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The Relationship Between Public Debt, Trade Openness, and Economic Growth in Indonesia: Symmetric and Asymmetric Analysis

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Abstract

This study aims to explore the relationship between public debt and trade openness on economic growth in the context of the Indonesian economy. The symmetric model (Autoregressive Distributed Lag/ARDL) and the asymmetric model (Nonlinear ARDL) are employed to estimate the association among the variables in the model, both in the short and long run, in a quarterly dataset from 2010: Q1 to 2019: Q4. The results show that both the symmetric and asymmetric models confirm the use of external debt has a detrimental effect on economic growth. On the other hand, the use of domestic debt supports economic growth in the long run. This study only found a significant impact of trade openness on economic growth in the asymmetric model, which suggests that reducing trade openness empirically contributes to a rise in economic growth in the long run. The diagnostic tests for both models indicate satisfactory results. Some policy implications are also discussed.

Keywords: Public Debt, Trade Openness, Economic Growth, Indonesia, ARDL, NARDL
JEL Classifications: C5, E6, F1, H6, O4

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1. Introduction

Public debt plays a pivotal role in smoothing business cycles, funding government investment, and responding to several crises (Rogof, 2020). The study of the relationship between economic growth and public debt has been gaining more traction since the seminal work of Reinhart & Rogoff (2010). Empirical studies in this spectrum are important since the continuous increase in government spending to meet the development agenda forces the government to use public debt to fill the fiscal deficit, especially in developing countries (Presbitero, 2012; Bal & Rath, 2014). In addition, ensuring sustainable economic growth from the government side depends on many factors. One of the significant factors is public debt. In this respect, some studies show that the trajectory of public debt is a pivotal indicator of future economic growth and financial condition (Pescatori et al., 2014; Chudik et al., 2017).

In the case of Indonesia, the government has been conducting a fiscal expansion policy (a tendency to increase the budget deficit to GDP ratio[1]) between 2008 and 2019. However, this fiscal expansion is also coupled with a persistent problem of low tax ratio which has been hovering between 11 to 13 percent to GDP during this period. This implies that the government has to raise public debt to sustain its role as the enabler of the economy. From 2009 to 2019, the average growth of the Indonesian public debt stock was 14 percent, higher than the average economic growth which was calculated at around 5 percent. Consequently, the public debt to GDP ratio[2] has been increasing steadily from 30 percent in 2009 to 33 percent in 2019. Since the Indonesian economy still relies on public debt to fund government expenditure while at the same time the public debt to GDP ratio tends to increase, the empirical study of the public-debt growth relationship is essential.

In the international landscape, the degree of a country's openness to the global marketplace is also important for market access, revenue opportunities, and technology diffusion (Rivera-Batiz & Romer, 1991; Barro & Sala-i-Martin, 1997). In the literature on trade openness, it can contribute both positively and negatively to the domestic economy through various channels (Rigobon & Rodrik, 2005; Freund & Bolaky, 2008; Nowbutsing, 2014; Musila & Yiheyis, 2015; Polat et al., 2015; Keho, 2017). These pieces of literature also suggest that trade openness can, in the long run, influence economic growth.

In the case of Indonesia, the data of import growth was on average higher than the growth of exports from 2000 to 2018 which was calculated at 9.24 percent and 6.97 percent, respectively. The majority of imported products are classified as raw material support and capital goods, while the majority of exported products are classified as industrial and mining goods. The fact that domestic producers, in general, are less competitive in producing input products may limit job creation in the rich-labor domestic industries. On the same token, a heavy reliance on raw material products for export is considered risky due to market volatility and limited supply. These aspects may hinder the domestic economy from growing at its full capacity. For this reason, the empirical study related to the trade-growth relationship is also necessary since Indonesia adopts an open economic policy.

Given the importance of the points discussed above, therefore, the objective of this paper is to explore the relationship between public debt and trade openness on economic growth in the context of Indonesia by using symmetric and asymmetric models. This study

[1] According to Law Number 17 of 2003 about the State Finance, the maximum budget deficit is 3 percent of GDP.

[2] According to Law Number 17 of 2003 about the State Finance, the maximum public debt to GDP ratio is 60 percent.

contributes to the literature in some ways. First, the majority of public debt studies in Indonesia do not separate the composition of public debt creditors. As noted by Hausmann & Panizza (2011), the outcome of economic growth depends more on the composition of public debt than on the level of government debt. Second, this study employs a combination of a symmetric model (Autoregressive Distributed Lag /ARDL) and an asymmetric model (Nonlinear Autoregressive Distributed Lag/NARDL) to estimate the association among the variables in the model both in the short and long run. Moreover, the asymmetric analysis provides a better understanding of the regressors' asymmetric impact on the regressand. Third, to the best of the author's knowledge, this is the first paper to incorporate the domestic and external components of public debt, trade openness, and economic growth into one equation by using both symmetric and asymmetric models for the Indonesian case.

The rest of the paper is organized as follows. Section 2 presents the literature review. Section 3 provides the development of public and trade openness in Indonesia. Section 4 presents the estimation method and data. Section 5 discusses the main results, and Section 6 presents the conclusions and its policy implications.

2. LITERATURE REVIEW

2.1 Debt-Growth Relationship

The literature shows that the issuance of public debt has both positive and negative impacts on economic growth. Some positive impacts are as follows. First, an increase in debt due to unanticipated shocks provides a tax- smoothing mechanism (Yared, 2019) and stabilizes short-term macroeconomic fluctuations by providing the necessary fiscal stimulus to support activity (World Bank, 2019). Second, it promotes long-term economic growth if the debt is channeled through public investment in areas that produce large positive externalities, such as health and research and development (Fournier, 2016). Third, government debt instruments constitute a safe asset for investors (Azzimontia & Yared, 2019). On the other hand, the disadvantages of public debt should not be ignored. First, a rise in distortive taxes and a decline in public investment to facilitate repayment after debt buildups led to a decrease in economic output (Yared, 2019). This limits the ability of governments to provide fiscal stimulus during downturns (Kose et al., 2020) or catastrophes (Romer & Romer, 2017). Second, a rising risk premium on debt may make creditors fear that the public debt is no longer sustainable (Blanchard, 2019), creating uncertainty about macroeconomic policy (Lo & Rogoff, 2015), and the associated lower probability of debt repayment (i.e., the "debt Laffer curve"). Third, an increase in public debt crowds out private investment and deteriorates economic performance in the long run (Calderón & Fuentes, 2013; Bronera et al., 2014).

Looking at the composition of debt holders, the advantages of having domestic public debt creditors are incurring low cost and exposure to currency risk, acting as a collateral function, and acting as a benchmark yield curve for domestic private lending (Bua, et al., 2014). Nevertheless, the main drawback is the presence of the crowding-out effect in the domestic financial market. On the other hand, having external holders of public debt also creates a less severe problem of crowding out in domestic financial markets (Beaugrand et al., 2002). Nevertheless, external debt creditors pose a threat and a domino effect on the domestic economy through the movement of the exchange rate and international capital flows.

Recent literature suggests that there is no ideal consensus on the relationship between public debt and economic growth. Rogoff & Reinhart (2010) show that economic growth slows down considerably if the public debt-to-GDP ratio exceeds 90%. An early study by Eberhardt & Presbitero (2013) shows no evidence of common debt

thresholds within countries over time. A systematic literature review by Rahman et al. (2019) indicates that the 90% threshold in the Reinhart-Rogoff hypothesis is not applicable across countries. A study by Saungweme & Odhiambo (2019) also underlines that the results are inconclusive regarding debt-growth relations and that such a relationship depends on the level of development of the sampled countries, data coverage, methodology, and the control variables. The heterogeneous effects of public debt on economic growth in several economies might be attributable to the level of governance, which plays a mediating role (Abbas et al., 2021), and different degrees of fiscal uncertainty (Ahlborn & Schweickert, 2016).

In Indonesia, studies on the link between public debt and growth are also inconclusive. The majority of studies employ a symmetric model. A study by Handra & Kurniawan (2020), using the Autoregressive Distributed Lag (ARDL) model with time-series data from 1980 to 2017, indicates a significant and negative relationship between total government debt to GDP ratio and economic growth both in the long run, but the relationship is inelastic. In addition, the authors also incorporate trade openness as their regressor. For this variable, the result indicates a positive long-run impact of trade openness and economic growth but is inelastic.

A study by Aziz (2016) made similar findings. He employs the Vector Error Correction Model (VECM), which results from the negative and significant relationship between the ratio of total public debt to GDP during the observation period of 1970 and 2015. By using the ARDL model on yearly data from 1980 – 2017, Kurniawan (2019) also shows a significant and negative relationship between government debt and output growth in both the short and long run. By contrast, a study by Erlina (2013) found that the ratio of total government debt to GDP has a positive relationship with economic growth. The author also concludes that the debt threshold is 21 %, which implies that the accumulation of government debt below that threshold will spur economic output and vice versa.

Moreover, a study by Islam et al. (2014) using the VECM model found an inelastic positive relationship between overall government debt and economic growth. The findings also highlight that public debt in the form of government bonds is more effective in increasing economic growth than government loans. On the other hand, a study by Kuncoro (2011) found that public domestic debt does not have any contributory effects on economic growth. In addition, he found that external public debt harms economic growth. This finding is also supported by Sijabat's (2020) study, which used VECM estimation between 1998 and 2018 to show that, over the long term, domestic debt significantly and positively affects economic growth. At the same time, external debt has a negative and significant effect on economic growth. The negative effect of external public debt can be explained by the argument that a rise in external public debt will increase external debt service, which slows down output growth in the long run (Cholifihani, 2008).

Furthermore, Muhdi & Sasaki (2009), using macro-econometric modeling and simulation analysis, found that the increasing trend of Indonesian domestic debt leads to the crowding-out effect in the economy. As a result, both investment and output growth decline. The authors also found that a rise in external public debt yields a positive effect on output growth.

2.2 Trade Openness-Growth Relationship

Empirically, there is no consensus on whether greater openness to trade stimulates economic growth. Some studies yield positive effects of trade openness: Freund & Bolaky (2008), Nowbutsing (2014), Musila & Yiheyis (2015), Polat et al. (2015), and Keho (2017). On the other hand, the negative impacts of trade openness are found in

studies by Rigobon and Rodrik (2005), Fenira (2015), Hye & Lau (2015), and Belloumi & Alshehry (2020). This negative impact of trade openness can be attributable to low-quality products (Hausmann, Hwang, & Rodrik, 2006) and low financial development (Kim, 2011). The mixed empirical results of the trade-growth relationship might be attributable to the difference in empirical methodology and country-specific factors.

In the Indonesian case, the majority of studies show a positive relationship between trade openness and growth. Simorangkir (2006) used Structural Vector Autoregression (SVAR) to explore the impact of trade openness and financial openness in the Indonesian economy from 1980: Q1 until 2005: Q2 to show that trade openness and financial openness have negative impacts on output. On the contrary, Agusalim & Pohan (2018), using the VECM model in a time-series setting from 1978 to 2015, found that trade openness contributes to economic growth. Kunanti & Adry (2020) also used the VECM model for the period 2005: Q1 to 2018: Q2 to find that trade openness has a positive impact on economic growth in Indonesia.

Using the Johansen co-integration test, Yusoff & Febrina (2014) found that a 1 % rise in trade openness leads to an increase of 26.5 % in economic growth. A similar cointegrated method conducted by Nursini (2017) for the period 1990-2015 found that trade openness has a positive and significant impact on output growth.

Nurjanah (2013), using ARDL – ECM, found that trade openness has a negative impact on Indonesia's economic growth in the short and long run. The author used annual data from 1980 to 2011. A similar method was employed by Irzam & Setyari (2020) using an annual dataset for the period 1985-2018. They found a significant positive impact of trade openness on economic growth. By using annual data and the NARDL model, Sriyana & Afandi (2020) found that the impact of trade openness is asymmetric in the short run, but symmetric in the long run. In addition, Saimul & Darmawan (2020) used panel data to examine the effect of trade openness on economic growth at the provincial level in Indonesia. They found that there is a low positive effect of trade openness on the domestic economy.

To sum up, the impact of debt and the degree of trade integration with the global marketplace play a pivotal role in affecting economic growth. For the Indonesian case, the results of debt-growth and trade-growth nexus literature are mixed, and the majority only uncovers symmetric relationships. Heterogeneous results may come from the choice of methodology, macroeconomic characteristics, and variables included in the model.

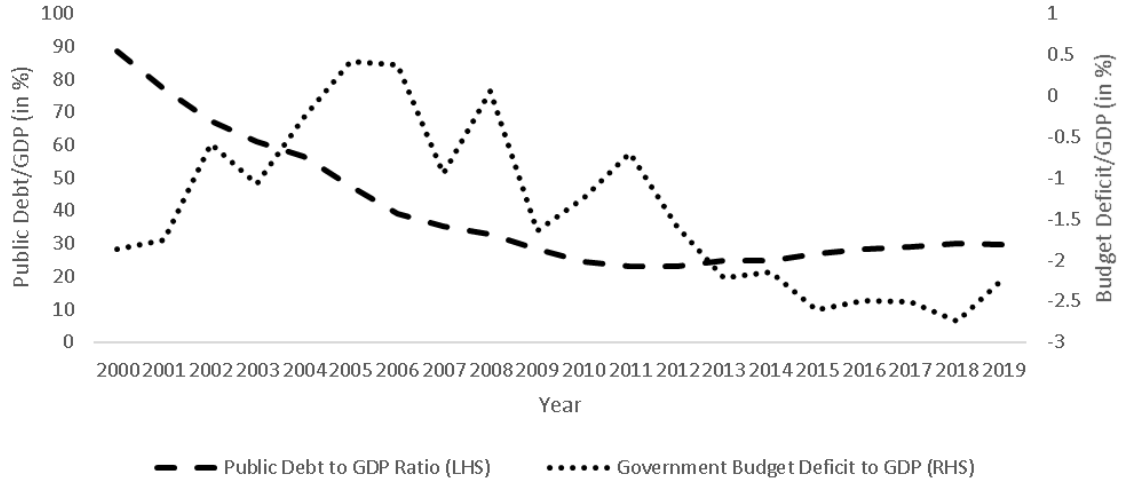
Given the above arguments, this paper, which combines debt-trade-growth variables into one equation, will offer novel evidence in Indonesia's case by employing symmetric and asymmetric models. This paper hypothesizes that the relationship between economic growth and its regressors (public debt and trade openness) will be both symmetric and asymmetric in the long run. Therefore, this paper does not explore the channels in which public debt and trade openness affect economic growth. Rather, this study will explore the direct relationship between the variables of public debt and trade openness on economic growth in both symmetric and asymmetric specifications.

3. The Development of Public Debt and Trade Openness in Indonesia

3.1 The Development of Public Debt in Indonesia

In Indonesia, the total public debt[3] to GDP ratio has been in a declining trend during the last 20 year period, from 87.43 % in 2000 to 30.5 % in 2019. Based on Figure 1, from 2000 to 2008, the government conducted fiscal consolidation by reducing the deficits, bringing them closer to positive territory. The accumulation of deficit reduction (flow) between 2000 to 2008 coupled with strong economic growth (see Figure 2) reduced the overall government debt level (stock). As a result, the government debt to GDP level decreased significantly during this period. This fiscal consolidation and government debt to GDP reduction also showed the commitment of the government to maintain its fiscal rules, which limit the maximum budget deficit of 3 percent of GDP and the maximum public debt to GDP ratio of 60 percent, as stipulated in Law Number 17 of 2003 about the State Finance.

Figure 1: Public Debt to GDP Ratio and Budget Deficit to GDP Ratio in Indonesia (2000-2019)



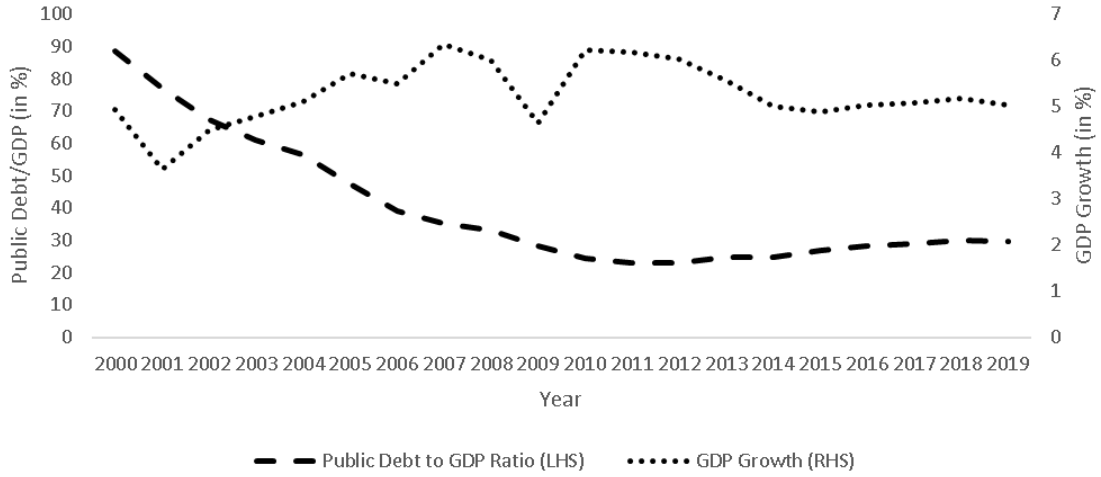
Source: Ministry of Finance (2021)

From 2009 to 2018, the government conducted a fiscal expansion policy (an increase in the budget deficit to GDP ratio) to support economic activity, infrastructure projects, social programs, and fiscal decentralization. As a result, the stock of government increased, but it was still manageable at less than 30 percent to GDP. From 2014 to 2017, the government also strengthened its structural reforms to meet the development agenda. One of which was a budget reallocation from energy subsidies to more productive sectors (infrastructure, health care, and education)[4]. Between 2014 and 2017, the amount of budget for energy subsidies decreased by 77. 38 percent, while the budget for infrastructure, education, and health increased by 117. 17 percent, 10. 9 percent, and 54 percent, respectively. Starting from 2018 to 2019, the government again carried out fiscal consolidation to maintain a long-term sustainable budget.

[3] Indonesian public debt is divided into two components: government bonds (government securities and Islamic government securities) and government loans (domestic loans and external loans). Each component comprises both domestic and external holders, according to the residency of debt holders.

[4] According to the Law on Health (Law No. 36/2009), the mandatory budget for the health sector is 5 percent of the government budget. For the educational sector, the Law on The National Education System (Law No 20/2003) stipulates that the mandatory budget for education spending is 20 percent of the government budget.

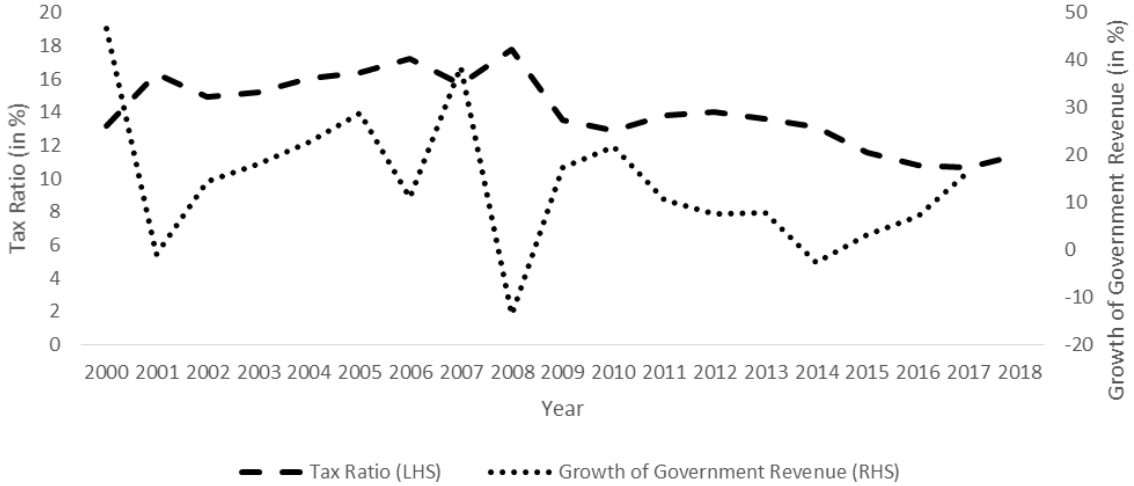
Figure 2: Public Debt to GDP Ratio and GDP Growth in Indonesia (2000-2019)



Source: Ministry of Finance (2021)

In addition, between 2000 and 2008, the tax revenue was also performing well due to the commodity boom that increased the taxes coming from natural resources. Figure 3 shows the tax to GDP ratio and the growth of government revenue from 2000 to 2008. Several policies to further improve revenue optimization were also implemented by the government, such as the sunset policy, reinventing policy, tax amnesty, and IT reformation for enhancing tax collection. Despite such efforts to improve the revenue side, the tax ratio has been decreasing in the last 10 years and is considered low compared to the ASEAN countries. On the other hand, it is also worth noting that the interest payments on government debt as a percentage of revenue have been rising since 2010, from just below 10 percent in 2010 to around 15 percent[5]. To sustain the role of the government as the enabler of the economy, therefore, issuing government debt plays a pivotal role. In practice, the government of Indonesia issues government bonds in the domestic and foreign markets. In addition, the government can also get loans from banks and financial institutions, both domestic and overseas.

Figure 3: Tax to GDP Ratio and Growth of Government Revenue (2000-2018)

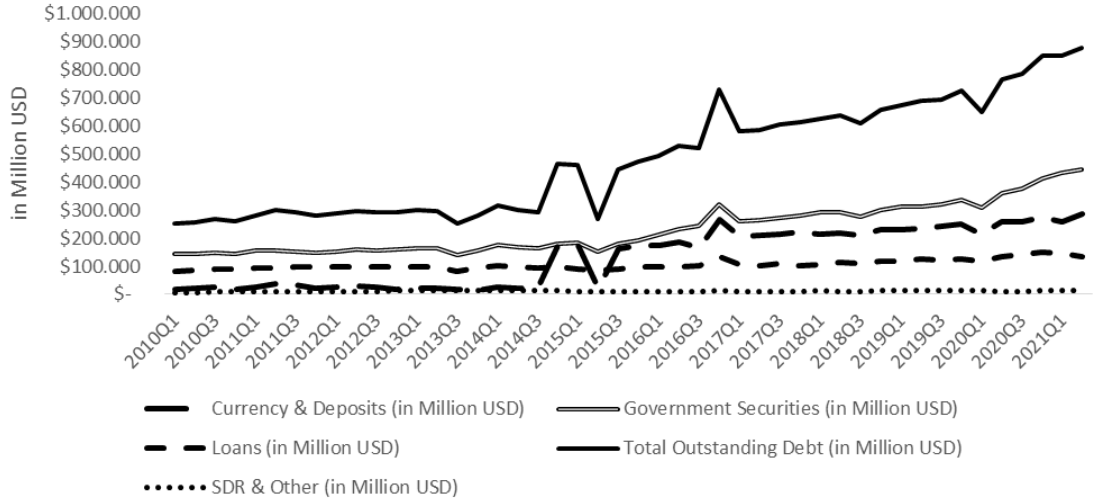


Source: Ministry of Finance (2021)

[5] It is worth noting that the proportion for regular civil servant payments was at around 13 to 15 percent during this time period.

For the last 10 years, the average growth of Indonesian public debt is 14 percent, dominated by long-term debt and fixed rates of interest. The highest growth of public debt outstanding was in the period of 2014 to 2016, in which the government executed many infrastructure projects to boost the economy and meet the development agendas. In 2021: Q1, the total outstanding debt (the amount of principal plus interest minus any repayment) is approximately 880 billion US dollars. As shown in Figure 4, the Indonesian public debt consists of a majority of (1) government bonds as a source for central government financing, including financing the deficit; (2) currency (which is authorized by the central government or central bank) and deposits (claims or liabilities in the form of deposits[6]); and (3) government loans as a source for funding specific projects. As of September 2021, the composition of government bonds consists of 78 percent domestic currency and 12 percent foreign currency-based government bonds.

Figure 4: The Indonesian Government Outstanding Debt and Its Composition (2010-2021)



Source: Ministry of Finance (2021)

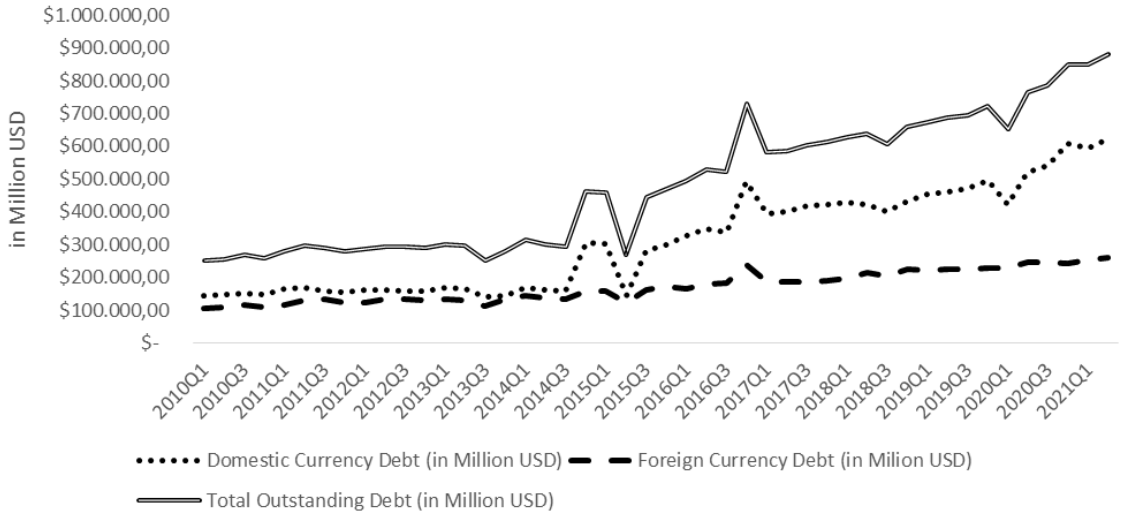
In addition, the public debt can also be classified according to the currency issued: domestic currency debt and foreign currency debt. From Figure 5, the government debt based on the currency has the same proportional size between domestic (IDR) and foreign currency (USD, JPY, EUR, and others) from 2010 to 2014. Following that, the domestic currency debt has played a dominant role for Indonesia, especially in funding infrastructure projects. The use of domestic currency debt has also been an alternative for the government to minimize the exchange rate and capital outflow risk. This also shows that the government has been shifting its source of deficit financing from external to domestic creditors. On average, the proportion of domestic creditors and external creditors since 2015 has been 60 percent and 30 percent, respectively. As of June 2021,

[6] This includes the money transferred from central government to regional governments, SOEs, and other public institutions

the composition of domestic[7] and external creditors[8]of public debt was 584.97 billion US dollars and 265.37 billion US dollars, respectively.

In practice, the use of both domestic and external debt is to fund the central government expenditure and the regional government expenditure (Ministry of Finance, 2021). The domestic government debt is mainly used for paying civil servants' expenditure, domestic capital expenditure, domestic principal debt including interest, subsidy, specific allocation fund, general allocation fund, and state equity participation in state-owned enterprises for infrastructure projects. The external debt is essentially used to pay overseas capital expenditure, the external principal debt, including interest, and finance the current account deficit

Figure 5: The Indonesian Government Outstanding Debt Based on the Currency Issued (2010-2021)



Source: Ministry of Finance (2021)

3.2 The Development of Indonesian Trade Openness

From Figure 6, we can see that the level of Indonesia's share of international trade to GDP or trade openness[9] has been declining since the 2000s. In 2019, the degree of trade openness was calculated at 37 %, significantly down from 71 % in 2000 due to slowing global economic growth, external competitiveness issues, and a more domestic consumption-driven economy. Moreover, the trade balance during this period shows a downward trend despite still accounting for a cumulative surplus of US$ 8.2 million on average between 2000 and 2019.

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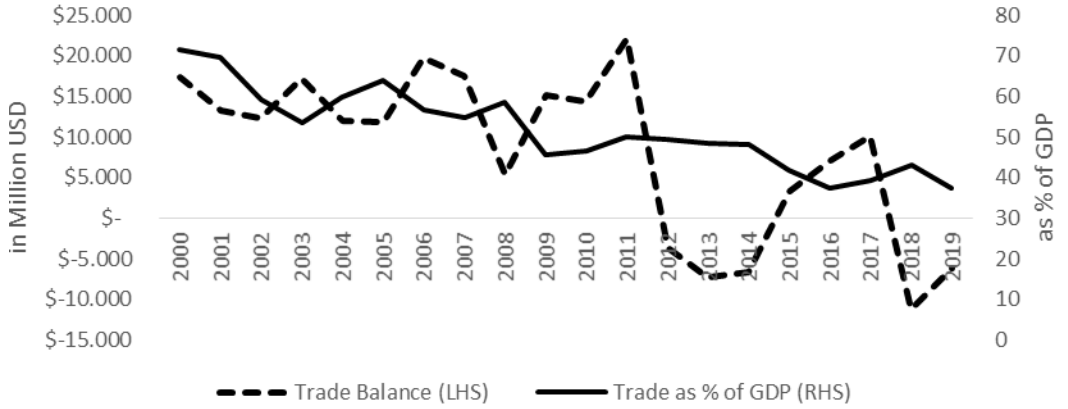
[7] As of September 2021, the domestic holders of Indonesian government bonds are the banking sector (33.69 percent), central bank (14.87 percent), insurance and pension funds (14.40 percent), individual (4.94 percent), mutual funds (3.28 percent), and others such as Securities Company, Corporation, and Foundation (7.28 percent). *Source*: Ministry of Finance (2021)

[8] As of September 2021, external holders (non-residents) owned 21.56 percent of Indonesian government bonds, which included private banks, fund/asset Managers, securities companies, insurance companies, and pension funds. In addition, the top 5 creditor countries for Indonesian external debt from 2010 to 2020 are Japan, Germany, France, South Korea, the USA, and China. Meanwhile, the top institutional creditors' institutions are ADB and IBRD. As related to the China Belt and Road Initiative (BRI), the Indonesian government has received a total loan of 2.89 billion US Dollars for 10 projects since 2016 from the Asian Infrastructure Investment Bank (AIIB) which was initiated by China. This figure represents only 10 percent of the total 28.45 billion US Dollar loan given to the AIIB recipients. *Source*: Ministry of Finance (2021); Bank of Indonesia (2021); (Asian Infrastructure Investment Bank, 2021)

[9] In the national income identity, Y= C+I+G+(X-M). Trade openness is measured by the ratio of exports (X) plus imports (M) to GDP or Y.

Figure 6: Trade Balance and Trade Openness Indonesia (2000-2019)



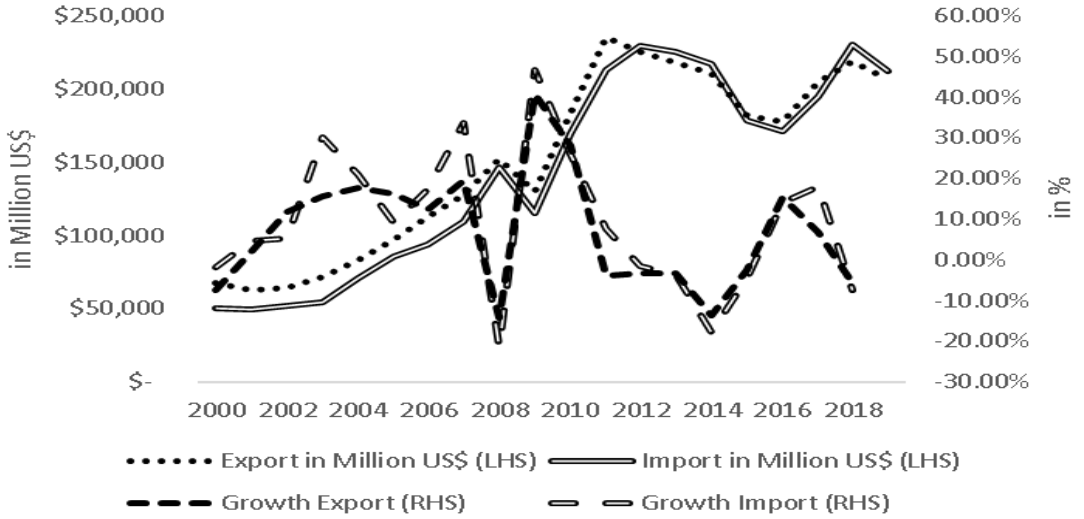
Source: Indonesian Statistics (2021)

According to Figure 7, the average growth rate of exports and imports between 2000 and 2018 was 6.97 percent and 9.24 percent, respectively. In other words, the growth of imports was on average higher than the growth of exports during this period. The top 5 import countries for Indonesia are China, Singapore, Japan, Thailand, and the United States. The top 5 imported products are industrial machinery (HS 84), oil and mineral fuels (HS 27), electrical machinery (HS 85), iron and steel (HS 72), and plastics (HS 39). The majority of imported products are classified as raw materials for support and capital goods. On the other hand, the top 5 export countries for Indonesia are China, the United States, Japan, Singapore, and India. The top 5 exported products are oil and mineral fuels (HS 27), fats and oil (HS 27), electrical machinery (HS 85), motor and vehicleparts (HS 87), and iron and steel (HS 72). The majority of exported products are classified as industrial and mining goods (raw materials).

Looking at this data, Indonesia is unlikely to rely on raw materials for export since its availability is limited in the long run. On the other hand, Indonesia still has a heavy reliance on importing industrial goods and oil. The import of industrial goods is essential to support domestic economic activity. The supporting study indicates that there is a positive relationship between GDP and demand for imported industrial machinery (Hapsari & Kurnia, 2018). As for oil-importing, this has been done to meet the domestic demand for transportation and industry usage since the production of domestic oil has been stagnant (Thirafi, 2020)[10]. Moreover, the presence of trade agreements such as the ASEAN Free Trade Area (AFTA) and ASEAN China Free Trade Area (ACFTA) that reduce trade barriers has also contributed to the increasing value of imports due to low domestic competitiveness and high domestic demand for Chinese products (Poetra, 2019; Syah & Fachrudin, 2020)

[10] Since 2010, Indonesia has been a net importer country of oil and gas products

Figure 7: Export Value, Import Value, and Its Growth in Indonesia (2000-2018)



Source: Indonesian Statistics (2021)

For Indonesia, some positive impacts from foreign trade to the country include foreign exchange earnings, business expansion, access to foreign supply, transfer of knowledge, and job creation. The degree of trade openness, to some extent, also poses a threat because many domestic businesses are not competitive enough to compete with foreign producers (Aswicahyono & Rafitrandi, 2018). Moreover, heavy reliance on imported inputs also reduces the willingness of domestic manufacturers to produce high-quality local products (Verico & Pangestu, 2020). Therefore, trade openness through various channels may affect the country's economic growth.

4. METHODOLOGY

4.1 Empirical Model

Based on the public debt literature, the issuance of public debt has both positive and negative impacts on economic growth**.** Moreover, the outcome of economic growth depends more on the composition of public debt than on the level of overall government debt **(**Hausmann & Panizza, 2011**).** On the other hand, the literature on the open economy suggests that trade openness can also significantly influence the dynamics of economic growth**.** From this theoretical point of view, the general model for this research is**:**

$$GDPG_t = \beta_0 + \beta_1 DEBTDOM_t + \beta_2 DEBTEX_t + \beta_3 TO_t + \varepsilon_t \quad (1)$$

The variable of the real GDP growth rate **(**GDPG**)** is the GDP growth rate at constant prices**.** This variable measures the overall economic output**.** Following Hausmann & Panizza **(**2011**)** by disaggregating the total public debt data according to its external and domestic creditors, this study uses the domestic component and external component of public debt**.** This can also be used to separately measure the relative effects of the domestic and external components of public debt on economic growth**.** The domestic component of public debt **(**DEBTDOM**)** is total gross public sector debt, all maturities, and all instruments by domestic creditors **(**nominal value in US Dollar**)** as a percentage of GDP**.** The external component of public debt **(**DEBTEX**)** is the total gross public sector debt, all maturities, and all instruments by external creditors **(**nominal value in US Dollar**)** as a percentage of GDP**.** Trade openness **(**TO**)** is the sum of exports and imports of goods and services divided by the gross domestic product**.** This variable

measures the degree of economic openness to international trade and reflects the domestic industrial policy choices towards international trade (Altayligil & Çetrez, 2020). All variables are transformed into natural logarithms.

This study uses quarterly data from 2010:Q1 to 2019:Q4 with 40 data observations of each variable. The data is taken from the World Bank-World Development Indicators (WDI), Quarterly Public Sector Database (QPSD), and Ministry of Finance. Table 1 below shows the descriptive statistics of the dataset in this study.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std.Dev	Min	Max
lgdpg	40	1.687505	0.0981781	1.563672	1.881605
ldebtdom	40	2.339739	0.0941286	2.168821	2.521285
ldebtex	40	2.697519	0.1248906	2.51868	2.860656
lto	40	3.802845	0.0901656	3.621361	3.948852

Source: Author's calculation

4.2 Symmetric Specification

This paper employs the Autoregressive Distributed Lag (ARDL) introduced by Pesaran et al. (2001), which presents the symmetric adjustments in the long and short run. The standard specification of the ARDL (*p*,*q*) model for this study is:

$$\begin{aligned}\Delta lgdpg_t = \alpha + \sum_{j=1}^{p-1} \gamma_j \Delta lgdpg_{t-j} \\ + \sum_{j=0}^{q-1} \varphi_{1j} \Delta ldebtdom_{t-j} + \sum_{j=0}^{q-1} \varphi_{2j} \Delta ldebtex_{t-j} + \sum_{j=0}^{q-1} \varphi_{2j} \Delta lto_{t-j} + \\ + \rho \text{lgdpg}_{t-1} + \theta_1 ldebtdom_{t-1} + \theta_2 ldebtex_{t-1} + \theta_3 lto_{t-1} + u_t\end{aligned} \quad (2)$$

where p and q are the lag associated with both the dependent variable and independent variables as regressors, $lgdpg_t$ denotes the growth of output, $ldebtdom_t$ is the proportion of domestic public debt creditors to total public debt, $ldebtex_t$ is the proportion of external public debt creditors to total public debt, and lto_t presents trade openness. The parameter α is for a constant regressor, Δ shows the first-differenced operator, p and q are the lags for the dependent and independent variables, and ρ is the autoregressive parameter. The long-run coefficients are $\theta_1, \theta_2, \theta_3$ while the short-run coefficients are $\gamma_j, \varphi_{1j}, \varphi_{2j}, \varphi_{3j}$. The u_t is an *i.i.d* stochastic process.

To ascertain the existence of cointegration, bound testing is tested by using two different critical values proposed by Pesaran *et al*. (2001) and Kripfganz & Schneider (2018). The latter produces a more robust result using a smaller sample size. Both methods present *F*-stat (F_{PSS}), introduced by Pesaran *et al*. (2001), which tests the joint null hypothesis of no cointegration (H_0: $\rho = \theta_1 = \theta_2 = \theta_3 = 0$) against a two-sided alternative hypothesis (H_0: $\rho \neq \theta_1 \neq \theta_2 \neq \theta_3 \neq 0$) and *t*-stat ($t_{BDM}$) proposed by Banerjee *et al*. (1998), which tests the null hypothesis of no cointegration ($H0: \rho = 0$) against a one-sided alternative hypothesis ($H1: \rho < 0$). For the former, the variables are cointegrated if the calculated F_{PSS} is higher than the upper-bound critical value of $I(1)$. As for the calculated *t*-test statistics, cointegration occurs when the t_{BDM} is lower than the critical value of $I(1)$.

4.3 Asymmetric Specification

To account for asymmetric relationships in the model, this paper uses the Non-Linear Autoregressive Distributed Lag (NARDL) developed by Shin et al. (2014). The

NARDL model modifies the ARDL model by incorporating the positive and negative partial sums of the regressors in both short-run and long-run relations in the system, that is:

$$x_t = x_0 + x_t^+ + x_t^- \quad (3)$$

where:

$$x_t^+ = \sum_{j=1}^{t} \Delta x_j^+ = \sum_{j=1}^{t} \max(\Delta x_j, 0) \text{ and } x_t^- = \sum_{j=1}^{t} \Delta x_j^- = \sum_{j=1}^{t} \max(\Delta x_j, 0) \quad (4)$$

such that the asymmetric long-run relationship can be written as:

$$y_t = \beta^+ x_t^+ + \beta^- x_t^- + u_t \quad (5)$$

where β^+ and β^+ are the parameters of the long-run asymmetric positive and negative impacts on y_t , respectively. Following Shin *et al*. (2014), this paper modifies Eq *(*5*)* with the ARDL *(p,q)* in Eq *(*2*)* to get the NARDL *(p,q):*

$$\begin{aligned} \Delta lgdpg_t = \alpha + & \sum_{j=1}^{p-1} \gamma_j \Delta lgdpg_{t-j} \\ & + \sum_{j=0}^{q-1} \big(\varphi_{1j}^+ \Delta ldebtdom_{t-j}^+ + \varphi_{1j}^- \Delta ldebtdom_{t-j}^- \\ & + \varphi_{2j}^+ \Delta ldebtex_{t-j}^+ + \varphi_{2j}^- \Delta ldebtex_{t-j}^- + \varphi_{3j}^+ \Delta lito_{t-j}^+ \\ & + \varphi_{3j}^- \Delta lito_{t-j}^- \big) + \rho \text{lgdpg}_{t-1} + \theta_1^+ ldebtdom_{t-1} \\ & + \theta_1^- ldebtdom_{t-1} + \theta_2^+ ldebtex_{t-1} + \theta_2^- ldebtex_{t-1} \\ & + \theta_3^+ lto_{t-1} + \theta_3^- lto_{t-1} + u_t \end{aligned} \quad (6)$$

where ${\beta_i}^+ = -\theta_i^+/\rho$ and ${\beta_i}^- = -\theta_i^-/\rho$ are the associated asymmetric long-run parameters, the signs *(+)* and *(−)* denote the positive and negative effects on y_t, *p* and *q* indicate the lag length for the dependent and independent variables, and u_t indicates the error term. According to Shin et al. (2014), the presence of asymmetric long-run dynamics in Eq. 5 exists if we reject the joint null hypothesis of no cointegration (H0: $\rho = \theta_1^+ = \theta_1^- = \theta_2^+ = \theta_2^- = \theta_3^+ = \theta_3^-$) by using the F_{PSS}, following Pesaran et al. (2001). Moreover, the null hypothesis of no cointegration ($\rho = 0$) can also be tested using the t_{BDM} statistics, following Banerjee et al. (1998). As for the lag order, I follow the general to specific from Shin et al. (2014) by specifying the max lag of $q = 4$ and $p = 4$.

To validate the long-run and short-run asymmetric impacts of regressors on the dependent variable, this paper uses the standard Wald test following Shin et al. (2014). The rejection of the null hypothesis of ${\beta_i}^+ = {\beta_i}^-$ would suggest there is a long-run asymmetric relationship between each regressor on y_t. On the other hand, the presence of a short-run asymmetric relationship exists if we reject the null of $\sum_{j=0}^{q-1} {\varphi_i}^+ = \sum_{j=0}^{q-1} {\varphi_i}^-$ for each regressor on y_t.

Having provided the asymmetric results, the next procedure is to develop the positive and negative dynamic multipliers associated with the unit changes in ${x_t}^+$ and ${x_t}^-$. These calculations are*:*

$$m_h^+ = \sum_{j=0}^{h} \frac{\partial y_{t+j}}{\partial x_t^+} \text{ and } m_h^- = \sum_{j=0}^{h} \frac{\partial y_{t+j}}{\partial x_t^-} \quad (7)$$

for x_t^+ and x_t^- , respectively. Note that as $h \to \infty$, then $m_h^+ \to \beta^-$ β+ and $m_h^+ \to \beta^+$. These multipliers capture the path of disequilibrium and the duration of disequilibrium following the perturbations in the regressors.

The symmetric and asymmetric models are also subjected to some diagnostic tests (the Breusch–Godfrey LM test for serial correlation, the Breusch–Pagan–Godfrey test for heteroskedasticity, the Ramsey Reset for specification test, and the CUSUM and CUSUMSQ stability tests) to ensure that the estimation results are statistically robust.

5. RESULTS

5.1 Checking the Conditions for Modeling

According to Jordan & Philips (2018), the criteria for modeling cointegration in the ARDL and NARDL is that the regressors are not of an order of integration higher than I(1), and the dependent variable must be *I(1)*. To check such criteria, this paper uses 3 stationary tests: Phillips-Perron (Phillips & Perron, 1988), Augmented-Dickey Fuller, or ADF test (Dickey & Fuller, 1979;1981), and Zivot-Andrews (Zivot & Andrews, 1992) with one structural break. The conclusion regarding the order of integration for each variable can be derived from the results of each variable's stationary test.

Table 2: Unit root test of stationarity

Variable	Phillips–Perron		ADF Test		Zivot - Andrews		Stationary
	Intercept	Trend	Intercept	Trend	*t*-stat	Break	
lto	-0.134	-2.256	0.444	-2.043	-3.915	2017q3	I (1)
Δlto	-4.979 ***	-5.355***	-4.705***	-5.082***	-3.262	2016q4	
lgdpg	-0.971	-1.421	-1.040	-1.121	-3.916	2014q1	I(1)
Δlgdpg	-6.201***	-6.384***	-1.881	-2.005	-8.528***	2015q1	
ldebtdom	-0.569	-3.162	-0.910	-3.208	-4.720	2015q3	I(1)
Δ ldebtdom	-9.890***	-11.294***	-10.525***	-11.582***	-12.429***	2016q3	
ldebtex	-0.611	-3.453	-1.003	-3.549*	-5.623***	2013q3	I(0) & I(1)
Δ ldebtex	-10.081***	-10.017***	-9.345***	-9.242***	-10.058***	2013q3	

Note: Δ is the first difference operator.

****,**,* show significance at the 1, 5, and 10 % levels, respectively*

The optimal lag structure for the ADF, PP, and Zivot-Andrews tests follows the AIC criteria

Source: Author's calculation

The results in Table 2 above suggest that the variables of *lto*, *lgdpg*, and *ldebtdom* are stationary in the first difference (i.e *I(1))*. Only variable of *ldebtex* is both stationary in level (i.e *I(0))* and in first difference (i.e *I(1))*. None of the variables are stationary in the second difference (i.e *I(2))*. Most importantly, the dependent variable *(lgdpg)* is also *I(1)*. This result satisfies the conditions for modeling with the symmetric (ARDL) and asymmetric (NARDL) specifications. Therefore, we can use the variables for the modeling process.

5.2 Symmetric Model

Table 3 presents the results of the bound tests by using Pesaran et al. (2001) and Kripfganz & Schneider's (2018) critical values. The tests show a rejection of the null hypothesis, which suggests a strong presence of a cointegration relationship in the symmetric (ARDL) model. In other words, there is a symmetric long-run relationship between the variables in the model.

Table 3: Cointegration Test for Linear ARDL (4,0,2,4)

Critical Values by	*F*- Stat	*t* - stat	Decision
Pesaran *et al.* (2001)	F_{PSS} = 6.293** *{I(0): 3.23}* *{I(1): 4.35}*	t_{BDM} = -4.069** *{I(0): -2.86}* *{I(1): -3.78 }*	Cointegration
Kripfganz & Schneider (2018)	F_{PSS} = 6.294** *[I(0): 3.546]* *[I(1): 5.126]*	t_{BDM} = -4.069** *[I(0): -2.860]* *[I(1): -3.828]*	Cointegration

*Note: This paper employs k=4 and use case 3 (unrestricted intercept and no trend) for testing the null hypothesis. *** and **show significance at the 1 and 5 % levels, respectively.*
FPSS is the F-statistic of Pesaran et al. (2001). tBDM is the t-statistics of Banerjee, Dolado, and Mestre (1998). Numbers inside the square brackets are the 5 % critical values for Kripfganz and Schneider (2018).
Numbers inside the curly brackets are the 5 % critical values for Pesaran et al. (2001).
Source: Author's calculation

Table 4 presents the results of the ARDL $(4,0,2,4)$[11] the model whose lags are chosen from a baseline framework of four lags based on the Akaike Information Criterion (AIC) and. The results from Panel A indicate that the coefficients for the domestic and external components of public debt are 0.749 and -1.080, respectively. Both coefficients are significant. Therefore, if the domestic component of public debt increases (decreases) by 1 %, then economic growth will increase (decrease) by 0.74 %. The relationship is positive and shows an inelastic impact. On the other hand, if the external component of public debt increases (decreases) by 1 %, economic growth will decrease (increase) by 1.08 %. The relationship is negative and shows an elastic impact. The finding is also similar to the study of Cholifihani (2008), Kuncoro (2011), and Sijabat (2020). Moreover, this empirical model suggests that economic growth will respond by a larger amount due to a shock of external debt rather than to a shock of domestic debt in the long run. Nevertheless, the variable of trade openness appears to be statistically insignificant in this model.

Table 4: ARDL Estimation Results [ARDL (4,0,2,4)]

Variables	Coefficient	Standard Error	*t*-statistic
PANEL A: Long-run coefficients			
$lgdebtdom_{t-1}$	0.749***	0.144	5.19
$lgdebtex_{t-1}$	-1.080***	0.174	-6.18
lto_{t-1}	-0.078	0.259	-0.30
PANEL B: Short-run coefficients			
$lgdpg_{t-1}$	0.194	0.141	1.38
$lgdpg_{t-2}$	0.294	0.157	1.87
$lgdpg_{t-3}$	0.423***	0.137	3.08
$\Delta ldebtdom$	0.303***	0.099	3.06
$\Delta ldebtex$	-0.145	0.090	-1.62
$\Delta ldebtex_{t-1}$	0.214***	0.060	3.56
Δlto	0.036	0.166	0.22
Δlto_{t-1}	0.043	0.116	0.37
Δlto_{t-2}	0.251**	0.123	2.03
Δlto_{t-3}	0.410***	0.146	2.81
Cons	1.271	0.509	2.81

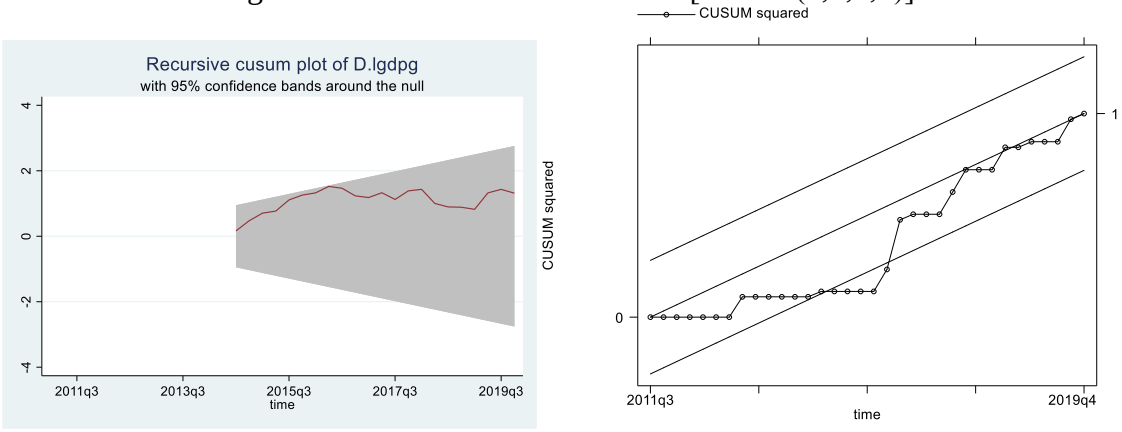
[11] The lag of the dependent variable is (4). Therefore, the lag incorporated into the ARDL model will be *p-1*, which is 3. By the same logic, this also applies to the lag of each independent variable which is (0,2,4). The lag in the model will be *q-1* which is (0,1,3). These lags in the model can be seen in Table 4, Panel B.

ECM_{t-1}	-0.404***	0.099	-4.07
PANEL C: Statistic and Diagnostic Test			
R-Squared = 0.7191			
HET = 0.66 (0.416)			
SC = 0.33 (0.563)			
RESET = 1.70 (0.200)			
CUSUM = 0.8813			
CUSUMSQ = weakly stable			

*Note: *** and ** show significance at the 1 and 5 % levels, respectively.*
HET is an LM test for heteroscedasticity (Breusch-Pagan), SC is an LM test for serial correlation (Breusch-Godfrey). p-value estimates are represented in parentheses. RESET performs a specification-error (Ramsey Reset) test for omitted variables. CUSUM and CUSUMSQ are for the parameter stability tests.
Source: Author's calculation

From Panel B, we can see that the error correction term (ECM_{t-1}) is negative and significant. Thus, if there is a short-run disequilibrium in economic growth, then it takes around 2.5 quarters to get back to its long-run equilibrium. Finally, Panel C presents that this symmetric model has a good fit. Figure 8 also shows that CUSUM is within the confidence bands. We can also see the result of CUSUMSQ tending to regain its stability. These results thus prove the model's stability.

Figure 8: ARDL Estimation Results [ARDL (4,0,2,4)]



Source: Author's STATA output

5.3 Asymmetric Model

Having established the symmetric analysis, this paper proceeds with the next analysis by using asymmetric analysis. Table 5 represents the results of bound testing for detecting cointegration. The result from Panel A shows that the FPSS and tBDM statistics reject the null hypothesis of no long-run relationship in the model. Thus, domestic public debt, external public debt, and trade openness differently influence output growth in both runs, with different impacts coming from positive and negative shocks in the long run. The results of the asymmetric test for each regressor against the response variable for both the short and long run are also presented.

Table 5: Bound Testing Asymmetric Tests

Panel A: Bound Testing for Asymmetric Cointegration			
F_{PSS} = 13.140***			
t_{BDM} =-2.830*			
Panel B: Long-run and Short-run Asymmetric Test			
Asymmetric Relation	Wald Statistic	χ^2statistic	Conclusion
ldebtdom → lgdpg	W_{LR}	4.87**	LR Asymmetric
	W_{SR}	12.62***	SR Asymmetric
ldebtex → lgdpg	W_{LR}	3.88**	LR Asymmetric
	W_{SR}	1.73	No SR Asymmetric
lto → lgdpg	W_{LR}	1.31	No LR Asymmetric
	W_{SR}	22.83***	SR Asymmetric

*Note: For Panel A, this paper employs k=4 and use case 3 (unrestricted intercept and no trend) for testing the null hypothesis. The 1% (10%) level of significance for FPSS (Pesaran et al., 2001) and tBDM (Banerjee et al., 1998) are 4.428 (2.660) and -3.430 (-2.570), respectively. The critical values are obtained from Pesaran et al. (2001). *** and * show significance at the 1 and 10 % levels. For Panel B, the null hypothesis is that the coefficients are symmetric. WSR and WLR denote the short- and long-run Wald statistic symmetries, respectively. ** and *** show significance at the 5 and 1 % levels, respectively.*

Source: Author's calculation

From Table 6 in Panel A, the value of ECT is -0.641 and significant, which validates the asymmetric cointegration. It also implies that the associated short-run shocks are corrected in less than two quarters in returning to its long-run equilibrium.

From Panel B, the positive partial shock of $\beta^{+}_{ldebtdom}$ is 1.608, and statistically significant, while the negative partial shock is insignificant. Therefore, a 1 % increase in the domestic component of public debt leads to a rise of 1.614 % of GDP growth. Still, the variable of domestic debt to GDP plays an important asymmetric role in GDP growth both in the short and long run, as suggested by the Wald test in Table 5. For the short-run results in Panel B, none of the parameters of the domestic component of public debt appears to be significant, even though its short-run behavior indicates an asymmetric relationship towards economic growth.

On the other hand, the positive partial shock of $\beta^{+}_{ldebtex}$, the external component of public debt, reduces economic growth by 0.8 % and is significant in the long run. The Wald test also suggests that asymmetric cointegration exists between external debt and economic growth in the long run, but not in the short run. From the short-run results, only the lag of the negative shock $\Delta ldebtex^{-}_{t-1}$ appears to be statistically significant.

Meanwhile, the estimation of $\beta^{+}_{lto}$is statistically insignificant, while the value of β^{-}_{lto} is significant. The significant result of a negative partial shock of trade openness indicates that a 1 % decrease in trade openness will improve economic growth by 1.64 % in the long run. In other words, a reduction in the trade sector in the economy will increase economic growth. This result contradicts the conventional theory, which postulates a positive relationship between trade openness and economic growth. This negative relationship between trade activities and economic growth might be attributable to exchange rate volatility, which leads to higher cost (Bustaman & Jayanthakumaran, 2006; Sugiharti *et al.*, 2020) and a combination of low productivity growth as well as a progression of labor costs (Aswicahyono & Rafitrandi, 2018). These circumstances may exacerbate external competitiveness and the trade balance. The variable of trade openness, however, only demonstrates the importance of the asymmetric contribution to short-run economic growth as suggested in Table 5.

Table 6: NARDL Estimation Results

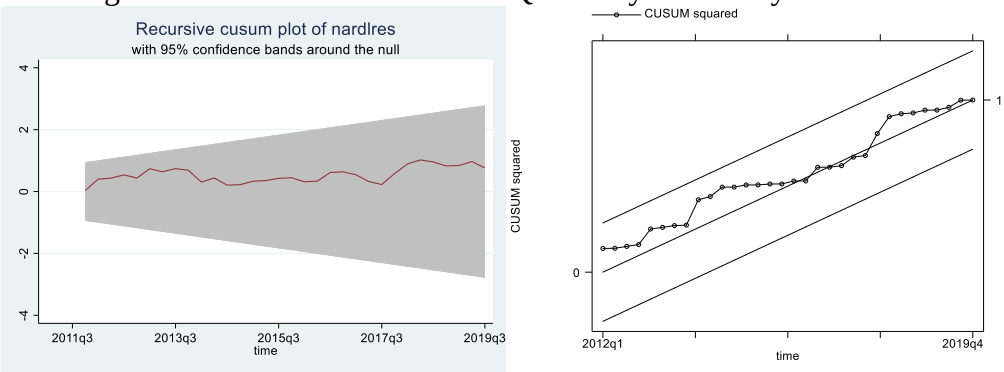
PANEL A: Long-run and short-run estimation of NARDL			
Dep Var: *lgdpg*	**Coefficient**	**Standard Error**	***t*-statistic**
$lgdpg_{t-1}$	-0.647***	0.228	-2.83
$ldebtdom^{+}_{t-1}$	1.041***	0.315	3.30
$ldebtdom^{-}_{t-1}$	0.051	0.321	0.16
$ldebtex^{+}_{t-1}$	-0.520***	0.172	-3.02
$ldebtex^{-}_{t-1}$	-0.124	0.329	-0.38
lto^{+}_{t-1}	-0.113	0.132	-0.86
lto^{-}_{t-1}	1.061***	0.320	3.31
$\Delta lgdpg_{t-1}$	0.104	0.159	0.66
$\Delta ldebtdom^{+}_{t}$	0.685	0.163	4.20
$\Delta ldebtdom^{+}_{t-1}$	-0.048	0.200	-0.24
$\Delta ldebtdom^{-}_{t}$	-0.194	0.196	-0.99
$\Delta ldebtdom^{-}_{t-1}$	-0.079	0.249	-0.29
$\Delta ldebtex^{+}_{t}$	-0.168	0.121	-1.38
$\Delta ldebtex^{+}_{t-1}$	0.149	0.121	1.25
$\Delta ldebtex^{-}_{t}$	0.314	0.219	1.43
$\Delta ldebtex^{-}_{t-1}$	0.506**	0.195	2.59
Δlto^{+}_{t}	0.485	0.273	1.78
Δlto^{+}_{t-1}	0.578**	0.233	2.48
Δlto^{-}_{t}	0.629**	0.225	2.79
Δlto^{-}_{t-1}	-0.201	0.201	-1.00
Cons	1.191**	0.425	2.80
PANEL B: Asymmetric Long-Run Relationship			
$\beta^{+}_{ldebtdom}$	1.608 (0.000)***		
$\beta^{-}_{ldebtdom}$	-0.080 (0.876)		
$\beta^{+}_{ldebtex}$	-0.804 (0.000)***		
$\beta^{-}_{ldebtex}$	0.192 (0.724)		
β^{+}_{lto}	-0.175 (0.380)		
β^{-}_{lto}	-1.639 (0.000)***		
PANEL C: Statistic and Diagnostic Test			
R-Squared = 0.8117			
HET = 5.39 (0.020)			
SC = 1.592 (0.207)			
RESET = 1.35 (0.277)			
CUSUM = 0.5344			
CUSUMSQ = Strongly Stable			

*Note: *** and ** show significance at the 1 and 5 % levels, respectively. The superscripts "+" and "−" denote positive and negative partial sums, respectively. p-value estimates are represented in parentheses.* β^{+} *and* β^{-} *are the estimated asymmetric long-run coefficients associated with positive and negative changes, respectively, defined by* $\hat{\beta}^{+} = -\hat{\theta}^{+}/\hat{\rho}$ *and* $\hat{\beta}^{-} = -\hat{\theta}^{-}/\hat{\rho}$.
SC and HET denote the LM Breusch–Godfrey tests for serial correlation and the Breusch–Pagan–Godfrey heteroskedasticity test, respectively. RESET performs a specification-error (Ramsey Reset) test for omitted variables. CUSUM and CUSUMSQ are for the parameters of the stability tests. The models have been estimated following the general-to-specific approach with maximum lag length 4.
Source: Author's calculation

Panel C presents that this asymmetric model has a good fit. Figure 9 also shows that CUSUM and CUSUMSQ are within the confidence bands, which proves the model's stability. Finally, Figure 10 shows the dynamic multiplier that explores the temporal dynamics and confirms the asymmetric impact of the model. The green and red lines show the impact of positive and negative changes, respectively. We can see that a positive

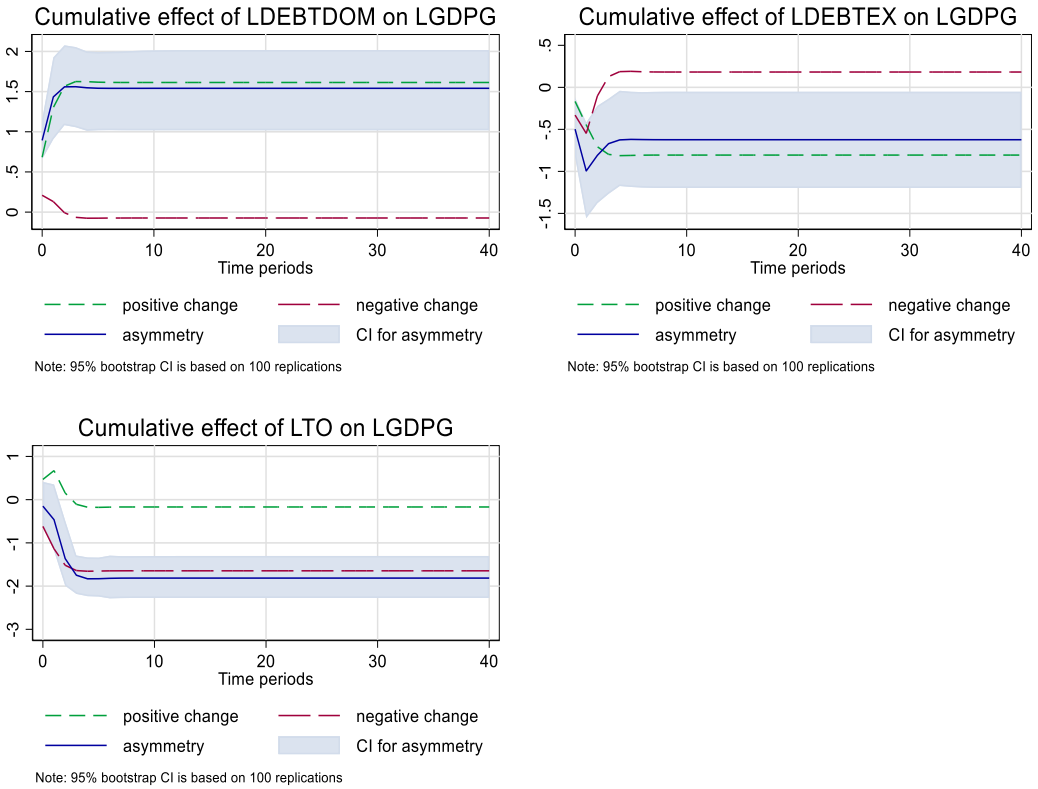
shock of domestic debt is more sensitive to economic growth than its negative shock. It takes about two to three quarters for the domestic component of public debt to increase and decrease to work through its effects until a relatively stable state is reached. The external component of public debt on economic growth is also more sensitive compared to its negative shock. As for trade openness, a declining value of this variable has a bigger and more positive impact on economic growth. Its equilibrium is achieved at around three quarters after the shock.

Figure 9: CUSUM and CUSUMSQ stability for the asymmetric model



Source: Author's STATA output

Figure 10: Dynamics Multiplier



Source: Author's STATA output

To conclude, the results from the asymmetric model suggest that an increase in domestic public debt could spur economic growth, while an increase in external public debt could dampen output growth. On the other hand, a decrease in trade openness will have a positive impact on long-run economic growth.

6. CONCLUSION

Empirically, this study found that the relationship between economic growth, public debt, and trade openness can be symmetric or asymmetric. Despite having different sizes of impacts, the findings from both the symmetric and asymmetric models confirm that the use of external debt has a detrimental effect on economic growth. This conclusion is also supported by the study of Cholifihani (2008) and Sijabat (2020). On the other hand, the use of domestic public debt has a long-run positive relationship with economic growth in the case of Indonesia, which aligns with the study of Sijabat (2020).

On the one hand, the use of domestic public debt tends to be safer for some reasons: lower exposure to currency risks and capital flow reversal, improved financial sector deepening, and reduced the risk of sovereign default. While the use of external public debt in this paper empirically entails a detrimental effect on economic growth, on the other hand, the use of domestic debt may crowd out private lending in the financial sector and reduce efficiency in the banking sector. This could happen since the majority of government bonds in Indonesia are held domestically and dominated by commercial banks (33.69 percent) and the central bank (14.87 percent).

Moreover, the push factor of the crowding-out effect in the Indonesian banking sector could be coming from the spread between the return on government bonds (around 6.42 percent) and the return deposit rate (just around 5 percent). In this case, the tighter credit condition might be faced by the banks in the category of BUKU 3 (core capital between 350 million US dollars and 2 billion US dollars) and BUKU 4 (core capital of more than 4.8 billion US dollars), which are top-tier banks (Triggs et al., 2019). Therefore, to further limit the adverse impact of public debt on economic growth, a sound domestic policy environment, such as price stability, fiscal discipline, monetary and fiscal authority coordination, and institutional improvement, is necessary.

On the other hand, this study only found a significant impact of openness on economic growth in the asymmetric model, suggesting that reducing trade openness contributes to an increase in economic growth in the long run. This negative effect of trade openness on economic growth also supports the previous study of Nurjanah (2013) and Irzam & Setyari (2020). The fact that the growth of imports was on average higher than the growth of exports from 2009 to 2018 also supports the argument that a higher degree of trade openness may negatively impact economic growth in the long run for Indonesia.

In the context of Indonesia, the biggest trading partners in terms of values in the last 10 years are China, Japan, Singapore, the United States, and India (WITS, 2021). In 2019, these countries contribute to around 53 percent of Indonesia's total import value and 51 percent of its total export value. With China alone, Indonesia calculated 72.8 billion US dollars of trade value despite having a 17 billion US Dollar trade deficit in 2019. The China-Indonesia trade value was more than 2 times higher compared with Singapore (only 30.4 billion US Dollars) and 3 times bigger in terms of trade deficits (only 4.6 billion US Dollars). As with the US, Japan, and India, Indonesia calculated positive trade balances of 8.5 billion US Dollars (total trade value of 28 billion US Dollars), 341 million US Dollars (total trade value of 31 billion US Dollars), and 7.5 billion US Dollar (total trade value of 15 billion US Dollar), respectively.

The trade deficit with the biggest trading partners (especially China) is caused by the import of a wide range of consumer, electronic, and intermediary goods. These imported products come from labor-intensive-based industries, which actually can be produced in Indonesia. This should have created job opportunities and improved the

domestic supply chain in the long run. However, lack of labor productivity and product competitiveness has resulted in the domestic demanders preferring importing from overseas rather than buying from domestic producers. Therefore, if Indonesia keeps increasing its trade sector, knowing that Indonesia has a trade deficit with some strategic partners and less competitive domestic supply, it will adversely impact its economic growth.

Based on the aforementioned arguments, this study recommends some policy options. First, develop a more robust government bond market for domestic creditors. This can be done by broadening the domestic investor base, such as individual holders or households holders, improving domestic investors' capacity to make investments in government bonds, diversifying government bonds, and creating a more robust domestic saving system. These can help the government to mobilize domestic investment in funding development agendas and to limit the reliance on external funding. Second, while the government's external debt position remains safe due to 99 percent counted for long-term maturity debt (Bank of Indonesia, 2021), it is important to keep maintaining the short- term external debt payment to show credibility and increase the international reserves to build greater resilience towards external shock. Moreover, the improvement of sovereign credit ratings also becomes a policy option to ensure the ease of issuing external debt in the international financial market. Third, the degree of trade openness can have impacts through various channels. On the one hand, Indonesia can generate a positive net effect due to globalization through the structural transformation process created from the demand side (Verico & Pangestu, 2020). Nevertheless, this requires developing a more robust and consistent industrial sector that can compete with global products. Thus, improving sectoral productivity through research, education, and industrial funding is the prerequisite to fostering industrial champions.

Finally, the purpose of this study is limited to measuring the direct symmetric and asymmetric impact of public debt and trade openness on economic growth by using an ad hoc empirical model. In addition, the use of NARDL has assumed a zero threshold and is likely to become restrictive once the current circumstances have changed (Fousekis et al., 2016). Future research may elaborate on the channels or effects through which public debt and trade affect economic output. At the same time, improving the empirical model by deriving it from more established macroeconomic models and using a sample of many countries has become an interesting avenue for future research.

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