

DO EXPORTS OF OIL AND GAS STILL MATTER FOR REGIONAL ECONOMIC GROWTH OF SUMATRA, INDONESIA?

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Abstract

Although Indonesia ranks as the world's 17th oil and 6th gas producing country, but its production level has been slowly declining since the last few decades. Amidst the decline of oil and gas production, thus it is important to explore how this impacts the regional economic growth. Specifically, this study attempts to empirically examine the impact of oil and gas and non-oil and gas exports on the regional economic growth of Sumatra, Indonesia over the period 2008-2017 using the generalized method of moments (GMM) approach. The study found that oil and gas exports were no longer contributed positively to regional economic growth. On the other hand, non-oil and gas exports have positively contributed to regional economic growth. This implies that to further promote the growth of the regional economy the focus should be given on the expansion, value-added creation and diversification of non-oil and gas commodities.

Keywords: Regional economic growth, Oil and gas sector, Non-oil and gas sector, GMM, Sumatra.

JEL classification: C32, F43, O11

1. Introduction

Achieving sustainable economic growth is an aspiration of every country, including Indonesia as it has a positive impact on the welfare of society. There are many ways to increase economic growth; one of them is through export. Since the last three decades, the Indonesian economy has moved its dependency from the primary sector to the secondary sector with a 5% annual economic growth (World Bank, 2015). Hitherto, Indonesia continues to conduct open trade activities so that all regions have the potential to export their goods and services to promote their regional economic growth. But in reality, the export activities do not always provide an equal level of economic growth across regions because of differences in natural resources from one region to another (Sunde, 2017). For example, the exports of Javanese region have larger contributions to the national economic growth of Indonesia as compared to the contribution from the region of Sumatra. For example, when national economic growth reached 6.44% in 2011, the regional economic growth of Java and Sumatra recorded 6.65% and 6.06%, respectively. Meanwhile, when national economic growth declined to 5.07% in 2017, the regional economic growth of Java and Sumatra declined to 5.61% and 4.30%, respectively (Central Statistics Agency of Indonesia, 2018).

As an open economy, the domestic economy of Indonesia continues to gain benefits from international trading activities. In addition, supported by abundant natural resources, Indonesia has been considered as a fairly important global business partner of foreign

countries. To date, Indonesia has established cooperative business partner with 16 countries, consisting of both developed countries such as the United States, Japan, the Netherlands, the United Kingdom, and Germany, and other developing countries such as Nigeria, India, Pakistan, Malaysia, Thailand, and China (Central Statistics Agency of Indonesia, 2018). These international business partnerships have increased the trading values of Indonesia with its major trading partners. However, the values of exports of Indonesia, including Sumatra have shown a fluctuating trend over the period 2008-2017 due to various factors such as a declining in prices of exported commodities in the global market.

The Ministry of Trade of the Republic of Indonesia divided exports into two sectors, namely the oil and gas sector and the non-oil and gas sector. Oil and gas exports are generally known as petroleum commodities such as crude oil and oil which has been processed in the form of fuel, while the non-oil and gas exports are commodities from the agricultural, mining and plantation sectors. According to the Central Statistics Agency of the Republic of Indonesia (2018), the most superior exporting commodities from the region of Sumatra were coffee, tea, and spices with total exports of USD30.50 billion. Over the last decade, the average export value of Sumatra Island was only USD48.9 billion with an average growth of 2.19%. The exports were recorded as the highest value of USD64.9 billion in 2012, but declined to the lowest value of USD 34.1 billion in 2017.

The decline in export commodities in Sumatra are contributed by various factors, one of them is the export should be done through existing ports in other provinces, such as through port of Special Territory of Jakarta, the capital city of Indonesia. The percentage of total commodity exports from Sumatra through the ports in other provinces in 2017 amounted to 33.35% or USD11.36 billion. The biggest commodity exported in 2017 through ports outside Sumatra was the commodities of coffees (*arabica* and *robusta*), tea, and spices.

There have been many previous studies investigated the contribution of export to economic growth. Hesse (2008) found that a more diversified export positively related to economic growth. Export affected economic growth both in short-run (Siregar and Daryanto, 2005; Herzer and Nowak-Lehmann, 2006; and Aditya and Acharyya, 2013) and long-run (Gokmenoglu *et al.*, 2015; and Shafiullah *et al.*, 2017). Using the Harrod-Domar model of an open economy, Aditya and Acharyya (2013) revealed that the export sector of goods and services and the level of export technology could boost economic growth. In the context of Indonesia, Siregar and Daryanto (2005) found that exports only have an effect on economic growth in the short-run, suggesting the need to expand the development of oil and gas sector and non-oil and gas sector for further enhancing the economic growth of Indonesia. Finally, evidence of export-led growth is also found by Shafiullah *et al.* (2017) for the Indonesian case.

Unlike previous studies on the export-growth nexus in Indonesia that focused on the national economy and aggregate national export, this study investigates the impact of exports on the regional economy of 10 provinces in Sumatra Island, Indonesia. In addition, this study divides the exports into the oil and gas sector and the non-oil and gas sector using the GMM panel dynamic approach. Focusing on the impacts of exports of both oil and gas sector and non-oil and gas sector for the case of regional economy of Sumatra, this study hopes to provide a clear nature of exports-economic growth nexus that could be referred by the policy-makers in designing a proper and comprehensive economic policy to promote the regional economic growth through exports.

The rest of the study is organized in the following manner. Section 2 reviews relevant literature on export-economic growth nexus. Section 3 provides the empirical framework and data as the basis for further analysis. Section 4 discusses the findings and implication, and finally, Section 5 concludes the study.

2. Literature Review

Export has been viewed as an important engine of economic growth for several reasons. First, export expansion due to an increase in foreign demand for domestic products causes economic growth through an increase in employment and income in the export sector (Awokuse, 2008). Second, export growth indirectly affects economic growth through resource allocation efficiency, enhanced capacity utilization, economies of scale utilization, and

stimulation of technological advancement driven by global market competition (Helpman and Krugman, 1985). Finally, exports expansion provides international trading activities that allow for the rising number of imported intermediate goods that consequently increase capital formation and thus promote economic growth (Esfahani, 1991).

Previous studies on the export-economic growth nexus have been conducted both in advanced and developing economies. Previous studies found mixed empirical findings, where some studies found significant export-led growth, insignificant export-growth relation, and significant growth-driven export hypothesis. For example, Jin and Yu (1996) examined the export-led growth hypothesis in the US using vector autoregressive framework and found no significant influence of exports on the US economy. Testing similar export-led growth hypothesis using cointegration and Granger causality tests, Gokmenoglu *et al.* (2015) found a long-run equilibrium relationship between exports and economic growth and a unidirectional causality running from economic growth to export for the case of Costa Rica, finding contradicted to the export-led hypothesis.

Borgensen and King (2015) analyzed endogenous boundaries for economic growth in transition economies related to exports from the supply side perspective. A slowing down of non-tradable sector productivity growth is found as the major cause of lower level of export that in turns adversely influenced economic growth in the transition economies. Idris *et al.* (2016) investigated the impact of trade openness on economic growth in 87 selected countries including the Organization for Economic Cooperation and Development (OECD) and developing countries for the period 1977-2011 using the GMM. The study revealed a bidirectional causal relationship between export and economic growth. This finding is similar to those of Aktar *et al.* (2008) who found a bidirectional causal relationship between export and economic growth for the case of Turkey over the period 1980-2007. Using a gravity model, Warr and Ayres (2010) explored the flow of trade between the countries and trade blocks within the Asia-Pacific Economic Cooperation (APEC) members. The study found that each country has a different level of export, thus the effect of export to their economies was different from one to other APEC member countries. The flow of exports is also found to highly correlate with previous years of export values. For the case of the Australian economy, using the autoregressive distributed lag (ARDL) approach, Shaifullah *et al.* (2017) found a positive contribution of exports of mining and oil, agricultural, and manufacturing commodities to economic growth both in the long run and short run.

There have also been many previous studies on export-growth nexus in African countries. For example, Adekokun (2012) found that oil and gas export has a long-run equilibrium between export and economic growth and a positive effect of export on the Nigerian economic growth using an error correction model. Similar findings are found by Ee (2016) and Zahonogo (2018) where export positively affected the economy in the Sub-Saharan African region. Using an ARDL approach, Ojide *et al.* (2014) found a bidirectional causal relationship between export of non-oil and gas and the Nigerian economy. Furthermore, Allaro (2012) found that export is an engine for economic growth in Ethiopia; finding supported the export-led growth hypothesis. On contrary, Bosupeng (2015) found a unidirectional causality running from economic growth to export in Botswana; finding supported the growth-driven export hypothesis.

In a similar vein, Daoud and Basha (2015) explored the export-led growth hypothesis for the Jordanian, Kuwaiti, and Egyptian countries over the period 1976-2013. They found bidirectional causality between export and economic growth in Jordan, while a unidirectional causality running from exports to economic growth were found for the economies of Kuwait and Egypt, findings in harmony with the export-led growth hypothesis. The finding of the export-led growth hypothesis is also rejected by Love and Chandra (2005) for the case of Bangladesh, where economic growth is found to Granger cause exports. Unlike Daoud and Basha (2015) and Love and Chandra (2005), Storm (1997) assessed the feasibility of export-led manufacturing strategies for the Indian economy using a nine-sector general equilibrium model and found that industrial growth raised the relative price of domestic goods that in turns caused demand-export barriers.

Furthermore, Tang *et al.* (2015) re-investigated the export-led growth hypothesis for four small dragons' economies of Asia (i.e., Hong Kong, Taiwan, Singapore, and South Korea) using the analyses of cointegration and rolling causality. The study found that a long-run

relationship between variables and a unidirectional causality running from growth to export, finding supported the growth-led export hypothesis. These findings imply that to promote further the economies, instead of export, policymakers should look for alternative sources of economic growth.

Mahadevan and Suardi (2008) re-examined the stability of the trade-growth nexus for Japan and the Asian Tigers in a dynamic framework. They found that in turbulent environments, Japanese growth is only driven by imports, the Hong Kong's growth is driven both by exports and imports, but the economic growth of Taiwan was independent of exports and imports. The finding of independence between export and growth for Taiwanese economy contradicted both the export-led growth and growth-driven export hypotheses.

Finally, for the case of Indonesia, Aliman and Purnomo (2001) found a unidirectional causal relationship running from economic growth to export; a finding supported the growth-driven export hypothesis. This finding is also supported by Badikenita (2004) who studies the export-growth nexus in the ASEAN economies. Similar to Malaysia, the economic growth of Indonesia has Granger caused the exports. On contrary, Puspadilla (2009) found that export influences the growth of the Indonesian economy over the period 1996-2007; a finding supported the export-led growth hypothesis. However, Oiconita (2006) found bidirectional causality between export and economic growth; findings supported both the export-led growth and growth-driven export hypotheses. Finally, the insignificant export-growth nexus is found by Sulistyawati (2017) for the case of East Java, Indonesia over the period 1984-2000, findings contradicted both the export-led growth and growth-driven export hypotheses.

The above-reviewed studies documented mixed findings for the export-growth nexus both in advanced and developing economies. To provide a shred of clearer empirical evidence on the importance of export on the regional economic growth, unlike the previous study, our study divides export into two sectors, namely: oil and gas sector and non-oil and gas sector and explores their effects on the regional economic growth of 10 provinces in Sumatra, Indonesia.

3. Empirical Framework

3.1. Data

This study empirically explores the extent to which the exports of oil and gas and non-oil and gas on the regional economic growth of 10 provinces in Sumatra, Indonesia over the period 2008-2017. These provinces include Aceh, North Sumatra, South Sumatra, West Sumatra, Riau, Riau Islands, Bangka Belitung, Jambi, Bengkulu, and Lampung. The export is measured by the total values of exporting oil and gas and non-oil and gas commodities in the US dollar. Export of oil and gas sector includes the excavation, drilling, washing, retrieval, and utilization of all kinds of mining goods, minerals and excavated goods available in the soil, both in the form of solid objects, liquids, and gases, while the export of non-oil and gas sector includes all exploitation and utilization of biological creatures and processing of organic or non-organic materials into new products of higher quality either produced by hand, machinery or chemical processes and agricultural products to meet living needs or as raw materials in the production. The data of exports are transformed into a natural logarithm. Meanwhile, the economic growth is measured by the changes in provincial Gross Regional Domestic Product (GDP) using 2010 as the base year. The data of exports were gathered from the 10-Provincial Trade and Industry Service Offices in Sumatra, while the data of GDP was collected from the reports of the Provincial Central Bureau of Statistics and the Representative of Central Bank of Indonesia within the region of Sumatra, Indonesia.

3.2. Model of analysis

This study investigates the effects of exports on the regional economy of 10-provinces in Sumatra, Indonesia. Considering the decline of oil and gas production and its export, apart from the oil and gas sector, this study includes non-oil and gas sector into the following panel model of analysis:

$$EG_{it} = \beta_0 + \beta_1 EOG_{it} + \beta_2 NEOG_{it} + \varepsilon_{it} \quad (1)$$

where EG is the economic growth, EOG is the export of oil and gas, $NEOG$ is the export of non-oil and gas, it is the i province for t period; β_0 is the constant term, β_1 and β_2 are the estimated coefficients for exports of oil and gas and non-oil and gas sectors, respectively, and ε is the error term.

Since the study investigates export-growth nexus in 10-province in Sumatra region over 10 years, thus the panel model of analysis is adopted. Two models of panel data have been commonly used, namely the static panel model and dynamic panel model. The static panel model consists of pooled least square, fixed effect, and random effect models, while the dynamic panel model comprises a generalized method of moments (GMM) technique. Due to the shortcomings of the static panel models, this study adopts the dynamic panel model of the GMM. The GMM could solve the problem of endogeneity as found in the fixed effect model of static panel model (Verbeek, 2008), thus the uses of the GMM in this study could provide unbiased and consistent empirical findings. Additionally, the GMM is a common estimator that provides a more useful framework for comparison and assessment. The GMM approach is a simple alternative to other estimators such as maximum likelihood approach. Finally, the potential estimator bias could be easily removed by the use of instrument variables within the GMM even though there are endogenous variables in the estimated model. In short, the use of instrumental variables ensures the consistent estimator irrespective of existing measurement error variable in the model (Baum *et al.*, 2003).

In this study, the lagging and leading values of exports of oil and gas and non-oil and gas, and exchange rate are included as the instrumental variables. The Hansen J-statistics is used to ensure the validity of the instrumental variables included in the model. If the probability value of the J-stats is lesser than 5%, thus the instrumental variable is valid in the model. On the other hand, the instrumental variable is found to be invalid in the model when the probability value of J-statistics is greater than 5%.

4. Findings and Discussion

4.1. Descriptive statistics

Achieving high economic growth has a significant impact on the future economy. Economic growth is often associated with increases in the overall production of goods and services in a country in a certain period. The higher the increase in the production of goods and services indicates a higher increase in economic growth and vice versa. Table 1 illustrates the economic growth of 10-province in the region of Sumatra, Indonesia during the years 2010 and 2017.

Table 1. Regional economic growth in Sumatra, Indonesia (in percentage)

Province	Year		Average Growth
	2010	2017	
Aceh	-6.24	4.19	0.70
North Sumatra	5.39	5.12	5.47
West Sumatra	4.65	2.71	5.48
Riau	5.88	5.29	2.95
Jambi	5.63	2.01	6.02
South Sumatra	6.16	4.64	5.01
Bengkulu	4.75	4.99	5.51
Lampung	4.07	5.51	5.28
Bangka Belitung	4.35	5.17	4.63
Riau Island	3.6	4.51	5.58
Sumatera	3.82	4.41	4.66

Source: Adapted from the Central Statistics Agency of Indonesia (2018).

As illustrated in Table 1, the economic growth of each province fluctuated across the period. The economic growth of Aceh Province was recorded to be the lowest at -6.24%, while the economic growth of South Sumatra was recorded to be the highest by 6.16% in 2010. However, in 2017, the province of Lampung is found to be the highest economic

growth rate by 5.51%, while the province of Jambi was recorded to be the lowest economic growth rate by 2.01%. Overall, the regional economic growth of Sumatra, Indonesia has increased by 4.66% from 3.82% in 2010 to 4.41% in 2017. With the exception of the three provinces of Aceh, Riau, and Bangka Belitung, the other provinces recorded economic growth above the regional economic growth of Sumatra.

Table 2 provides the figures for exports of oil and gas and non-oil and gas for the years 2008 and 2017. The values of exports are very much depending on the number of the existing port in the provinces. The province of North Sumatra has 6 ports, Riau 12 ports, and Riau Islands has 14 ports.

Table 2. Exports of oil and gas and non-oil and gas by the province in Sumatra, Indonesia

Province	Oil and Gas (USD000)			Non-Oil and Gas (USD000)		
	2008	2017	Growth (%)	2008	2017	Growth (%)
Aceh	2,104,395	66,757	-96.83	129,735	10,921	-91.58
North Sumatra	-	-	-	9,261,977	9,225,286	-0.40
Riau	7,921,099	2,349,214	-70.34	12,834,732	13,814,303	7.63
West Sumatra	-	-	-	2,384,568	2,046,269	-14.19
Riau Island	-	-	-	-	-	-
Jambi	332,907	201,125	-39.59	857,018	1,022,343	19.29
Bengkulu	-	-	-	153,003	275,250	79.90
South Sumatra	851,838	798,281	-6.29	2,619,997	2,509,412	-4.22
Lampung	-	-	-	4,080,522	-	-100
Bangka	223,339	190,876	-14.54	1,812,618	1,593,262	-12.10
Belitung	-	-	-	-	-	-
Sumatera	11,433,579	3,606,255	-68.46	34,134,172	30,497,046	-10.66

Source: Adapted from the Central Statistics Agency of Indonesia (2018).

As illustrated in Table 2, half of 10-province in Sumatra exported no oil and gas during the period 2008-2017. Of 5-province exported oil and gas, the highest oil and gas exports are dominated by the province of Riau (USD7.92 billion), followed by the province of Aceh (USD2.10 billion) in 2008. Meanwhile, the lowest oil and gas exports were the province of Jambi amounted to USD332 million. Overall, the values of oil and gas exports in 2017 experienced a significant decline. The exports of oil and gas by the provinces of Aceh declined by 96%, Riau by 70.3%, Bangka Belitung and South Sumatra by lesser than 15%. The decline in oil and gas exports is partly caused by an increasing needs of domestic energy for the electrical, automotive, and communication industries. As for the exports of non-oil and gas, the province of Riau recorded the highest values of export by USD12 billion and USD13 billion in 2008 and 2017, respectively, showing an average increase by 7.63%. Meanwhile, the lowest values of non-oil and gas exports were experienced by the province of Aceh amounting only USD129 million and USD10.9 million in 2008 and 2017, respectively, showing an average decline by -91.58%. However, the province of Bengkulu recorded the highest average increase by 79.9% over the period 2008-2017.

Furthermore, Table 3 reports the descriptive statistics of the economic growth and both oil and gas and non-oil and gas exports in the region of Sumatra over the period 2008-2017. Table 3 illustrates that the average of regional economic growth, the value of oil and gas exports, and value of non-oil and gas exports of the 10 provinces in Sumatra, Indonesia was 4.66%, USD1,048 billion, and 3,803 billion respectively. This indicates that the economic growth of the region relied most on the exported of non-oil and gas commodities compared to the oil and gas commodities. The economic growth and the values of exports of oil and gas, and exports non-oil and gas have been relatively volatile as indicated by their standard deviation values of -2.59%, USD1,896 billion and USD4,189 billion.

Table 3. Descriptive statistics

Variable	Economic Growth (%)	Value of Exports (USD000)	
		Oil and Gas	Non-Oil and Gas
Mean	4.66	1,048,141	3,803,641
Maximum	7.86	7,921,099	15,268,962

Minimum	-6.51	0	0
Standard Deviation	-2.59	1,896,464	4,189,156

4.2. Correlation Coefficients

Table 4 illustrates the coefficients of correlation between economic growth, values of exports of oil and gas, and non-oil and gas. The exports from the oil and gas sector are found to be strongly correlated to the exports from the non-oil and gas sector. In the view of exports, only exports of non-oil and gas are found to be correlated with the economic growth by 0.073 at the 5% significance level, while the oil and gas exports are found to be non-correlated to the regional economic growth of Sumatra, Indonesia. These findings support our earlier finding that indicates an important role of non-oil and gas sector in the growth of the regional economy of Sumatra. However, to further confirm these initial findings, the relationship between oil and gas and non-oil and gas sectors and regional economic growth is examined in the next section using the dynamic GMM panel model.

Table 4. Correlation coefficients

Variable	Economic growth	Oil and gas exports	Non-oil and gas exports
Economic growth	1.000	-	-
Oil and gas exports	-0.089	1.000	-
Non-oil and gas exports	0.073**	0.664***	1.000

Note: *** and ** indicate significance at the 1% and 5% levels.

4.3. The role of exports in the regional economy of Sumatra, Indonesia

As mentioned earlier, the dynamic GMM model is adopted to empirically assess the impacts of exports of oil and gas and non-oil and gas on the regional economic growth of 10 provinces in Sumatra Island, Indonesia over the period from 2008 to 2017. The findings from the GMM estimation are reported in Table 5.

Table 5. Findings from the dynamic GMM panel model

Variable	Estimated coefficient	t-Statistics	Prob.
Economic growth(-1)	0.1761***	7.080	0.000
Exports of oil and gas	1.22E-07	0.531	0.596
Exports of non-oil and gas	3.79E-07***	2.870	0.005

J-stat = 8.75; Prob. J-stats = 0.27; AR(1) = - ; AR(2) = 0.917

Note: *** indicates significance at the 1% level. Instrumental variables: one-lagging and one-leading values of exports of oil and gas and exports of non-oil and gas, and contemporaneous values of exchange rate.

As observed from Table 5, the study found that the oil and gas exports have no significant effect on the regional economic growth, while the non-oil and gas exports have a positive and significant effect on the regional economic growth of Sumatra, Indonesia over the period 2008-2017. Specifically, an increase in the non-oil exports by USD1 million caused an increase in regional economic growth by 0.38%. Additionally, the trend of the regional economic growth is determined positively by the previous level of regional economic growth, as indicated by the significance of last year regional economic growth at the 1% significance level. If the last year of economic growth in the region of Sumatra is increased by 1%, the 10 provinces in the region would enjoy a continued trend of an increase in their economic growth by 0.18%.

Our finding of the insignificant effect of oil and gas exports to regional economic growth is mainly due to the following reasons. First, the decline in oil and gas production in the region of Sumatra caused a decline in exports and thus provides no contribution to economic growth. Second, the fluctuations in the world prices of oil and gas prices due to changes in supply and demand for oil and gas in international markets resulted in uncertainties of revenues from exporting activities. An unstable international market adversely affected the national economy both in short- and long-run. Fourth, an increase in the domestic demand for oil and gas for the electricity generation, especially in developing countries, including

Indonesia caused a decline in oil and gas exports. Finally, only half of the 10 provinces in Sumatra region have the potential reserves of oil and gas for exports and for their domestic consumption as well as the consumption of the other provinces that produced no oil and gas. The finding of the insignificant contribution of oil and gas sector on the regional economic growth is supported by those of Jin and Yu (1996) for the US economy and Sulistyawati (2017) for the provincial economy of East Java, Indonesia over the period 1984-2000. This finding contradicted both export-led growth and growth-driven export hypotheses.

On the other hand, an increasing trend of non-oil and gas exports in the region of Sumatra has contributed towards the promotion of regional economic growth in the Sumatran region. This finding is in line with those of Puspadilla (2009) and Shaifullah (2017). In their studies on export-growth nexus, Puspadilla (2009) found a positive influence of exports on the national economic growth of Indonesia over the period 1996-2007. Similarly, Shaifullah *et al.* (2017) found a positive contribution of exports of non-oil and gas of agricultural and manufacturing commodities to the Australian economy both in the long run and short run. This finding further supported the export-led growth hypothesis.

Referring to the above findings, several important implications could be derived. The oil and gas production in the region of Sumatra is still dominated by the province of Riau, followed by the province of Aceh. However, since the shutdown of PT. Arun Natural Gas Liquefaction Co. located in the Aceh province in 2014, the oil and gas production in the province sharply declined. The oil and gas is an economic resource that is non-renewable and only can be used up at a certain period depending on the scale of exploration. Realizing these facts, thus to further promote the economic growth, the province should further promote the non-oil and gas sector as it has greater potential to be expanded and diversified in the long-run. This is as viewed by Aladejare and Saidi (2014) and Seraphin and Yinguo (2015), where the non-oil and gas commodities become an important engine for economic growth globally.

In the last few decades, the diversification and increased value added of non-oil and gas products become the leading world exports (Hesse, 2008; Herzer and Nowak-Lehmann, 2006; and Aditya and Acharyya, 2013). The non-oil and gas products and derivations are more varied than oil-gas products and thus have greater potentials to be marketed in the global arena. For example, as a rich wood plantation country, the wood industry in Indonesia could process it into many furniture-based products. Nonetheless, the contribution of the non-oil and gas sector to the national economic growth of Indonesia has been smaller as compared to the other emerging economies. The non-oil and gas sector only contributed 1-2% of the Indonesian economy, while the other countries their non-oil and gas sector have contributed more than 5% to their economies. The government of Indonesia should expand and diversified the non-oil and gas products, supported by advanced technology, sufficient development budget, and good governance principles. This is believed among the strategic ways to accelerate the economic growth both at the regional and national levels of Indonesia.

Finally, our estimated GMM model has produced unbiased and consistent estimators. The J-statistics is found to be insignificant, indicating the instrumental variables included in the model were valid. Apart from lagging and leading values of the variables of oil and gas exports and non-oil and gas exports, the exchange rate is also included in the model as one of the instrumental variables as it plays an important role in determining export activities. The depreciation in the Indonesian Rupiah (IDR) will cause an increase in exports as the domestic products, including oil and gas becomes cheaper and more competitive in the international markets. Conversely, the appreciation of the IDR against other foreign currencies will cause the exports to decline as the oil and gas from Indonesia become more expensive and thus less competitive in the global markets. As for the autocorrelation problem, our model is found to be non-autocorrelated, as indicated by the value of the AR(2) that is greater than 5%.

5. Conclusion

Amidst the decline of oil and gas production in the last decade in the region of Sumatra, Indonesia, it is important for our study to explore how this impacts the regional economic growth in Indonesia. Specifically, this study attempts to empirically examine the impact of exports of oil and gas and non-oil and gas on the regional economic growth of 10 provinces

(i.e., Aceh, North Sumatra, South Sumatra, West Sumatra, Riau, Riau Islands, Bangka Belitung, Jambi, Bengkulu, and Lampung) in Sumatra, Indonesia over the period 2008-2017.

Using the dynamic generalized method of moments (GMM) panel model, the study found that the oil and gas exports were no longer contributed positively to the regional economic growth, finding contradicted to both export-led growth and growth-driven export hypotheses. On the other hand, the non-oil and gas exports have positively contributed to the regional economic growth of Sumatra, Indonesia, finding supported the export-led growth hypothesis.

These findings implied that to further promote the growth of the regional economy the focus should be given on the enhancing the non-oil and gas sectors. The expansion, creation more value-added and diversification of non-oil and gas products could increase the exports potentials and thus promote the regional economy of the 10-provinces in Sumatra Island, Indonesia. In its effort to expand and diversify the non-oil and gas products, the government of Indonesia should support it by providing advanced technology, allocating sufficient development budget, and implementing good governance principles in the production activities. This is believed among the strategic ways to accelerate the economic growth both at the regional and national levels of Indonesia.

To enhance empirical finding on the export-growth nexus, future studies might focus on the potential influences of other determinants from the political, social, economic, environmental, legal, and technological perspectives on the exports and, in turns, on the economic growth. Additionally, to provide a better picture on the nature of export-growth nexus, the future researches should consider assessing the role of exports both oil and gas sector and non-oil and gas sector on the national economy of Indonesia using all 34-province data.

References

- Adedokun, A. J. 2012. "Oil export and economic growth: Descriptive analysis and empirical evidence from Nigeria." *Pakistan Journal of Social Sciences*, 9(1), 46-58.
- Aditya, A., and Acharyya, R. 2013. "Export diversification, composition, and economic growth: Evidence from cross-country analysis." *The Journal of International Trade and Economic Development*, 22(7), 959-992.
- Aladejare, S. A., and Saidi, A. 2014. "Determinants of non-oil export and economic growth in Nigeria: An application of the bound test approach." *Journal for the Advancement of Developing Economies*, 3(1), 68-81
- Aliman, A., and Purnomo, A. B. 2001. "Kausalitas antara ekspor dan pertumbuhan ekonomi." *Journal of Indonesian Economy and Business*, 16(2), 122-137.
- Allaro, H. B. 2012. "The effect of export-led growth strategy on the Ethiopian economy." *American Journal of Economics*, 2(3), 50-56.
- Awokuse, T. O. 2008. "Trade openness and economic growth: is growth export-led or import-led?" *Applied Economics*, 40(2), 161-173.
- Badikenita. 2004. "Analisis kausalitas antara ekspor dan pertumbuhan ekonomi di negara negara ASEAN." Master Thesis: Ekonomi Pembangunan, Universitas Sumatera Utara.
- Baum, C. F., Schaffer, M. E., and Stillman, S. 2003. "Instrumental variables and GMM: Estimation and testing." *The Stata Journal*, 3(1), 1-31.
- Borgersen, T. A., and King, R. M. 2015. "Endogenous supply side constraints to export-led growth and aggregate growth implications in transition economies." *Structural Change and Economic Dynamics*, 33, 96-109.
- Bosupeng, M. 2015. "The Export-led growth hypothesis: New evidence and implications." No. 77917. University Library of Munich, Germany.
- Central Statistics Agency of Indonesia. 2018. *Statistik Indonesia*. Jakarta: BPS.
- Daoud, H. E., and Basha, M. 2015. "Export-led growth: Time series approach analysis: Case of Jordan, Kuwait, and Egypt." *European Scientific Journal*, 11(7), 229-239.
- Ee, C. Y. 2016. "Export-led growth hypothesis: empirical evidence from selected Sub-Saharan African countries." *Procedia Economics and Finance*, 35, 232-240.
- Esfahani, H. S. 1991. "Exports, imports, and economic growth in semi-industrialized countries." *Journal of Development Economics*, 35(1), 93-116.
- Tang, C. F., Lai, Y. W., and Ozturk, I. 2015. "How stable is the export-led growth hypothesis? Evidence from Asia's Four Little Dragons." *Economic Modelling*, 44, 229-235.
- Gokmenoglu, K. K., Sehnaz, Z., and Taspinar, N. 2015. "The export-led growth: A case study of Costa Rica." *Procedia Economics and Finance*, 25, 471-477.

- Helpman, E. and Krugman, P. 1985. *Market Structure and Foreign Trade*. Cambridge, MA: MIT Press.
- Herzer, D., and Nowak-Lehmann D, F. 2006. "What does export diversification do for growth? An econometric analysis." *Applied Economics*, 38(15), 1825-1838.
- Hesse, H. 2008. *Export diversification and economic growth.*" Working Paper No. 21, Commission of Growth and Development.
- Idris, J., Yusop, Z., and Habibullah, M. S. 2016. "Trade openness and economic growth: A causality test in panel perspective." *International Journal of Business and Society*, 17(2), 281–290.
- Jin, J. C., and Yu, E. S. 1996. "Export-led growth and the US economy: Another look." *Applied Economics Letters*, 3(5), 341-344.
- Love, J., and Chandra, R. 2005. "Testing export-led growth in Bangladesh in a multivariate VAR framework." *Journal of Asian Economics*, 15(6), 1155-1168.
- Mahadevan, R., and Suardi, S. 2008. "A dynamic analysis of the impact of uncertainty on import-and/or export-led growth: The experience of Japan and the Asian Tigers." *Japan and the World Economy*, 20(2), 155-174.
- Oiconita, N. 2006. "Analisis ekspor dan output nasional di Indonesia: Periode 1980-2004 kajian tentang kausalitas dan kointegrasi." Doctoral Dissertation, Fakultas Ekonomi, Universitas Indonesia.
- Ojide, M. G., Ojide, K. C., and Ogbodo, J. C. 2014. "Export-led growth hypothesis in Nigeria: Applications of ARDL model and co-integration analysis." *Global Journal of Emerging Market Economies*, 6(1), 5-13.
- Puspadilla, W. 2009. "Analisis kausalitas ekspor dengan pertumbuhan ekonomi periode 1996– 2007." Master Thesis, Universitas Padjadjaran.
- Seraphin, T., and Yinguo, D. 2015. "Impact of export on economic growth in Madagascar." *International Journal of Economics, Commerce and Management*, III(7), 136–156.
- Shafiullah, M., Selvanathan, S., and Naranpanawa, A. 2017. "The role of export composition in export-led growth in Australia and its regions." *Economic Analysis and Policy*, 53, 62–76.
- Siregar, H., and Daryanto, A. 2005. "Perkembangan dan diversifikasi ekspor Indonesia." *Jurnal Manajemen and Agribisnis*, 2(2), 157-166.
- Storm, S. 1997. "Domestic constraints on export-led growth: a case-study of India." *Journal of Development Economics*, 52(1), 83-119.
- Sulistyawati, D. R. 2017. "Analisis potensi nilai ekspor, angkatan kerja dan penerimaan pemerintah terhadap peningkatan kinerja pendapatan asli daerah." *Jurnal Disprotek*, 8(2), 57-74.
- Sunde, T. 2017. "Foreign direct investment, exports and economic growth: ADRL and causality analysis for South Africa." *Research in International Business and Finance*, 41, 434-444.
- Aktar, S. T. İ., Taban, S., and Aktar, İ. 2008. "An empirical examination of the export-led growth hypothesis in Turkey." *Journal of Yaşar University*, 3(11), 1535-1551.
- Verbeek, M. 2008. *A Guide to Modern Econometrics*. 3rd ed. England: John Wiley and Sons Ltd.
- Warr, B. S., and Ayres, R. U. 2010. "Evidence of causality between the quantity and quality of energy consumption and economic growth." *Energy*, 35(4), 1688-1693.
- World Bank. 2015. *World Bank Report*. Washington: World Bank.
- Zahonogo, P. 2018. "Globalization and economic growth in developing countries: evidence from Sub-Saharan Africa." *The International Trade Journal*, 32(2), 189-208.