The Effects of Domestic Demand and Export on Economic Growth of North Sumatra

Abstract

The objective of this study is to investigate the roles of domestic demand and export in the economic growth of North Sumatra, Indonesia. Specifically, this study examined: (i) the effect of domestic demand and export on economic growth, (ii) the effect of domestic demand components (i.e., private consumption, government consumption, and investment) on economic growth, and (iii) causal relationships between domestic demand, export, and economic growth. Using the autoregressive distributed lag (ARDL) bound test to cointegration, the study revealed that North Sumatra's economic growth is not driven by export. Export and economic growth do not affect each other, whereas domestic demand and economic growth influence each other dynamically. In the short-run, private consumption and investment have positive and significant effects on economic growth. However, in the long-run, only private consumption has a significant effect. ARDL Granger causality analysis showed that in the short-run, only private consumption has a causal relationship with economic growth. The absence of the causal relationships between both investment and government expenditure and economic growth indicates that the export sector, which is growing rapidly in both monetary terms and its shares in the regional gross domestic products (GDP), is isolated from the regional economic activities.

INTRODUCTION

Globalization and economic liberalization since the 1990s have caused an interdependence among the nations worldwide. Although the phenomenon of globalization has contributed to the prosperity of the global economy through trade liberalization and capital transfers, the financial crisis since 1994 (Mexico) revealed the risks of unprecedented financial integration in economic history. In fact, according to Shangquan (2000), economic globalization has expanded rather than reduced the gap between the North and South. In addition, developing countries have risks of being concussed by unfavorable external factors.The study also highlighted that "under open economic conditions, the conflict between the realization of external economic equilibrium and that of internal economic equilibrium is a great constraint on the macroeconomic policies of developing countries, weakening their capacity of macroeconomic control and regulation". From a monetary point of view, Renasih, Agustin & Wulandari (2016) illustrated how the Federal Fund Rate (FFR) of the United States (US) has a positive and significant effect on the BI (Bank Indonesia) rate.

Global economic integration has grown developing countries relying more than ever on the access to international markets (Palley, 2011). Logut (2015) illustrated the

risks of interdependence with the 2008 financial crisis in the US, which triggered economic problems in various parts of the world. On the other hand, financial crises take place more frequently with shorter distances from one crisis to another. In 90 years (i.e., from 1901 to 1990), there were 11 financial crises occurred. Nevertheless, in the last 30 years (from 1991 to 2018), the world experienced 17 crises, and 10 of them took place in the 21st century (from 2001 to 2018).

Apart from debates about the root causes of the financial crises, whether the breakdown of the Bretton Woods System in the 1970s when the US broke the dollar's peg to gold (Detrixe, 2017), banking panics and fraud (Mishkin, 1991), speculation (Shanquan, 2000), or as a consequence of the Washington Consensus (Williamson, 1990 and 2000; Palley, 2002; Stiglitz, 2006), the financial crises will certainly occur (Detrixe, 2017) and give significant impacts on the world economy as an aggregate of the negative impacts experienced by individual countries, especially developing countries that are vulnerable to external shocks.

The financial crises in Mexico (1994), Asia (1997), Russia (1998), and Brazil (1999) were responded by crisis-hit governments with the efforts to switch from export-led growth (ELG) to a more domestic demand-led growth (DDLG) strategy (Felipe & Lim, 2005; Tsen, 2010). The development of thoughts on the assessment of the importance of domestic demand as a response to the global financial crisis was motivated by the view of Palley (2002), who identified the negative impacts of ELG strategy. Felipe and Lim (2005) and Tsen (2010) highlighted the impacts are as follows: (i) it inhibited growth and development of the domestic markets, (ii) it forced fellow developing countries to compete to the bottom among themselves, (iii) it put workers in developing countries in conflict with workers from developing economies, (iv) it blamed for financial instability by creating overinvestment boom, (v) the over-emphasis on international markets could aggravate the deterioration in terms of the trades of developing economies in the long-run, and (vi) it reinforced the dependency of developing countries on the developed economies. In short, export-oriented economies are very dependent on foreign demands. However, if there is a recession in the international markets, developing countries will experience the effects of slowing economic growth. It is the reason why ELG was criticized and suffered from a fallacy of composition as it assumed that all countries can grow by depending on the demand growth from other countries (Palley, 2002; Felipe & Lim, 2005; Tsen, 2010).

The development of technical analysis from correlations and econometrics models of ordinary least square (OLS) to causality analysis supported by the availability of more complete data to enable disaggregation, decomposition, and grouping of data according to the needs of the analyses, showed that the relationship between exports and economic growth is not as simple as when the view 'export as engine of growth' was popularized by Nurkse in 1965 (Tampubolon & Nababan, 2018). A study by Anwer & Sampath (1997) of 96 countries documented that only 6 countries experienced economic growths as a result of export development, while the rest showed diverse relationships. On top of that, the study highlighted that 30 countries did not show any causal relationship between exports and economic growth. Mixed findings were also reported by Yang (2008) and Konya (2004) through their studies among the countries incorporated in the Organization for Economic Co-operation and

Development (OECD). In detail, variations in the relationship between exports and economic growth include the followings (Anwer & Sampath, 1997; Lee & Huang, 2002; Konya, 2004; Tsen, 2010):

(i) ELG, in which export activities encourage economic growth as a positive impact of outward-oriented trade policy on technological change, labor productivity, capital efficiency, and ultimately on production.

(ii) Growth-led export (GLE), in which economic growth encourages trade flows. This can be sourced from two factors; (a) economic growth leads to enhancement of skills and technology, which subsequently increases efficiency and creates a comparative advantage for the country that facilitates exports and market failure, with subsequent government intervention.

(iii) A reciprocal relationship (bi-directional causal relationship or feedback causality) between exports and economic growth.

(iv) A simple contemporary relationship between exports and economic growth.

(v) The negative causality of economic growth towards export growth. This would be likely to occur if consumer demands are concentrated in exportable and non-tradeable goods in which case an increase in domestic demand would increase outputs but decrease exports.

Those are the reasons why recent studies have empirically rejected the view that ELG strategy is one of the causes of the financial crises, especially in Asia as Palley's view promoted DDLG as a new paradigm of development (Palley, 2002; 2011). It is not the ELG strategy that contributed to the crises, rather it is the promotion of debt-financed domestic demand growth at the expense of net exports (i.e. increasing trade deficit) (Felipe & Lim, 2005).

Focusing on the DDLG strategies among the export-oriented Asian economies is a reaction to the prolonged weakness in the advanced economies (the US, Japan, and European Union) in the aftermath of the 2008/2009 global financial crises (Yeah, 2017). Similar views were also developed between countries in the European transition (Saglam & Egeli, 2018), Latin America (Alvarado, Ochoa-Jimenez, & Garcia-Tinisaray, 2018) and Africa (Keho, 2018). Likewise, all studies concluded that the shift from ELG to DDLG cannot be seen as"either-or"menu choice, rather it aims at optimizing the countries' growth potential as well to strengthen their national competitiveness. Even, Palley (2002), as a prominent figure in promoting DDLG as a new paradigm, held the view that developing countries must still participate in exports to obtain foreign exchange to finance imports that are considered more efficient than foreign debts. The similar stance was also hold by Tsen(2010) and Felipe & Lim (2005). For this reason, Lian (2004) introduced the term "dual-track" strategy, which relies on external demand (first-track) and simultaneously develops domestic demand and supports domestic enterprise (second-track). This is in line with the conclusion from Felipe & Lim (2005), which stated that the more successful phase of development was associated with the significant increment of investment, capital accumulation, and significant export growth that caused trade surpluses or reductions in trade deficits. It was proven as shown by China and India during the mid of 2000 (post-crisis of Thailand), where both countries experienced the best

periods when both domestic demand and exports exhibited significant continuous growth and improvement.

The DDLG criteria were first introduced by Felipe & Lim (2005) and followed by other researchers, such as Wong (2008), Tsen (2010), Yeah (2017), and Saglam & Egeli (2018). The criteria are as follows:(i) gross domestic product (GDP) grows as domestic demand is growing, and net exports are deteriorating, or (ii) domestic demand and net exports are growing, however, domestic demand is growing faster. The domestic demand itself is an economic component of the Keynes'four economic sectors, except for net export, which is total exports minus total imports. Thus, domestic demand consists of private consumption, government consumption, and investment, which are popular with the symbols C, G, and I in the macroeconomics textbook (Mankiew, 2016).

Similar to the relationship between exports and economic growth, theoretically the relationship between domestic demand and economic growth is also not monotonic but varies (Keho, 2018) as follows: (i) domestic demand affects economic growth, (ii) economic growth affects domestic demand, and (iii) bi-directional relationship. Since the domestic demand consists of three components, the relationship between overall domestic demand and economic growth and the relationship between every component of domestic demand and economic growth are different, as found by Wong (2008) among five ASEAN countries (i.e., Indonesia, Malaysia, the Philippines, Singapore, and Thailand).There is a Granger causality between either private consumption or government consumption and GDP per capita. However, the relationship between investment and economic growth is less conclusive. In China, bi-directional causality was found in the relationship between domestic demand and economic growth (Tsen, 2010), while in Cote d'Ivoire, there is a one direction causality from domestic demand to economic growth, and from both private consumption and government consumption to GDP (Keho, 2018). In Bangladesh (Islam & Hossain, 2015), household consumption and export influenced economic growth in both the short-run and in the long-run. However, economic growth had an impact on domestic demand in the short-run, but in the long-run, it only had an impact on household consumption. Whereas, in Brazil (Bakari, Fakraoni & Tiba, 2019), domestic investments had bi-directional causality with economic growth.

All the aforementioned studies emphasized that it is better for macroeconomic policy to consider a balance between ELG and DDLG strategies for sustainable economic growth because DDLG strategies can help to offset the weak export demand prevailing during and post-financial crisis periods. The complementarity of the two strategies can be summarized from the identification of the disadvantages of one strategy as a reverse mirror of other benefits, and *vice-versa*. In comparison to ELG strategies, DDLG offers the following advantages (Yeah, 2017): (i) reduces vulnerability to a global demand shock. Given the increasing volatility and unpredictability of international markets and doubts over the ability of advanced economies to absorb all exports from developing countries, the DDLG strategy will lead to more stable and sustainable growth, (ii) prospects for abetter quality of growth. The pursuit of export growth to the extreme mercantilism, where trade is

viewed as a zero-sum game, may entail sacrificing labor and human rights and environmental standards, leading to a worse outcome than a DDLG approach that takes such concerns into consideration, (iii) develops a more balanced economy and full utilization of resources. The production of goods and services that caters to foreign demand tends to be highly concentrated, leading to unbalanced growth and more pronounced income inequality. A DDLG strategy, on the other hand, can lead to more optimal utilization of resources.

This study aims to investigate the role of domestic demand in the economic growth of North Sumatra, a province in Indonesia that has a strategic position in the international trade with high trade openness compared to Indonesia's average. North Sumatera hada trade index between 50 and 78 with an upward trend, besides having a relatively stable export index between 34 and 43, and always recorded a surplus in the balance of trade for the past two decades. Specifically, the purpose of the study is to investigate: (i) the effect of domestic demand and exports on economic growth, (ii) the effects of each component of domestic demand (i.e., private consumption, government consumption, and investment) on economic growth, and (iii) causal relationship between domestic demand, export, and economic growth. The second objective is theoretically analyzed by following the Keynesian models, which give emphasis to sources of aggregate demand.

METHODS

In analyzing the effect of domestic demand and exports on economic growth, domestic demand was considered in aggregate and per component. As suggested by Tampubolon & Nababan (2019), financial sector development was assigned as a control variable due to its important role in economic growth and exports in North Sumatra. Economic growth was measured by regional GDP (symbolized by GDP), private consumption (PRIVC, i.e., household consumption plus the consumption of social institutions and other non-governmental institutions), government consumption (GOVC), investment (INV; measured by capital formation), net export (EXP, i.e., exports minus imports) and financial development (FD, i.e., total domestic credit to the private sector). All data was in million Rupiah constant price (2010 = 100) and transformed to logarithmic form. Financial development data was obtained from the representative office of Bank Indonesia (Indonesia's Central Bank) in North Sumatra, and other data was available at the North Sumatra Central Statistics Agency, which was published annually in "North Sumatra in Figure". The data set covers the period 2000 - 2018.

This study used an autoregressive distributed lag (ARDL) bound test for cointegration as an analysis tool. ARDL approach is an OLS-based dynamic econometric model. This model was considered superior for small samples and does not require the necessity of a stationary variable in the same order, as long as it is still in I (0) and I (1) (Pesaran& Shin, 1999; Pesaran, Shin & Smith, 2001). In addition, ARDL also allows procedures on variables with different lags. Through a simple transformation, the ARDL model can derive a dynamic error correction model (ECM) that integrates the short-run dynamic and the long-run equilibrium. These properties have made the ARDL bound test to cointegration increasingly popular and widely

used recently, including Acaravci & Ozturk (2012); Shahbaz & Rahman (2012); Belloumi (2014); Shahbaz, Rehman & Taneem (2014); Furuoka (2018); and Dritsaki & Stamatio (2019).

Referring to Asteriou & Hall (2007: 204), long-term equations with lag *p* formulated as equation (1). With lag *p*, the period required for changes in the independent variable (X_t) to affect the dependent variable (Y_t) is $p + 1$ period.

$$Y_t = \quad + \quad_0 X_t + \quad_1 X_{t-1} + \quad_2 X_{t-2} + \dots + \quad_p X_{t-p} + \quad_t$$
$$= \quad + \sum_{j=0}^{p} \beta 1 X_{t-i} + \quad_t \tag{1}$$

The ARDL bound test to cointegration involves two steps (Pesaran, Shin & Smith, 2001). The first step is to investigate the existence of a long-term relationship between all variables in the estimated equation. The ARDL model for standard log-linear functional specifications of the long-term relationship between economic growth (GDP), domestic demand (DD), exports (EXP) and financial development (FD) was formulated as follows:

$$LGDP_t = \quad_{01} + \sum_{i=0}^{k} \alpha_{1i} \, LDD_{t-i} + \sum_{i=0}^{k} \alpha_{2i} \, LEXP_{t-i} + \sum_{i=0}^{k} \alpha_{3i} \, LFD_{t-i} + \quad_t \tag{2}$$
$$LDD_t = \quad_{02} + \sum_{i=0}^{k} \alpha_{1i} \, LGDP_{t-i} + \sum_{i=0}^{k} \alpha_{2i} \, LEXP_{t-i} + \sum_{i=0}^{k} \alpha_{3i} \, LFD_{t-i} + \quad_t \tag{3}$$
$$LEXP_t = \quad_{03} + \sum_{i=0}^{k} \alpha_{1i} \, LGDP_{t-i} + \sum_{i=0}^{k} \alpha_{2i} \, LDD_{t-i} + \sum_{i=0}^{k} \alpha_{3i} \, LFD_{t-i} + \quad_t \tag{4}$$

The next step is cointegration testing through ARDL bound test to cointegration. For this purpose, the ECM unrestricted equations are formulated as follows:

$$\Delta LGDP_t = \alpha_1 + \alpha_2 \, LGDP_{t-1} + \alpha_3 \, LDD_{t-1} + \alpha_4 \, LEXP_{t-1} + \alpha_5 \, LFD_{t-1} +$$
$$\sum_{i=0}^{n} \alpha_{GDP} \, \Delta LGDP_{t-i} + \sum_{j=0}^{p} \alpha_{DD} \Delta LDD_{t-k} + \sum_{k=0}^{q} \alpha_{EXP} \, \Delta LEXP_{t-k} +$$
$$\sum_{l=0}^{r} \alpha_{FD} \, \Delta LFD_{t-l} + \mu_t \tag{5}$$
$$\Delta LDD_t = \emptyset_1 + \emptyset_2 \, LDD_{t-1} + \emptyset_3 \, LGDP_{t-1} + \emptyset_4 \, LEXP_{t-1} + \emptyset_5 \, LFD_{t-1} +$$
$$\sum_{i=0}^{n} \emptyset_{DD} \, \Delta LDD_{t-i} + \sum_{i=0}^{n} \alpha_{GDP} \, \Delta LGDP_{t-i} + \sum_{k=0}^{q} \emptyset_{EXP} \, \Delta LEXP_{t-k} +$$
$$\sum_{l=0}^{r} \emptyset_{FD} \, \Delta LFD_{t-l} + \mu_t \tag{6}$$
$$\Delta LEXP_t = \emptyset_1 + \emptyset_2 \, LEXP_{t-1} + \emptyset_3 \, LGDP_{t-1} + \emptyset_4 \, LDD_{t-1} + \emptyset_5 \, LFD_{t-1} +$$
$$\sum_{i=0}^{n} \emptyset_{EXP} \, \Delta EXP_{t-i} + \sum_{i=0}^{n} \alpha_{GDP} \, \Delta LGDP_{t-i} + \sum_{k=0}^{q} \emptyset_{DD} \, \Delta LDD_{t-k} +$$
$$\sum_{l=0}^{r} \emptyset_{FD} \, \Delta LFD_{t-l} + \mu_t \tag{7}$$

The presence of cointegration can be seen from the F-statistic comparison by following the null hypothesis of no cointegration namely:

$$H_0 : \alpha_{GDP} = \alpha_{DD} = \alpha_{EXP} = \alpha_{FD} = 0, \text{ and}$$
$$H_0 : \emptyset_{DD} = \emptyset_{GDP} = \emptyset_{EXP} = \emptyset_{FD} = 0,$$

against the alternative hypothesis of cointegration:

$$H_a : \alpha_{GDP} \neq \alpha_{DD} \neq \alpha_{EXP} \neq \alpha_{FD} \neq 0, \text{ and}$$
$$H_a : \emptyset_{DD} \quad \emptyset_{GDP} \neq \emptyset_{EXP} \neq \emptyset_{FD} \neq 0,$$

Cointegration does exist if the F-statistic is greater than the upper critical bound (UCB). The decisions about long-term relationships cannot be concluded if the F-statistic calculation lies between a lower critical value (lower critical bound = LCB) and a higher critical value (UCB), while a value smaller than LCB indicates the absence of a long-term relationship (see e.g. Shahbaz & Rahman,(2012). The cointegration indicates a causal relationship from at least one direction. Granger suggested that the cointegration between variables indicates that there is information about long-term and short-term causal relationships. For this purpose, the autoregression vector (VAR) model was applied, which is known as the vector error correction model (VECM) in the multivariate counterpart of ECM (error correction mechanism) (Gujarati, 2012: 277).

After estimating the long-run relationships between the variables, the direction of causality was examined by using the ECM-ARDL model. The equation used for the Granger causality test was formulated as follows:

$$
\begin{bmatrix} LGDP_t \\ LDD_t \\ LEXP_t \\ LFD_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \end{bmatrix} + \sum_{i=1}^{q} \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} \end{bmatrix} \begin{bmatrix} LGDP_{t-q} \\ LDD_{t-q} \\ LEXP_{t-q} \\ LFD_{t-q} \end{bmatrix} + \begin{bmatrix} \lambda_1 \\ \lambda_2 \\ \lambda_3 \\ \lambda_4 \end{bmatrix} ECM_{t-1} + \begin{bmatrix} \pi_{1t} \\ \pi_{2t} \\ \pi_{3t} \\ \pi_{4t} \end{bmatrix}
$$

(8)

where i ($i = 1 \ldots q$) is the optimal lag length, which is determined by the Akaike information criterion (AIC), ECM_{t-1} is the lagged residual obtained from the long-run ARDL relationship presented in equation (2), (3) and (4), λ_1, λ_2, λ_3, λ_4 are the adjustment coefficients and $\pi_{1t}, \pi_{2t}, \pi_{3t}, \pi_{4t}$ are the disturbance terms, which are assumed to be uncorrelated with zero means N (0, ^{2}).

If the cointegration does not exist, then the valid result is the estimated parameter of the ARDL model as in equations (2), (3) and (4). In the case of cointegration, the ARDL model is transformed into an error correction regression model (ECM) to obtain the short-run equation. For this purpose, the ECM-ARDL for economic growth was formulated as follows:

$$
LGDP_t = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i} \, LGDP_{t-1} + \sum_{i=0}^{q1} \alpha_{2i} \, LDD_{t-1} + \sum_{i=0}^{q2} \alpha_{3i} \, LEXP_{t-1} + \sum_{l=0}^{q3} \alpha_{4i} \, LFD_{t-l} + \lambda_1 ECM_{t-1} + e_{1t}
$$

(9)

Where $_1$ is an error correction term (ECT), which shows an adjustment of the short-run model that is not in equilibrium towards its long-run equilibrium according to equation (2) with an absolute value $_1$ is the speed of adjustment. While the equation model for domestic demand was as follows:

$$
LDD_t = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i} \, LDD_{t-1} + \sum_{i=0}^{q1} \alpha_{2i} \, L‰DP_{t-1} + \sum_{i=0}^{q2} \alpha_{3i} \, LEXP_{t-1} + \sum_{l=0}^{q3} \alpha_{4i} \, LFD_{t-l} + \lambda_2 ECM_{t-1} + e_{2t}
$$

(10)

in this case, λ_2 is an error correction term that integrates the domestic demand short-run equation with equation (3) as its long-run equation. Next, the equation model for export was formulated as in equation (11):

$$LEXP_t = \alpha_0 + \sum_{i=0}^{n}\alpha_{1i}\ LEXP_{t-1} + \sum_{i=0}^{q1}\alpha_{2i}\ LGDP_{t-1} + \sum_{i=0}^{q2}\alpha_{3i}\ LDD_{t-1} +$$
$$\sum_{l=0}^{q3}\alpha_{4i}\ LFD_{t-l} + \lambda_2 ECM_{t-1} + e_{2t} \tag{11}$$

The same steps were taken in analyzing the relationship between the components of domestic demand and economic growth with the long-run equation as follows:

$$LGDP_t = \beta_{01} + \sum_{i=0}^{k}\beta_{1i}\ LPRIVC_{t-i} + \sum_{i=0}^{k}\beta_{2i}\ LGOVC_{t-i} + \sum_{i=0}^{k}\beta_{3i}\ LINV_{t-i} + \varepsilon_t \tag{12}$$
$$LPRIVC_t = \beta_{01} + \sum_{i=0}^{k}\beta_{1i}\ LGDP_{t-i} + \sum_{i=0}^{k}\beta_{2i}\ LGOVC_{t-i} + \sum_{i=0}^{k}\beta_{3i}\ LINV_{t-i} + \varepsilon_t \tag{13}$$
$$LGOVC_t = \beta_{01} + \sum_{i=0}^{k}\beta_{1i}\ LGDP_{t-i} + \sum_{i=0}^{k}\beta_{2i}\ LPRIVC_{t-i} + \sum_{i=0}^{k}\beta_{3i}\ LINV_{t-i} + \varepsilon_t \tag{14}$$
$$LINV_t = \beta_{01} + \sum_{i=0}^{k}\beta_{1i}\ LGDP_{t-i} + \sum_{i=0}^{k}\beta_{2i}\ LPRIVC_{t-i} + \sum_{i=0}^{k}\beta_{3i}\ LGOVC_{t-i} + \varepsilon_t \tag{15}$$

Furthermore, the cointegration test, error correction regression, and ARDL Granger causality analysis were conducted as in the analysis of the relationships between economic growth, domestic demand, export, and financial development variables that were formulated in equations (5) to (11).

RESULTS AND DISCUSSIONS
Figure 1 presents the contribution of the main variables forming the GDP of North Sumatra based on the aggregate expenditure. The figure shows the importance of domestic demand with a proportion of 81% - 95% with an increasing trend. As in most developing countries, private consumption was the main contributor (55% - 63%), although the trend is declining. The investment was increasing in the proportion between 13% and 32% while government consumption was relatively stable at 7% - 10% level. Saving was also relatively stable at the level of 30% - 37%. Asia's financial crisis in 1997/1998 caused heavy pressure on the North Sumatra's international trade in terms of exports and imports, and it only recovered five years later (i.e., after 2002). The Net exports (NX) that continued to decline was a reflection of a significant increment in imports, which was faster than exports. Between the years 2002 and 2018, exports grew 98%. However, imports grew at a more significant level (i.e., 266%). Consequently, the surplus in the trade balance continued to decline.
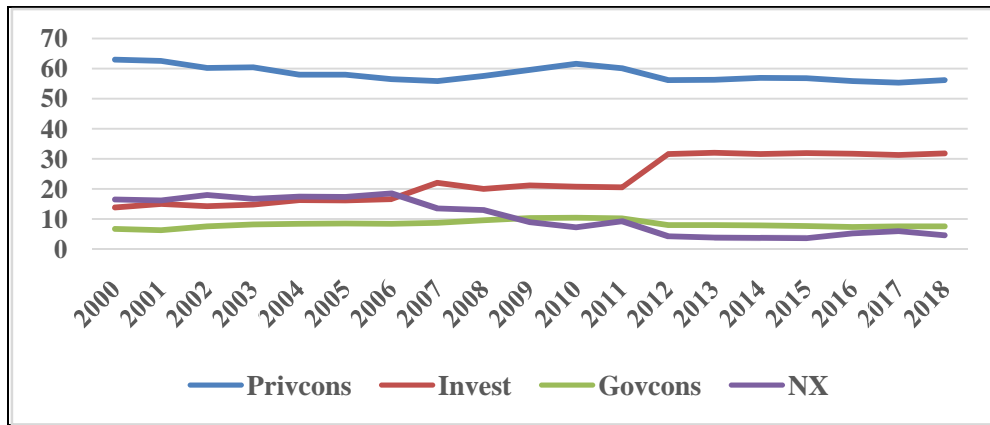
Figure 1. Contribution of Domestic Demand and Export to GDP ofNorth Sumatra
from 2000 to 2018 (in %).

Source: Author's calculation.

Note: Constant price(2010 = 100), NX = net exports (exports minus imports).

Referring to the DDLG criteria proposed by Felipe & Lim (2005), (i) if GDP (Gross Domestic Product) grows as domestic demand is growing and net exports are deteriorating, or (ii) domestic demand and net exports are growing, however domestic demand is growing faster, the 18 years observations show that there were eight years with DDLG criteria (i) and two years with DDLG criteria (ii).The ELG situation lasted only in four years, while in the remaining four years, the economy of North Sumatra experienced a negative growth and domestic demand declined significantly, with an absolute value of growth higher than the export growth, which was also negative. This information shows an initial picture that the economy of North Sumatra is more likely to be DDLG. Figure 2 presents the growth in GDP, domestic demand, and exports from 2001 to2018.
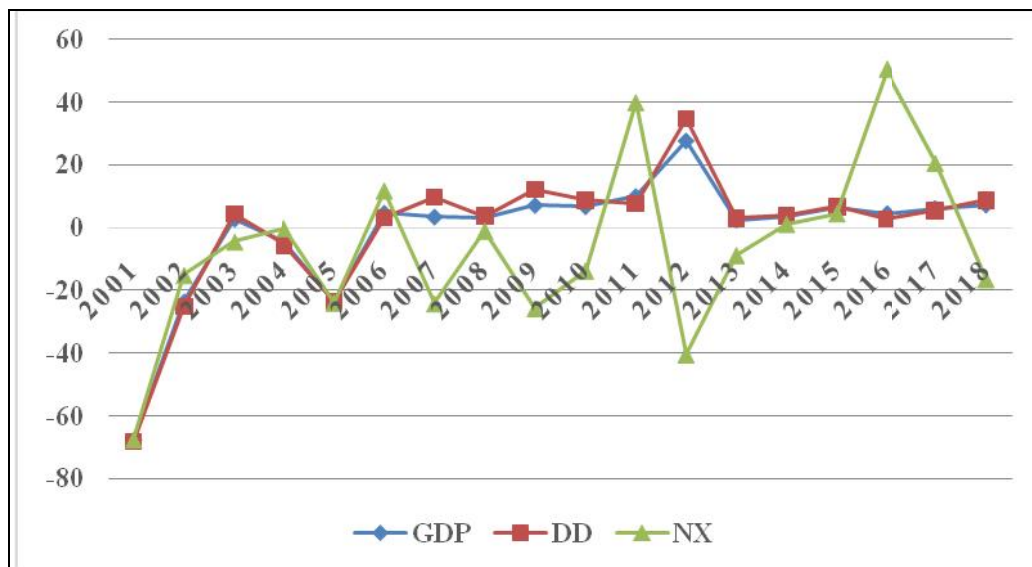
Figure 2.Yearly Growth of GDP, Domestic Demand, and Net Export of North Sumatra from 2001 to 2018 (in %).

Note: Constant price (2010 = 100), DD is domestic demand, and NX = net exports (exports minus imports).

To analyze the relationship between economic growth, domestic demand (aggregate and per component: C, G and I), exports, and financial development, the ARDL bound test to cointegration was applied. Firstly, a unit root test was run. The ARDL bound test to cointegration is flexible over the stationary level of variables. Therefore, the unit root test was intended to ensure that none of the variables are integrated into order two, I (2) or higher. According to Gujarati and Porter (2009: 760), there is no superior unit root test, "as yet there is no uniformly powerful test of the unit root hypothesis". Therefore, this study used three analysis tools, namely ADF (augmented Dicky-Fuller), ERS (Elliot-Rothenberg-Stock) and PP (Phillips-Perron), respectively with and without trends. The ADF is the most popular unit root test tool (Gujarati & Porter, 2009), the ERS shows to have higher statistical power for small sample size, and the PP is more robust in an error term process (Wong, 2008). The test results show that all variables are stationary at I (0) or I (1), where only the financial development variable is stationary at the first order I (1).

Table 1.Unit Root Test Result

Variables	ADF		ERS		PP	
	C	C,T	C	C,T	C	C,T
LGDP	-3.8994***	-3.3412*	-2.2668**	-3.8688**	-3.5364**	-8.4535***
LDD	-4.4243***	4.3447**	-2.4060**	--4.0671***	-3.8653***	-11.186***
LPRIVC	-4.4195***	-4.5023**	-2.3902**	-3.9807***	-3.8431**	-11.2379***
LGOVC	-4.2274***	-3.2220	-2.5264**	-4.7521***	-3.9217***	-11.1170***
LINV	-1.1863	-6.2477***	-1.1295	-3.6251**	-1.4665	-6.6674***
LEXP	-4.2737***	-3.6210*	-2.2480**	-3.1474*	-4.1899***	-3.5430*
LFD	-1.8548	-2.9235	-1.5747	-4.5583***	-2.1648	-10.3524***
LFD	-4.8461***	-4.8228***	-3.1812***	-4.4786***	-26.8541	-22.1356***

Note: *, ** and *** significant level $p < 0.1$, $p < 0.05$, and $p < 0.01$, respectively
C = constant and T = trend.

Cointegration test results with the ARDL bound test as in equations (5), (6), and (7) show that the cointegration is only found in the economic growth and domestic demand equations, while the export and financial development equations do not show cointegration. Thus,the results of the estimation of parameters in these two equations use the ARDL regression results. Table 2 presents the results of the ARDL bound test to cointegration.

Tabel 2. The Results of ARDL Cointegration Test of Domestic Demand and Economic Growth

Estimated models	Optimal lag length	F-bound test	Decision
LGDP/LGDP, LDD, LEXP, LFD	(1,2,0,2)	5.3746	Cointegration
LDD/LDD, LGDP, LEXP, LFD	(1,2,1,2)	7.5297	Cointegration
LEXP/LEXP, LGDP, LDD, LFD	(1,2,2,1)	3.2691	Inconclusive
LFD/LFD, LGDP, LDD, LEXP	(2,2,1,0)	4.0769	Inconclusive
	Significant (finite sample, n = 30)		
		Lower bound, I(0)	Upper bound, I(1)
	10 %	3.008	4.150
	5 %	3.710	5.018
	1 %	5.333	7.063

Source: Author's calculation.

Table 2 shows that the value of the F-bound test lies between the lower critical bound I (0) and the upper critical bound I (1). Therefore, the decision regarding the cointegration is inconclusive, and hence, the results of the error correction regression (ECM) analysis as in equation (11) are not presented. Besides, economic growth has a positive and significant effect on net exports in the short run. However, in the long run, only financial development has a significant effect. This negative significant effect is only seen after one year (see Table 3). In addition, domestic demand did not show any significant effect on exports in both short and long-runs.

Table 3.Results of Coefficient Estimation of Exports and Financial Development Equations.

Dependent variable: LEXP, ARDL (1,2,2,1)			Dependent variable: LFD, ARDL (2,2,1,0)		
Independent Variable	Coefficient	t-statistic	Independent Variable	Coefficient	t-statistic
$LEXP_{t-1}$	0.3766	1.5895	LFD_{t-1}	0.3335	0.9812
LGDP	-0.7820	-0.3936	LFD_{t-2}	0.5711	1.5049
$LGDP_{t-1}$	1.2386	0.5789	LGDP	1.7764	2.1262*
$LGDP_{t-2}$	2.2250	1.4854	$LGDP_{t-1}$	-0.9773	-1.8984*
LDD	-0.2573	-0.1450	$LGDP_{t-2}$	-0.7520	-2.1432*
LDD_{t-1}	-0.1869	-0.0863	LDD	-1.1165	-1.2521
LDD_{t-2}	-1.8972	-1.2675	LDD_{t-1}	1.0746	1.7758
LFD	1.4321	1.3921	LEXP	0.1237	1.4884
LFD_{t-1}	-1.9675	-2.5849**			
R^2 = 0.9019			R^2 = 0.9892		
F-stat = 7.1507***			F-stat = 91.5001***		
Diagnostic:			Diagnostic:		
Heteroscedasticity	p-value = 0.4995		Heteroscedasticity	p-value = 0.2397	
Serial correlation	p-value = 0.9930		Serial correlation	p-value = 0.2260	

Normality	p-value = 0.9021	Normality	p-value = 0.7496
Autocorrelation	no autocorrelation	Autocorrelation	no autocorrelation
Stability	CUSUM	Stability	CUSUM and CUSUMSQ

Source: Author's calculation.

Note: ***, **, and * are significant at p < 0.01, p < 0.05, and p < 0.1, respectively.
CUSUM is the cumulative sum of recursive and CUSUMSQ is the cumulative sum of squares of recursive residuals.

In addition, in the short-run, economic growth and exports show significant positive effects on financial development with coefficients of 0.8997 and 0.1399, respectively. However, in the long-run, only economic growth has a significant and positive effect as shown in Table 3.

Error correction regression analysis for the equations of economic growth and domestic demand as formulated in equations (9) and (10) shows that, in the short-run, domestic demand and financial development have positive and significant effects on economic growth. However, in the long-run, only domestic demand has a significant effect on economic growth with the elasticity of 0.9229, which indicates that an increase in domestic demand of 1% will encourage economic growth by 0.92%. In the short-run, this model is in disequilibrium and is adjusting towards its long term equilibrium at the rate of 41.58% per year. In the domestic demand equation, only economic growth has a significant effect both in the short and long-runs. Financial development will only show positive influence after two years lag. The domestic demand system makes adjustments towards its long-run equilibrium at the rate of 43.55% per year. The results of ARDL error correction regression are presented in Table 4.

Tabel 4. Results of ARDL Error Correction Regression of Economic Growth and Domestic Demand(Short-run analysis)

Dependent variable: LGDP			Dependent variable: LDD		
Independent Variable	Coefficient	t-stat	Independent Variable	Coefficient	t-stat
LDD	0.9229	15.3868***	LGDP	0.9876	17.1270***
LDD_{t-1}	-0.2954	-4.9184***	$LGDP_{t-1}$	0.4367	6.7559***
LFD	0.1677	2.9106**	LEXP	0.0084	0.3887
LFD_{t-1}	0.2982	5.3511***	LFD	-0.0980	-1.6686
ECT	-0.4158	-5.4370***	LFD_{t-1}	-0.4522	-6.9203***
			ECT	-0.4355	-6.5595***
$R^2 = 0.9852$			$R^2 = 0.9876$		
F-stat = 146.0664***			F-stat = 132.5970***		
Diagnostic:			Diagnostic:		
Heterosedasticity	p = 0.7586		Heteroskedasticity	p = 0.8030	
Serial correlation	p = 0.1783		Serial correlation	p = 0.5113	
Normality	p = 0.6641		Normality	p = 0.4980	

Autocorrelation	no autocorrelation	Autocorrelation	no autocorrelation
Stability	CUSUM and CUSUMSQ	Stability	CUSUM and CUSUMSQ

Source: Author's calculation.
Note: ***, **, and * are significant at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

The existence of cointegration in a model shows the causality between at least one independent variable and the dependent variable. To determine the causality between variables and its direction, the ARDL-Granger causality analysis was used, the results are exhibited in Table 5. Of the four observed variables, there is a bi-directional causal relationship, in the short-run, between economic growth and domestic demand. It shows the dynamic relationship between economic growth and domestic demand. Besides, the causal relationship between economic growth and financial development is one-direction from GDP to FD. This is in line with the finding of Tampubolon & Nababan (2019) showing that in North Sumatra apply growth-led finance or demand-following hypothesis.

Table 5. ARDL-Granger Causality Analysis of Economic Growth and Domestic Demand

Dependent Variable	ARDL optimal lag	Short-run causality (F-stat of Wald-test)				Long-run (t-stat)
		LGDP	LDD	LEXP	LFD	ECT
LGDP	(1,2,0,2)	-	8.6752***	-0.0426	1.6399	-0.4158***
LDD	(1,2,1,2)	9.1244***	-	0.2461	-0.8443	-0.4355***
LEXP	(1,2,2,1)	-0.3936	-0.1480	-	1.3921	-0.6253***
LFD	(2,2,1,0)	2.1262*	-0.2938	1.5274	-	-0.2814***

Source: Author's calculation.
Note: ***, **, and * are significant at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively

The analysis shows that although North Sumatra has a high trade index (i.e., above the Indonesian average) and always records a surplus in the trade balance (compared to Indonesia, which experienced a deficit in 2012 - 2014), it does not mean that this region is in the ELG conditions. Export and economic growth do not affect each other. By nature, the economy of North Sumatra is a DDLG, where domestic demand and economic growth dynamically influence each other, in which domestic demand drives economic growth and *vice-versa*. On the contrary, economic decline is in line with weakening domestic demand. Considering three components of domestic demand (i.e., private consumption (PRIVC), government consumption (GOVC), and investment (INV)), further analysis was carried out to scrutiny their effects on economic growth.

Table 6 presents the results of the ARDL cointegration test. The table shows that the economic growth, private consumption, and government consumption equations show cointegration, while the investment equation does not show a conclusive result because the F-bound statistic is between the lower critical bound (LCB) and upper critical bound (UCB). Therefore, to examine the short-run effects of each independent variable, an error correction regression analysis was conducted for the first three

equations (i.e., economic growth, private consumption, and government consumption).

Table 6.The Results of the ARDL Cointegration Test of Domestic Demand Components and Economic Growth.

Estimated models	Optimal lag length	F-bound test	Decision
LGDP/ LGDP, LPRIVC, LGOVC, LINV	(1,0,0,1)	34.3535	cointegration
LPRIVC/ LPRIVC, LGDP, LGOVC, LINV	(1,0,1,2)	15.1373	cointegration
LGOVC/ LGOVC, LGDP, LPRIVC, LINV	(1,2,2,2)	8.4376	cointegration
LINV/ LINV, LGDP, LPRIVC, LGOVC	(1,2,0,2)	3.2444	inconclusive
	Significant (finite sample, n = 30)		
		lower bound, I(0)	upper bound, I(1)
	10 %	3.008	4.150
	5 %	3.710	5.018
	1 %	5.333	7.063

Source: Author's calculation.

With the similar analysis steps, the following were concluded; : (i) in the short-run, private consumption and investment have positive and significant effects on GDP but, in the long-run, only private consumption has a significant effect with the elasticity value of 0.9734. The short-run equation adjusts towards its long-term equilibrium with the rate of 99.82% per year, (ii) GDP, government consumption, and investment have positive and significant effects on private consumption, but in the long-run, this effect was only shown by GDP and government consumption with elasticities of 0.4799 and 0.4761, respectively. The adjustment rate of the short-run towards its long-run equilibrium is 83.55% per year, (iii) private consumption has a significant and positive effect on government consumption in the short-run, while the significant effect of economic growth will only emerge a year later, and investment shows a negative effect. In the long-run, GDP does not show any significant effect on government consumption, while investment has a negative effect and private consumption has a positive effect with elasticity of 1.0846. The short-run equation makes adjustments to its long-run equilibrium at the rate of 86.73% per year, and (iv) GDP and government consumption have significant effects on investment, and GDP has a positive effect, while the effect of government consumption is negative with coefficients of 1.3690 and -1.5500, respectively. In the long-run, only government consumption shows a significant effect on investment. Error correction term (ECT) is significant at $p < 0.01$ with a value of -0.3867, which indicates the adjustment of the short-run equation towards its long-term equilibrium at the rate of 38.67% per year.

ARDL Granger causality analysis showed that all four variables have long-run causality relationships. In the short-run, the relationships between economic growth and private consumption, between private consumption and government consumption, and between investment and government consumption are bi-

directional. Thus, of the three domestic demand components, only private consumption that deals directly with causality with economic growth, while the effect of government on economic growth is indirectly through private consumption, and the effect of investment on economic growth must go through the government consumption that affects private consumption and subsequently affects economic growth (table 7).

Table 7. ARDL-Granger Causality Analysis of Economic Growth and Components of Domestic Demand

Dependent Variable	ARDL optimal lag	Short-run causality (F-stat of Wald-test)				Long-run (t-stat)
		LGDP	LPRIVC	LGOVC	LINV	ECT
LGDP	(1,0,0,1)	-	0.9734***	-0.2046	0.1324	-0.9928***
LPRIVC	(1,0,1,2)	0.4799**	-	0.4761***	0.0811	-0.8355***
LGOVC	(1,2,2,2)	-0.0586	1.0846***	-	-0.2352**	-0.8673***
LINV	(1,2,0,2)	1.3690	1.5284	-1.5500*	-	-0.3866***

Source: Author's calculation.
Note: ***, **, and * are significant at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively

   Schematically, the relationships shown in table 7 are illustrated in figure 3 to exhibit the unique causal relationships between the variables. Based on the figure, the direct relationship of domestic demand components to economic growth is only owned by private consumption. The other variables affect economic growth indirectly. Investment affects government consumption, then government consumption affects private consumption, and subsequently private consumption influences economic growth.
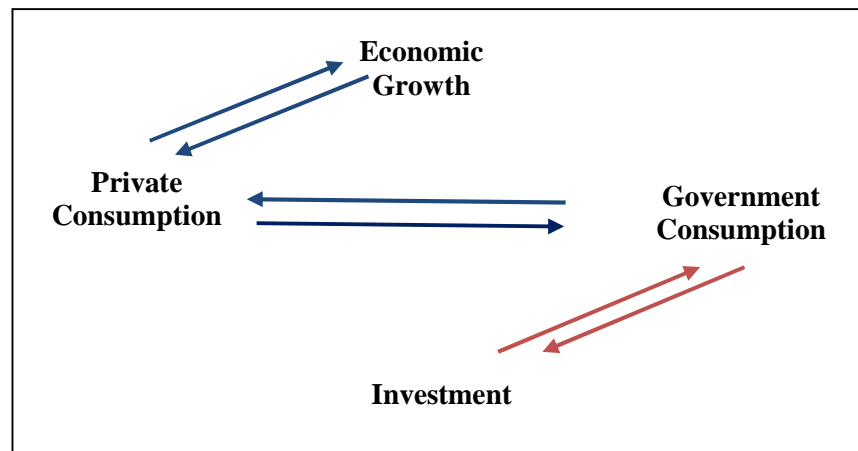

Figure 3. ARDL-Granger Causality of Economic Growth and Components of Domestic Demand

   This empirical analysis revealed new evidence related to the behavior of the economy of North Sumatra. As a region that had been involving in the international

trade in plantation products (from Deli/Sumatra tobacco in the colonial era to palm oil and rubber nowadays) and with a high level of trade openness, the common sense may conclude that the economic growth of North Sumatra should follow the ELG hypothesis. In a different vein, this study shows that domestic demand, specifically private consumption, plays a significant role as the main determinant of the economic growth of North Sumatra. During the 18 years observation, the ELG pattern was not found in the sense that GDP will grow when the export is growing while domestic demand deteriorates, or GDP grows together with exports and domestic demand but exports grow faster. On the contrary, this study found that exports and economic growth do not have causal relationships. With regard to the relationship between investment and economic growth, Yuliana, Bashir & Rohima (2019) reported different results from South Sumatra, Indonesia. In that study, investment affected economic growth significantly. However, the investment was measured by the value of foreign direct investment (FDI) and domestic direct investment (DDI).

This present study revealed that domestic demand does not only positively influence and bi-directionally related to economic growth, but also the proportion of domestic demand in the North Sumatra economy is also very dominant (i.e., 81.5 - 96%) with an average of 89% from the year 2000 to 2018. Furthermore, domestic demand is dominated by private consumption with a contribution to GDP between 55% and 63% with an average of 58%.

The absence of a causal relationship between investment, government expenditure, and economic growth is worrying because it hints that the export sector, which rapidly absorbs growing investment in both monetary value and its shares in GDP, is isolated from the regional economic activities. The plantation sector, which was the mainstay of exports (palm oil and rubber) in the colonial era, was known as an *enclave* that caused economic dualism because the modern economy in the plantation company was isolated from the surrounding people's economy. Consequently, it could not produce spill-over effects, apparently still in effect today despite the management of the modern plantation companies has been in the form of state-owned enterprises.

As some of the developing countries talked about the switch of policy from the ELG strategy to DDLG strategy in responding to the frequent global financial crises, the North Sumatra faced the challenge of shifting part of the burden of economic growth from domestic demand to the export sector. For this reason, the most critical industrial policy to be addressed is the development of processing industries. So, exports are no longer dominated by intermediate goods in the form of crude palm oil (CPO) and crumb rubber. Besides increasing the export values, processing CPO and crumb rubber into final products or intermediate goods at a higher derivation level will also produce significant value-added to the country that also contributes to the regional GDP. Thus, the investment will be directly related to economic growth, without having to go through a winding path from investment to government expenditure, to private consumption, and then to economic growth, as it is currently happening.

CONCLUSION

Using the ARDL bound test to cointegration, this study revealed that the economy of North Sumatra, by nature, follows DDLG pattern. Domestic demand and economic growth show a bi-directional causality, while net export and economic growth do not show any significant relationship. Since the year 2000, the economy of North Sumatra has never followed an ELG pattern, where positive economic growth coincides with export growth at one time when domestic demand deteriorated or exports and domestic demand are both growing but exports grow faster.

Of the three domestic demand components, only private consumption directly affects economic growth with a bi-directional causal relationship. Government expenditure is related to economic growth through private consumption, where private consumption also has a bi-directional causality with government expenditure. In addition, investment does not directly influence economic growth or private consumption, but the influence does exist through government spending because investment has a bi-directional causal relationship with government spending.

Contrary to the experience of developing countries facing global economic disruption due to financial crises, North Sumatra needs policies in export promotion through the development of processing industries. Thus, the exported plantation products are not only intermediate goods resulting from simple processing from fresh fruit bunch to CPO or latex to crumb rubber but also final goods or processed intermediate goods. This strategy, in addition to increasing the value of exports, will also create value-added in the local economy, which further contributes to economic growth. Hence, the investment that continuously increases has spill-over effects on the regional economy.

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