*	Lesotho	Philippines	Turkiye

Country Classification by Region

Sub-Saharan Africa (SSA)	East Asia and Pacific (EAP)	Latin America and Caribbean (LAC)	Middle East and North Africa (MENA)	South Asia (SA)
Benin	Fiji	Argentina	Algeria	Bangladesh
Botswana	Papua New Guinea	Bolivia	Egypt, Arab Rep.	India
Burkina Faso	Philippines	Brazil	Jordan	Pakistan
Cabo Verde	Samoa	Colombia	Morocco	Sri Lanka
Cameroon	Thailand	Costa Rica	Tunisia	
Congo, Rep.		Dominica	Turkiye	
Cote d'Ivoire		Dominican Republic		
Eswatini		El Salvador		
Ethiopia		Guatemala		
Gabon		Honduras		
Ghana		Jamaica		
Kenya		Mexico		
Lesotho		Paraguay		
Madagascar				
Mali				
Niger				
Nigeria				
Rwanda				
Senegal				
South Africa				
Sudan				
Togo				

Notes:
The country selected from World Bank Classification
* Heavily indebted and poor countries (HIPCs)