Edited by
Fithra Faisal Hastiadi

Globalization, Productivity and Production Networks in ASEAN

Enhancing Regional Trade and Investment

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"I always consider Fithra a "new breed of Indonesian economist" who, through this book, brings unique yet rigorous solutions for ASEAN and Indonesia's trade and investment. This book argues that Indonesia as a de facto leader of ASEAN will seal the destiny of this region in the years to come. The tone of Fithra's writing reminds me of Paul Krugman."

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"A brilliant piece of work! The author was able to give an important insight about everyday issues and turn it into a compelling read."

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"This book covers a wide array of problems that ASEAN is currently having. Globalization is not a threat for ASEAN and Indonesia if one could handle the latent root cause of low productivity and middle-income trap. It is impressive how much insight Fithra and other contributors can extract from rigorous economic analysis while providing concrete solutions for ASEAN, especially Indonesia."

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"This book offers great insight and excellent advice on trade-related issues within a complex and rapidly-changing world. Great book!"

—Hera F. Haryn, *Director CNBC Indonesia, Editor in Chief CNBC Indonesia TV*

Fithra Faisal Hastiadi
Editor

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Introduction

International trade of intermediate goods has increased along with the development of the global production network. The contemporary debate is the opportunity to reap gain from economic globalization through linking production into global production network. Specific recent studies that identify the determinants of participation have evolved through variety of methodologies but consider less the economic shocks that occur. In its development, the global production network was also affected by the economic crisis in Asia in 1997/1998 and the economic shock of 2008/2009 which caused a contraction of trade. Therefore, the early part of this work aims to answer the question whether by considering the contraction of trade as a structural break will portray the close relationship between trade contraction and the participation of global production network. The first chapter will discuss how the economic crisis of 1997/1998 and the economic shock of 2008/2009 have causal relation to the participation of the global production network.

Furthermore, Chap. 2 deliberates the Association of Southeast Asian Nations (ASEAN) as a regional organization that has successfully formed a free trade agreement (AFTA). Despite AFTA's success in decreasing internal tariff among its member countries, other form of trade barrier, which is non-tariff barrier (NTB), has increased over time. On the other hand, ASEAN member countries have diverse level of democracy which implies different political motives of trade policy determination, which

in turn affect their trade pattern. This study attempts to explore the effect of ASEAN member countries' democracy on ASEAN trade with other ASEAN countries and non-ASEAN countries. By utilizing data panel of trade from 2005 to 2014 and polity score as the proxy for democracy and conducting an inferential analysis based on gravity model of trade, it is found that democracy has different effect on intra-ASEAN trade and extra-ASEAN trade. Democracy brings negative effect on ASEAN intra-regional trade yet gives positive effect on ASEAN extra-regional trade. From these two results, it is found that democratization of ASEAN country causes a trade diversion from ASEAN country to non-ASEAN country, which eventually implies a decrease on regional economic integration.

Next, the third chapter reveals what many economists have called the middle-income trap since the share of middle-income economies is growing. The trap is known as a condition of stagnant economic growth that prevents economies from reaching high-income level. In recent years, ASEAN countries have successfully reached the middle-income level. This chapter aims to understand the relationship between innovation and per capita income for ASEAN countries, and understand the role of innovation in supporting ASEAN countries to switch toward a higher income level. It is found that innovation along with foreign direct investment and productivity contributes positively toward per capita income. Innovation is also found to increase the probability of moving up the income ladder, specifically for lower middle-income level toward upper middle-income level. Productivity is found to strongly influence the probability of moving up to a higher income level on any level of initial income group. Furthermore, there is a curvilinear relationship between growth factors and per capita income, which indicates that the contribution of growth factors comes with diminishing marginal effects. As income per capita grows toward a higher income level, growth factors contribute toward income at a decreasing rate, which suggests heightened difficulty when moving up the income stages.

As far as trade borders of countries are concerned, they have been significantly obscured by globalization. As one of the efforts to integrate, ASEAN was formed to foster the sustainability economy of each member. However, trade facilities consisting of hard and soft facilities play a

major role. Therefore, Chap. 4 analyzes the effect of trade facilities on export performance deriving from new indicators for ASEAN countries in 2008–2014. The method used in this chapter is fixed effect method with such indicators of trade facilities as technological readiness, border and transport efficiency, as well as business environment. The results imply that trade facilities which affect export performance with technological readiness give the most significant influence, followed by business environment and border and transport efficiency. Overall, trade facilities have an important role in intensifying the quality and quantity of a country's exports, especially that of developing countries, as it determines trade costs that also affect the effectiveness and efficiency of trade.

The development of global economic challenges has forced ASEAN countries to further deepen its economic integration within the ASEAN Economic Community (AEC) and to incorporate several ASEAN Plus agreements into Regional Comprehensive Economic Partnership (RCEP). Under this circumstance, the ASEAN members need to distinguish how the difference in comparative advantage of each export commodity affects and influences the pattern of ASEAN's non-oil exports. The next chapter attempts to identify the impact of comparative advantage, represented by normalized revealed comparative advantage (NRCA) index, on the non-oil export pattern of the ASEAN countries using the augmented gravity model as its research method. Chapter 5 indicates that comparative advantage has a positive influence on ASEAN's non-oil exports and that the comparative advantages in agricultural commodities have the biggest influence.

Chapter 6 is aimed at analyzing the effect of trade creation and trade diversion which occurs on the establishment of such cooperation for the export of Indonesian food and beverage industry products with trading partners either with its members' or non-members' cooperation. This research is conducted by using a test from 12 countries in the period of 2005–2015 estimated using a modified gravity model by increasing the variable on dummy FTA as a proxy from the impact on the implementation of ASEAN China Free Trade Area (ACFTA), ASEAN Korea Free Trade Area (AKFTA) and ASEAN India Free Trade Area (AIFTA). The estimate results of this research suggest that the implementation of

ACFTA, AKFTA and AIFTA provides positive and significant effect of trade creation and trade diversion on export of Indonesian food and beverage products. This signifies that the implementation of ACFTA, AKFTA and AIFTA creates a trade creation effect by increasing intra-regional trade between ACFTA, AKFTA and AIFTA member countries and not cause trade diversion with non-member countries.

The next chapter, Chap. 7, observes the impact of the export tax tariff imposition on Indonesian cocoa beans against the export of processed cocoa products from Indonesia and Malaysia in the long term. Research variables used are the export volume of processed cocoa products in Indonesia and Malaysia, price of Indonesian cocoa beans, price of international cocoa beans, average price of processed cocoa exports in five competitor countries of Indonesia and Malaysia, volume of processed cocoa imports worldwide and the dummy application of the Indonesian cocoa export tax. In response to the objectives of this chapter, the autoregressive distributed lag (ARDL) and the Bound Testing Co-integration methods are applied in observing the co-integration of variables researched. Data analyses outcomes indicate that the imposition of export tax on Indonesian cocoa beans significantly affect the increased export volume of the Indonesian processed cocoa in the long term. Meanwhile, for Malaysia, the imposition of export tax on the Indonesian cocoa beans does not significantly affect decreased export volume of Malaysian processed cocoa in the long term.

Chapter 8 delves into the impact of anti-dumping policies on steel imports volume in Indonesia. It employs ordinary least square (OLS) method with a fixed effects model using a sample of unbalanced data panel of imports from 48 countries, comprising those that impose anti-dumping duty (AD) on specific HS code steel (named countries) and those that are not subject to imported steel AD (non-named countries) in the period 2007–2015. As Indonesia is an object country that has different characteristics from other developed countries in earlier research, the object of this research confirms impact of trade diversion as trade as well as reduction as the policy impact of Indonesia's AD of steel. The empirical research results find the existence of trade reduction in the volume of steel imports from the named countries but do not prove the existence of trade diversion of steel import volumes from non-named countries. Such

results contrast to those occurring in previous study in which the imposition of the anti-dumping tariffs in the United States, European Union, Japan and other developed countries, in addition to the impact of trade reduction.

The impact of implementation of the safeguard policy on the efficiency/productivity level of the protected industries is highlighted in Chap. 9. The productivity level of protected industries is measured by total factor productivity (TFP). This chapter also takes into account the impact of firm's heterogeneity factor that explains the assumption of different responses to protectionist policy based on the initial productivity of the firm within an industry. The data structure takes form as unbalanced data panel using analysis unit at firm level. The data are obtained from the Directorate General of Taxes' (DGT) database, specifically from the annual tax return. The result of this study empirically indicates a significant evidence to conclude that safeguard policy has positive impact on the TFP level of the protected firms. The result also considers the factor of firm's heterogeneity in an estimation model which provides evidence to support argument that frontier firms—firms with the highest TFP in their industry—receive a weaker impact from protection policy, compared to the "laggard" firms that receive positive impact of increased productivity from the temporary protection policy.

Finally, the last part of this work, Chap. 10, estimates the effect of changes in the output tariffs and input tariffs as measured by the weighted average of most favored nation (MFN) tariffs and preferential tariffs on firm productivity in manufacturing industry. Estimation results using Indonesian manufacturing firms' unbalanced panel data from 2007 to 2014 with 28,178 observations indicate that the output tariffs do not have a significant impact on firm productivity, while decreasing input tariffs can increase the productivity of the firm. Similar results are also obtained if the amount of output tariffs and input tariffs is measured by MFN tariffs.

Depok, Indonesia Fithra Faisal Hastiadi

Contents

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Global Production Networks: Participation and Structural Break

Agus Miftahul Ilmi and Fithra Faisal Hastiadi

Introduction

International trade of intermediate goods has multiplied alongside the development of the global production network and the spread of distribution among countries. The phenomenon reveals that the division of global production forms a new economic pattern and occurs almost all over the world. Meanwhile, countries in East Asia which became pioneers in the development of this economic pattern have run for three decades. Developed and developing countries jointly interconnect production and distribution facilities for shared economic benefits.

The debate is the opportunity to harvest gain from economic globalization through participation in global production networks. The level of participation has been measured by several studies with various methodologies. Recent studies have shown empirical data and evidence of link-

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ages or participation in global production networks. An example is the Ando and Kimura (2005) research that identifies the international production/distribution network at the company level in the machinery industry (general, electrical, transport equipment, and precision machinery).

Research that specifically identifies the determinants of participation in global production networks is also evolving through various methodologies. The research of Kimura et al. (2007) and Athukorala (2011) formulates the determinant of participation in global production network using gravity method. In the meantime, Kowalski et al. (2015) measure the participation of developing countries in the global value chain (GVC) using regression based on domestic value added (DVA). Banga (2014) studies how to measure a country's participation in the GVC through the ratio of forward linkage to backward linkage, in which GVC is a value added term of a global production network based on a concept developed by Koopman et al. (2011). In the meantime, the determinant of global production network participation formulated by Soejachmoen (2014) specifically pertains to the automotive industry of 98 developed and developing countries based on the theory of production fragmentation initiated by Jones and Kierkowski (1990).

In its development, the global production network was also affected by the economic crisis in Asia in 1997/1998 and the economic shock of 2008/2009, which caused a contraction in both periods. The WTO report[1] states that the Asian economic crisis of 1997/1998 caused world trade to weaken due to the declining demand from Asian countries in terms of petroleum, capital goods, and industrial commodities. In the 1997/1998 period, export performance from Asian countries experienced a significant decline accompanied by falling real currency values and rising unemployment.

The economic shock in 2008/2009 in various studies was also allegedly linked to the development of the global production network. Krugman (2009) states that the vertical integration of global production is the most likely cause of the great contraction of trade in the 2008/2009 crisis,

[1] WTO Annual Report 1998, The Asian financial crisis and the multilateral trading system, Chapter 3, pp. 25–28.

compared to the Great Depression in 1928. Athukorala (2011) explains that in 2008 there was a more perceived larger trade contraction by East Asian countries compared to the contraction of world trade. Among East Asian countries, Japan was most affected by the crisis in 2008 owing to reduced demand for final goods exports to China (Fukao and Yuan 2009) as well as reduced demand for capital goods and high-end consumer durable goods to America and Europe (Athukorala 2011).

The academic debate is the opportunity to benefit from economic globalization through participation in global production networks. Given the condition of economic shock that occurs, it is necessary to do further research because it is important to consider the trade contractions taking place in the 1997/1998 economic crisis and the 2008/2009 economic shock at deeper levels of research analysis to understand their relationship with the participation of global production networks. In the existing researches, the participation of global production network has not optimally considered the condition of trade contraction in the research, even though it is allegedly very influential on the research results.

This study aims to answer the question whether considering the contraction of trade as a structural break in the study will show the causality relationship between trade contraction and the participation of global production network. The expected contribution of this research is to use structural break as a technique in analyzing the research and to show a clearer picture of the causal relationship between trade contraction and the participation of global production network, so that the economic phenomenon is considered in subsequent studies.

In 2014, Soejachmoen conducted a research on the determinants of participation in the global automotive production network and why Indonesia lagged behind in the global production network. The study uses the theory of production fragmentation pioneered by Jones and Kierkowski (1990) as a conceptual framework. The model specification applies labor cost and exchange rate as comparative factors of production location and utilizes trade cost, trade openness, Logistic Performance Index, and FDI openness as proxy of service link factor. Using unbalanced panel data from 98 countries in 1988–2007, estimates are calculated using fixed effect regression with least square dummy variable (LSDV) to see individual portraits of countries. In the model, the depen-

dent variable is the real export value of parts and automotive components, while special economic conditions (including economic crisis) and country characteristics are only proxied as dummy variables.

The results obtained in Soejachmoen's (2014) research are infrastructure and labor cost as the main determinants for all countries to participate in global automotive production network. In developed countries, the next important determinant is trade cost and trade openness, while in developing countries it is FDI openness. Another result denotes that Indonesia's automotive industry is lagging behind in benefiting from participation in global production networks compared to Thailand.

Banga's (2014) research measures the participation of a country in the GVC through the ratio of forward linkage to backward linkage, where GVC is a value added term for the global production and distribution network. The study explains that the gain of a country in GVC can be seen more in using the ratio of *forward linkage* to *backward linkage*. Forward linkages are *DVA* of intermediate goods (including parts and components) exported to other countries, whereas *foreign value added (FVA)* are semi-finished goods exported to other countries. DVA and FVA data are obtained from *trade-in value added (TiVA)* in the OECD-WTO joint project database which has been derived from the concept formulated by Koopman et al. (2011). The study measures the level of participation in a given period only and has not considered the conditions of economic shock.

Research by Kowalski et al. (2015) calculates participation in GVC in 57 developed and developing countries in Asia, Africa, and the Middle East using regression based on forward participation ratio variable and backward participation ratio variable sourced from OECD TiVA database. The study focuses on the determinants and benefits of participation in GVC, including trade-related policies that are key to improving the country's ability to connect with the GVC chain. This study concludes that the volume of production from specialization activities based on comparative advantage is an important factor besides domestic value added share. In addition, import and export activities of components in backward linkage and forward linkage schemes show economic benefits in the GVC chain. In general, the measurement of participation using

added value term calculates the overall value, so that some specific economic conditions will not be seen.

Studies by Kimura et al. (2007) and Athukorala (2010) formulate the level of participation in global production networks using gravity methods. Both studies employ export as the dependent variable, with distance and GDP of exporter and importer countries as the control variables. The difference is that Kimura's research aims to explain the differences in fragmentation mechanism in Asia and Europe and has not considered economic shock, while that of Athukorala aims to understand the role of East Asia in trade networks, especially China's influence and the effects of the 2008/2009 economic shock.

Several studies that analyze the role of a particular sector in a global production network argue that characteristics are highly influential to the development of the production network. Lall et al. (2004) conducted a study on the fragmentation of production occurring in the automotive and electronics industries in East Asia and Latin America. Mapping and analyzing the intermediate goods trade of the industry conclude that fragmentation in the electronics industry grows faster, more integrated, and more dispersed than that of automotive due to technical factors. Sturgeon, T.J. and Memedovic, O. (2010) performed a study of deep integration in three industry sectors that pioneer the economic globalization of electronics, automobiles and motorcycles, and apparel and footwear. The results suggest that the pattern of global economic integration depends largely on the characteristics of specific types of products and production processes as well as regulation and customs in order to strengthen the industry.

Things to consider in forming empirical specifications based on recent research developments related to production fragmentation are specific factor economic profile and real conditions in world trade. Kimura states the importance of gravity factor in global development of network production in order to capture the impact of economic advancement on export performance. He shares the input and criticism also in the discussion of Soejachmoen's (2014) research. Athukorala (2011) explains that during the economic shock in the fourth quarter of 2008, trade contraction (export and import) naturally spread with several Asian countries connected in regional production networks. The trade contraction was

felt to be very influential for Japan's economy, followed by Taipei, China, and South Korea.

Based on the research question, the following are the hypotheses proposed in this research: First, the characteristics of industry still greatly affect the participation rate of global production network. Second, trade contractions that occurred in the economic crisis of 1997/1998 and the economic shock of 2008/2009 affect the level of participation in the global production network within a certain period. Third, the use of structural breaks in research is very important to consider in order to see changes in the level of participation on a short-term basis and portray specifically on the economy of a country within a certain period.

Literature Review

Fragmentation Theory

Fragmentation theory was developed by Jones and Kierkowski (1990), where an integrated production process is broken down into separate stages (production block) in order to optimize profits with the specialization of production. Another term for the production network is the relationship (nexus) between functions and operations interconnected through production relationships, distribution relationships, and the relationship of consumption of goods and services (Henderson et al. 2002). A multinational company will exercise a global production network pattern if the total cost efficiency can be obtained by fragmentation of production into a smaller segment of production at a particular location by considering the *comparative advantage* (difference of factor endowment) and *economies of scale and economies of scope* (Dunning and Lundan 2008).

The rapidly growing international production and distribution formation in East Asia is one of the most important and well-known phenomena of the past two decades. The global economic trends can be well explained by the theory of fragmentation (Kimura and Takahashi 2004). This is because the fragmentation theory developed by Jones and

Kierkowski (1990) has contributed such factors as, first, developments in production technologies that enable cutting up the production process into several blocks of different production processes; second, trade liberalization; and third, progress in terms of communication and transportation (services link).

Traditional trading theory argues that Ricardian's productivity factor and Heckscher-Ohlin's price and intensity factor are still relevant to fragmentation theory because the decision of the production block's specialization location depends on the comparative advantage. The difference is that fragmentation theory is more complex because it involves more than two types of goods (non-finished goods or parts and components) and it is influenced by the relative cost and efficiency of service link among related countries (Arndt and Kierzkowski, 2001). According to Kimura and Takahashi (2004), the service link in international trade comprises the following:

- **Trade cost**: transportation cost, policy barrier, market and research information cost, cost associated with the use of different currencies, legal and regulatory cost to trade, local distribution cost and policy barrier
- **Investment cost**: supplier information cost, contract enforcement cost, legal and regulatory to invest
- **Communication cost**: telecommunication cost and internet fee
- **Coordination cost**: timelines logistic cost, uncertainty cost

Based on the production technology aspect, Lall et al. (2004) explain in their research that fragmentation relies on four factors:

1. **Technical divisibility** in the production process. Not all production processes can be divided into several stages. For example, the electronics and automotive industries can technically be divided into several stages of production, while the chemical industry cannot be easily separated from the production process.
2. **The intensity factor** of the process. The relocation of production processes to locations with low labor costs would be economical if the

industry is categorized as labor intensive and the savings from the relocation are greater than the transportation and coordination costs.
3. **Technological complexity** of every production process. Relocation is not always more economical unless it is followed by a more stable and simple technology to be applied in low-wage countries.
4. **Value-to-weight ratio** (product ratio to weight). Logistic-related distance factors greatly influence the decision of relocation location.

Fragmentation in Economic Shock's

The contraction of trade that occurred during the recession and economic crisis caused instability of exchange rate, a decrease in demand for goods, and an excess supply of goods, so that producing countries tended to adjust production (Fukao and Yuan 2009; Athukorala 2011). Under such circumstances, a multinational corporation that has a fragmentation pattern of production in the host country will begin to rethe relocating one or more of its production blocks for adjustment, or even decide to stop production. This will affect the level of host country participation in the global production network so that the country will tend to undertake various leeway policies in the framework of investment and distribution of its products to maintain its economic and trade stability.

Data and Empirical Model

Step 1

A host country's comparative perspective will be used as a model basis with relative production factors and service link factors as the main component, according to the fragmentation theory of Jones and Kierkowski (1990). The empirical model used to identify the determinants of participation in global production networks made by Soejachmoen (2014) is still relevant in this study, so it will be used as a key reference by adding some control variables that reflect the characteristics of the industrial sector and change the use of more precise data sources.

In principle, based on Lall et al. (2004), fragmentation can be realized if the cost saving of multinational companies has considered four factors of production technology, namely, technical divisibility in production process, intensity factor of process, technological complexity of each production process, and trade value to weight ratio. Each industry has different weighting scores, thereby describing the characteristics. Of the four factor proximities, only trade value to weight ratios data can be obtained and, hence, will be used in this study as a proximity for the characteristics of the industrial sector.

As Kimura's research suggests, this model will accommodate GDP per capita variable to capture the impact of the economic advancement level on export performance. This study applies trade data of intermediate goods (SITC Rev. 3) from 40 countries in Asia, Europe, America, and Africa which are considered representing global production and distribution patterns, according to the research scope of Athukorala (2010). The research-dependent variable is the real export value of intermediate goods (including parts and components). The research estimate is calculated using fixed effect regression with LSDV to see the portrait of each country. To see a clearer portrait of fragmentation, this study will use data from 1988 to 2015 by regressing all industrial sectors. The industrial product classification is given in Table 1.1.

Based on the main reference model, we determine the model specification for this research as follows:

$$\begin{aligned}\ln\left(\mathrm{Frag}_{i,t}\right) = {} & \beta_0 + \beta_1 \ln\left(\mathrm{LabCost}_{i,t}\right) + \beta_2 \ln\left(\mathrm{RER}_{i,t}\right) \\ & + \beta_3 \ln\left(\mathrm{TradeCost}_{i,t}\right) + \beta_4 \ln\left(\mathrm{Tradeopen}_{i,t}\right) \\ & + \beta_5 \ln\left(\mathrm{Infrastructure}_{i,t}\right) + \beta_6 \ln\left(\mathrm{FDIOpen}_{i,t}\right) \\ & + \beta_7 \ln\left(\mathrm{VTWR}_{i,t}\right) + \beta_8 \ln\left(\mathrm{GDPPercap}_{i,t}\right) \\ & + + \phi_1 D + \tau_1 T + a_i + U_{i,t}\end{aligned}$$

In this research, regression will be implemented in the model for each industry. The definitions of operational variables are given in Table 1.2, and the data source is described in Table 1.3.

Table 1.1 Industrial product classification

Classification	Industrial included
Machinery	• Power-generating machines (SITC 71) • Specialized industrial machine (SITC 72) • Metal working machine (SITC 73) • General industrial machinery (SITC 74)
ICT products	• Office machines and automatic data processing machines (SITC 75) • Telecommunication and sound recording equipment (SITC 76) • Semiconductors and semiconductor devices (SITC 772 + SITC 776) • Electrical goods (SITC 77—SITC 772—SITC 776)
Transport equipment	• Road vehicles (SITC 78) • Other transport equipment (SITC 79)
Resource-based product	• Leather (SITC 61) • Rubber (SITC 62) • Textile yarn and fabrics (SITC 65) • Non-metallic mineral (SITC 66) • Metals (SITC 69)
Other manufacturing	• Chemicals (SITC 5) • Miscellaneous manufacturing (SITC 8) • Professional and scientific equipment (SITC 87) • Photographic apparatus (SITC 88)

Step 2

By using the model specification in Step 1, the regression is performed in structural break by considering the condition of economic crisis in 1997/1998 and the economic shock in 2008/2009. Structural break is divided into three periods; first is the period 1988–1997, second is the period 1999–2007, and third is the period 2009–2015. Trade data in 1998 and 2008 are not included in the analysis because of a fluctuation in data that is feared to affect research results. It is assumed to be in a period of economic recovery in the country following the crisis or economic recession. Trade data in 1997 is still included in the analysis because it is assumed to be relevant in the calculation. Based on WTO data (1998), the new trade contraction started at the end of 1998 (October). Trade data in 2009 is still included in the analysis as it is graphically assumed to be relevant. The trade contraction that took place in 2008/2009 did not significantly affect other variables.

Table 1.2 Definition and operational variable

Variable	Definition and operational variable
$Frag_{i,t}$	*Fragmentation trade* is the real value of export of parts and components of country *i* in year *t*.
$LabCost_{i,t}$	*Cost of labor* is the real labor wage for country *i* in year *t*.
$RER_{i,t}$	*Real exchange rate* shows the competitiveness of country *i* in year *t*.
$TradeCost_{i,t}$	*Trade cost* is the export cost of product from country *i* in year *t*.
$TradeOpen_{i,t}$	*Trade openness* in the year *t* is the ratio of total export and import to GDP from country *i* in year *t*.
$Infrastructure_{i,t}$	*Logistic Performance Index*, in country *i* and period *t* year.
$FDIOpen_{i,t}$	*FDI openness* is the ratio of FDI stock to GDP from sector *i* in year *t*.
$VTWR_{i,t}$	*Trade value to weight ratio*, which denotes the characteristics of the industrial sector, is the ratio of export value to total weight of commodity sector in year *t*.
Dummy *D* and *T*	Dummy of certain country character and dummy time (time varying) to consider certain conditions at certain period.
a_i	Intercept for country *i* is an indicator of the characteristics of participation of each country.

Result

Participation of Global Production Network

Using the data as the data summary descriptions in Table 1.4, graphic data of Fig. 1.4, and graphic data of Fig. 1.5, an estimation according to the methodology in Step 1 is obtained from the fixed effect regression resulting items as shown in Table 1.5. The items that can be identified from the estimation result will be analyzed and discussed in this chapter. This discussion begins by looking at test results for all scopes of the industrial sector during the period 1988–2015 which show that almost all independent variables signify a positive and significant relation to real export variables, including real exchange rate (RER) and labor cost. Trade openness in machinery sector has a negative sign but not significant, so it is not included in consideration of analysis. This is in accordance with the study by Soejachmoen (2014) which becomes the model reference on the determinants of global production network participation.

Table 1.3 Data source for model specification

Variable	Remarks	Data source
$Frag_{i,t}$	*Fragmentation trade*, the value of real exports is derived from the export value of parts and components of each sector divided by US import price index.	Export value in SITC Rev. 3 from UN Comtrade while US import price index from Bureau of labor statistic-US Department of Labor.
$LabCost_{i,t}$	*Cost of labor* (US dollar unit) is divided by US consumer price index.	Labor costs represent the non-gender wage/ wages of the manufacturing sector, ISIC rev 2, 3, and 4- ILO/LABORSTA. European labor costs of UNECE. US Consumer price index is obtained from WDI-World Bank.
$RER_{i,t}$	*Real exchange rate* indicates competitiveness, calculated based on the equation: R = (E.P*)/P, where E is the nominal exchange rate in units of foreign currency. P* is the foreign price index while P is the domestic price index. Wholesale price index used as proxy P* and GDP deflator is used for proxy P.	The nominal exchange rate, the wholesale price index, and the GDP deflator are obtained from WDI-World Bank.
$TradeCost_{i,t}$	*The cost of trade* is the cost of exporting products of each sector.	Retrieved from Doing business report, Trading across Borders—Cost to export (US$ per container).
$TradeOpen_{i,t}$	*Trade openness* of each sector is the ratio of export/GDP and import/ GDP.	WDI-World Bank.

(*continued*)

Table 1.3 (continued)

Variable	Remarks	Data source
$Infrastructure_{i,t}$	*Logistic Performance Index,* LPI score including customs, infrastructure, international shipments, logistics quality and competence, tracking and tracing, timeliness.	LPI Reports 2007, 2010, 2012, 2014, and 2016.
$FDIOpen_{i,t}$	Ratio of FDI stock to GDP.	UNCTAD Database
$VTWR_{i,t}$	Export value ratio (US dollar) to total weight of commodity sector (kg).	UN Comtrade
Dummy *D* and *T*	Dummy country-specific characters, used to view country-specific variations, and dummy time (time varying) to consider trade contraction conditions for a given period.	The conditions of trade contraction in this model are assumed to have been determined in 1997/1998 and 2008/2009.The country characteristic in this case is the use of Euro currency in Europe.

Labor cost is the wage of real workers having positive expected signs based on the latest trade and fragmentation theory, where high-quality products require a higher capital intensity in production. An open-economy country with abundant capital will export high-quality products, whereas abundant labor country will export low-quality products. The higher the quality of the product, the higher the intensity of capital, and the higher the workforce skill that is required, which means higher cost of labor.

RER is a proximity of competitiveness in the industry and trade. Traditionally, the appreciation of the domestic currency increases the cost of imports and lowers the value of exports. However, in production networks, there is a different behavior. Changes in currency exchange rates are not excessively responded by exporting countries because only the proportion of imports increases in the export of their products. Therefore, RER changes will not be so influential in the global production network. This result may differ from the findings of Arndt and Huemer (2007)

Table 1.4 Data summary

Variable	Obs	Mean	Std. Dev	Min	Max
Ln Frag	1038	18.568	1.497	13.387	22.174
Ln RER	1064	1.785	2.706	−16.871	9.614
Ln LabCost	1038	2.380	1.911	−4.388	14.737
Ln TradeCost	1120	6.688	0.459	5.193	7.861
Ln TradeOpen	1103	0.029	0.156	−0.439	0.805
Ln Infrastructure	1118	3.495	0.467	2.368	4.226
Ln FDIOpen	1086	−15.447	1.068	−21.589	−12.609
Ln VTWR	1029	2.726	0.991	−2.924	6.647
Ln GDPpercap	1093	9.005	1.787	2.092	11.541

Source: Authors

which suggest that exchange rate and trade are negatively related to global production networks.

Economic advancement of a country to improve export performance, proxied by GDP per capita, denotes significant estimation results (error rate less than 1%) in all estimation groups. The export performance includes export parts and components that reflect the participation of global production networks. It supports the opinions of Athukorala (2011) and Kimura et al. (2007) who prefer using the theory of gravity in their study.

Based on industry characteristics, reflected from the variable value-to-weight ratio (VTWR), there are differences in inter-industry constant values and each of which is empirically significant. The industrial sector of ICT (coeff. 0.230) has the greatest influence on the participation rate of global production network, followed by the transport equipment industry (coeff. 0.145), then resource-based industry (coeff. 0.121), and the last is the machinery industry (coeff. 0.082) while the rest is industry is shown in other manufacturing groups. So it can be concluded that industry characteristics greatly affect the level of participation in global production networks. This further reinforces the opinion of Lall et al. (2004) and Sturgeon and Memedovic (2010).

Considering the estimation result using fixed effect and the technique using LSDV, we need to capture the intercept of each country, where the intercept is a portrait of the country participation level in the global production network. The order of participation level for each industry can be

seen in Table 1.6. In Southeast Asia (ASEAN), in general the highest participation rate is Malaysia followed by the Philippines, Singapore, Thailand, and Indonesia. Malaysia has a higher level of participation in almost all industries, except the transport equipment industry which lags behind Thailand and the Philippines. These results further support the results of research by Soejachmoen (2014) that the Indonesian automotive industry lags behind Thailand in the participation of the global production network.

Countries in other Asian regions, China, and India are at the highest level of participation in all industry. The strength of the Chinese economy undoubtedly lies on the rapid development of industrial and logistics infrastructure, supported by the ability of labor with competitive wages in all industries. Meanwhile, India is a developing country with a high GDP growth[2] that supports the linkage in the global production network. Japan has spread its economy into many developed and developing countries. Its domestic development is more about high-tech industries and license holders, so that participation must be seen in a wider scope across all production network. Korea is experiencing rapid growth in the ICT industry and has begun to build its production network in numerous countries. However, its sectoral competition with other countries still requires maximum effort, including with Israel and Russia.

The order of five major levels of participation for all sectors in the European region is owned by Germany, Turkey, Italy, France, and England. In industrial group, Germany also leads in all industries from Turkey and other countries, except for machinery where Turkey leads. In Germany, the transport equipment industry is lower than that of Italy. The next competitive ICT industry is France, Italy, and the UK. The industrial sector which is natural resource based is subsequently owned by Italy, France, and Spain. Strong integration and economic openness support the European countries in optimizing the trade traffic of goods including intermediate goods. As Kimura et al. (2007) argue, production pattern in Europe is more of horizontal relation (*product differentiation*).

[2] GDP growth in average from 2000 to 2016 is 7.03% for India, 8.9% for China, 5.5% for Indonesia, 5.15% for Malaysia, and 3.3% for Thailand. Source: WDI-World bank database.

Table 1.5 Recapitulation of model estimation results

	Dependent variable								
	Real export intermediate goods								
Independent variable	All period	Structural breaks 1	Structural breaks 2	Structural breaks 3	Machinery	ICT	Transport equip.	Resource based	Other Mfg
RER	0.776***	0.631***	0.131	0.305***	1.173***	0.742***	0.886***	0.905***	0.604***
LabCost	0.22***	0.174*	−0.124	−0.118	0.393***	0.235***	0.255***	0.246***	0.111**
TradeCost	0.259***	0.365***	0.513***	0.058	0.141**	0.157***	0.132*	0.166***	0.081
TradeOpen	0.447***	0.825***	0.706***	0.449**	−0.006	0.762***	0.338**	0.308**	0.453***
Infrastructure	0.275**	−0.817	3.026***	0.202**	0.2	0.094	0.658***	0.246*	0.648***
FDIOpen	0.317***	0.299***	0.127**	−0.078	0.288***	0.282***	0.382***	0.263***	0.371***
VTWR	0.111***	0.134***	0.068***	−0.042*	0.082***	0.23***	0.145***	0.121***	0.241***
GDPpercap	0.659***	1.647***	0.945***	1.038***	0.91***	0.563***	0.802***	0.826***	0.637***
Dummy euro currency	−0.177**	–	−3.615***	−0.049	−0.404***	−0.013	−0.42***	−0.508***	−0.486***
Dummy trade contraction	0.109**	–	–	–	0.131***	0.105***	0.081	0.068	0.01
Observation number	969	273	348	271	940	966	927	965	960
Adjusted R^2	0.947	0.984	0.981	0.991	0.953	0.953	0.938	0.942	0.924
Specific country intercept (a_i)									
ASEAN-5									
Indonesia	−3.699***	−0.677	2.328***	0.361	−8.014***	−2.722***	−4.449***	−5.183***	−4.778***
Malaysia	2.064***	2.782***	2.471***	2.85***	0.023	3.696***	−1.018***	0.573***	1.35***
Philippines	1.293***	2.315***	5.195***	3.313***	−2.484***	2.869***	−0.795	−1.053***	0.076
Singapore	1.082***	0.854	−0.679	2.454***	−0.212	2.691***	−1.821***	−0.159	−0.103
Thailand	0.953***	2.234***	2.21***	2.751***	−0.711***	2.303***	−0.769***	0.556***	1.145***

(*continued*)

Table 1.5 (continued)

	Dependent variable								
	Real export intermediate goods								
Independent variable	All period	Structural breaks 1	Structural breaks 2	Structural breaks 3	Machinery	ICT	Transport equip.	Resource based	Other Mfg
OTHER ASIA									
China	3.845***	5.504***	4.834***	5.304***	2.553***	5.253***	1.775***	3.485***	3.932***
Japan	0.115	1.966	−12.01	1.836***	−2.708***	1.495	−1.8***	−1.057**	0.646
Rep. of Korea	−2.18***	−1.331*	1.227***	1.417*	−6.486***	−0.355***	−5***	−3.882***	−1.581***
India	0.71***	3.478***	2.827***	3.138***	−0.204	1.496***	0.212***	1.055***	1.039***
Israel	−1.127***	−1.816***	−0.281	−0.309	−2.985***	−0.094***	−2.706***	−0.794***	−1.035***
Russian Fed.	−1.426***	0.009	2.577***	0.028	−2.192***	−0.774***	−2.52	−1.104***	−0.609***

Remarks: (a) All period is 1988–2015, Structural break 1 is the period 1988–1997, Structural break 2 is the period 1997–2007, and Structural break 3 is the period 2008–2015. (b) The *** sign shows a significant degree of error of less than 1%, the ** sign indicates a significant error rate of less than 5%, and the sign * denotes a significant degree of error of less than 10%

Table 1.6 The order of participation level of global production network of each industrial group

Region	Order of participation level	All industries	Machinery	ICT	Transport equip.	Resource based	Other Mfg
ASEAN-5	1	Malaysia	Malaysia	Malaysia	Thailand	Malaysia	Malaysia
	2	Philippines	Singapore	Philippines	Philippines	Thailand	Thailand
	3	Singapore	Thailand	Singapore	Malaysia	Singapore	Philippines
	4	Thailand	Philippines	Thailand	Singapore	Philippines	Singapore
	5	Indonesia	Indonesia	Indonesia	Indonesia	Indonesia	Indonesia
OTHER ASIA	1	China	China	China	China	China	China
	2	India	India	India	India	India	India
	3	Japan	Russia	Japan	Japan	Israel	Japan
	4	Israel	Japan	Israel	Russian	Japan	Russian
	5	Russian	Israel	Korea	Israel	Russian	Israel
	6	Korea	Korea	Russian	Korea	Korea	Korea

(*continued*)

Table 1.6 (continued)

Region	Order of participation level	All industries	Machinery	ICT	Transport equip.	Resource based	Other Mfg
EUROPEAN UNION	1	Germany	Turkey	Germany	Turkey	Turkey	Turkey
	2	Turkey	Germany	Turkey	Italy	Germany	Germany
	3	Italy	Italy	France	Germany	Italy	Italy
	4	France	France	Italy	France	France	France
	5	UK	UK	UK	Spain	Spain	Slovenia
	6	Spain	Spain	Netherlands	Slovakia	UK	Slovakia
	7	Slovakia	Slovakia	Spain	UK	Slovakia	UK
	8	Netherlands	Austria	Slovakia	Portugal	Belgium	Spain
	9	Austria	Netherlands	Portugal	Poland	Portugal	Poland
	10	Poland	Belgium	Austria	Slovenia	Austria	Netherlands
	11	Portugal	Poland	Poland	Belgium	Slovenia	Austria
	12	Belgium	Finland	Finland	Austria	Netherlands	Portugal
	13	Slovenia	Slovenia	Belgium	Netherlands	Poland	Belgium
	14	Finland	Portugal	Ireland	Czechia	Finland	Ireland
	15	Ireland	Switzerland	Slovenia	Finland	Switzerland	Czechia
	16	Switzerland	Ireland	Switzerland	Sweden	Czechia	Finland
	17	Czechia	Sweden	Czechia	Switzerland	Ireland	Switzerland
	18	Sweden	Czechia	Sweden	Ireland	Sweden	Sweden
	19	Denmark	Denmark	Denmark	Denmark	Denmark	Denmark
	20	Hungary	Norway	Hungary	Hungary	Hungary	Hungary
	21	Norway	Hungary	Norway	Norway	Norway	Norway

(*continued*)

Table 1.6 (continued)

Region	Order of participation level	All industries	Machinery	ICT	Transport equip.	Resource based	Other Mfg
NAFTA	1	USA	USA	USA	USA	USA	USA
	2	Mexico	Mexico	Mexico	Mexico	Mexico	Mexico
	3	Canada	Canada	Canada	Canada	Canada	Canada
OTHERS	1	Brazil	Brazil	Brazil	Brazil	Brazil	Brazil
	2	Argentina	Argentina	Australia	Argentina	Argentina	Argentina
	3	Australia	Australia	Argentina	South Africa	South Africa	South Africa
	4	South Africa	South Africa	South Africa	Australia	Australia	Australia
	5	Costa Rica	Costa Rica	Costa Rica	Costa Rica	Costa Rica	Costa Rica

Source: Authors

In addition, it is found that the use of Euro currency has empirically negative correlation with exports of parts and components because of lessening competitiveness caused by currency unification. In North America, the level of global network participation is dominated by the United States of America and followed by Mexico and Canada. In the interim, other exporting countries of intermediate goods that are considered superior are Brazil, followed by Argentina, Australia, South Africa, and Costa Rica. Brazil is a developing country that has a comparative advantage factor of cheap labor and good service link with a higher 2016 LPI, compared to that of Indonesia and Vietnam.

Indonesia's participation level is lagging behind in many industries, particularly the automotive industry in Soejachmoen's (2014) study due to, among others, lack of infrastructure, lack of disclosure policy (FDI openness), low labor quality, and high trade costs compared to other ASEAN countries. These attributes become evaluation and input for countries that have not maximized comparative factors and service links to achieve optimal benefits by connecting in a global production network.

Effect of Structural Break in the Model

A test that applies methodology in Step 2 produces regression result as shown in Table 1.5 with several items that can be identified in the analysis in this section.

In an estimation with long data range (without structural break) and that only employs dummy economic condition as economic shock effect, it is indicated that almost all independent variables (real labor cost, real exchange rate, trade cost, trade openness, infrastructure, and FDI openness as well as value-to-weight ratio) show a positive and significant relationship affecting the level of participation. Meanwhile, in the estimation with structural break, there are some variables that are negative but not significant. These variables are attributable to the data factor in that period which is not time invariant (infrastructure variable at first break), the relatively high fluctuation after the 1997/1998 economic crisis (variable real exchange rate and labor cost at second break), and independent variables that are not directly related to short-term export value (labor

cost, trade cost, and FDI openness at the third break). The variable export value to weight ratio (VTWR at third break is negative but is significant at less than 10% error rate. This has yet to be considered in the analysis because the data search results indicate doubtful data source for the total weight of Malaysian goods exports in 2010 (Fig. 1.4-g). Nevertheless, most variables exhibit a positive and significant relationship so that the model is still relevant to be used as an instrument of analysis of the participation rate of global production networks.

Intercept estimation results from each country, which are a portrait of the countries' participation level in the global production network, are depicted in detail in Tables 1.8 and 1.9. In order to see and analyze the change of participation rate in each period, the data are converted to Table 1.7.

The structural breaks in 1997/1998 and 2008/2009 indicate a change in the order of participation levels in ASEAN. In the first break period, the descending order of participation rates is Malaysia, Philippines, Thailand, Singapore, and Indonesia. In the second break period, the descending order of participation rates is the Philippines, Malaysia, Indonesia, Thailand, and Singapore. In the third break period the descending order of participation level from the highest is the Philippines, Malaysia, Thailand, Singapore, and Indonesia. In the table, questions arise whether the long-term participation rate of the Philippines is higher than that of Indonesia.

Figure 1.1 illustrates the data from the ASEAN-5 countries used in the model. In the graph, parts and components exports from Indonesia since 1995 have the lowest value compared to that of other ASEAN countries. This indirectly signifies that the participation of global production network from Indonesia is quite low, even compared to the Philippines.

Based on the ratio of part and component exports to imports, Figs. 1.2 and 1.3 exemplify that Indonesia in the first break period is greater in its imports value than its exports value, although it is slowly trying to reduce the value of negative ratios by increasing the rate of exports. In the second break period, the ratio jumped positively due to significantly reduced imports of parts and components after the 1997/1998 economic crisis. It can be explained that Indonesia has been deindustrialized since 2001 which indicates that Indonesia's manufacturing export value relative to

Table 1.7 Order of participation level of global production network in the presence of structural break

Region	Order of participation level	All period (1988–2015)	Structural breaks 1 (1988–1997)	Structural breaks 2 (1999–2007)	Structural breaks 3 (2009–2015)
ASEAN-5	1	Malaysia	Malaysia	Philippines	Philippines
	2	Philippines	Philippines	Malaysia	Malaysia
	3	Singapore	Thailand	Indonesia	Thailand
	4	Thailand	Singapore	Thailand	Singapore
	5	Indonesia	Indonesia	Singapore	Indonesia
OTHER ASIA	1	China	China	China	China
	2	India	India	India	India
	3	Japan	Japan	Russian Fed.	Japan
	4	Israel	Russian Fed.	Korea	Korea
	5	Russian Fed.	Korea	Israel	Russian Fed.
	6	Korea	Israel	Japan	Israel

Source: Authors

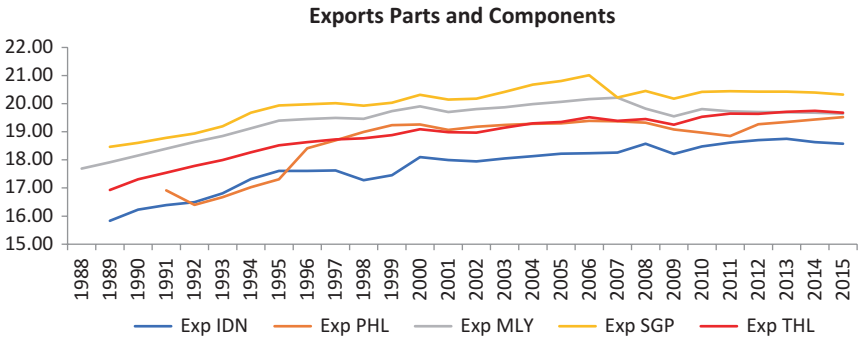

Fig. 1.1 Exports of parts and components of ASEAN-5 countries (logarithmic). Source: Authors, from UNCOMTRADE

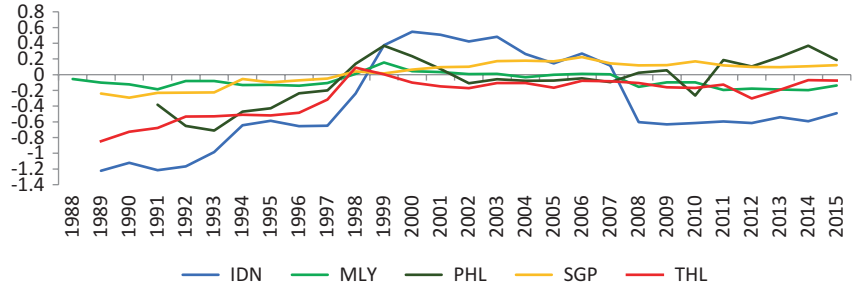

Fig. 1.2 Ratio of exports to imports for parts and components ASEAN-5 countries (logarithmic). Source: Authors, from UNCOMTRADE

GDP tends to decrease over time. Additionally, the post-crisis capital of 1997/1998 affected the economic condition of Indonesia (Nurunnisa and Hastiadi 2017). At the third break, imported parts and components come back higher than their exports. It is also suspected that the imported parts and components are mostly used for assembling domestically and are marketed domestically as well.

Based on the above discussion, we can observe that the use of structural break in the form of trade contraction in a certain period can see the change of participation level in the short term and a clearer portrait occurs in a country's economy. In the long period (without structural break), specific symptoms in a country will not be easily captured.

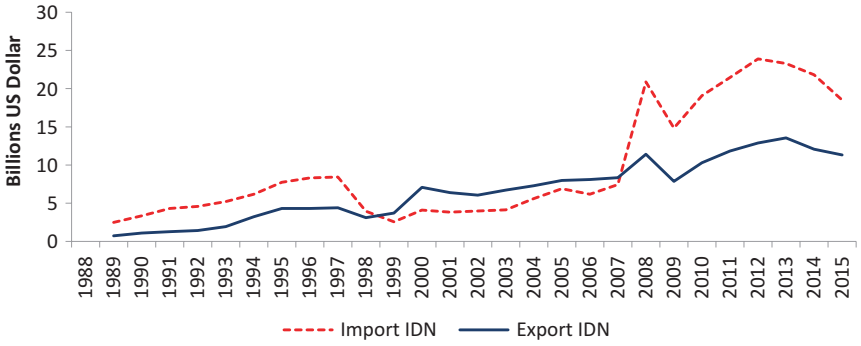

Fig. 1.3 Exports and imports of Indonesian parts and components. Source: Authors, from UNCOMTRADE

Conclusion and Recommendation

In this study, generally we can conclude that:

1. Industrial characteristics still greatly affect the participation rate of global production network with ICT industry (electronics and telecommunication) having the highest participation level, followed by transportation industry, resource-based industries (rubber, metal, cotton and yarn, minerals), and machinery (industrial machinery and generators).
2. Trade contractions that occurred in the economic crisis of 1997/1998 and the economic shock of 2008/2009 affect the participation level in global production network in certain period, especially in Asian region.
3. The use of structural break in research is very important to be considered to be able to see the change of participation rate in short term and portrait specifics on economy of a country in certain period.

This research still has some shortcomings such as:

1. Export data used in this study utilizes export reports from home countries. There is still a possibility of bias in certain countries that export through third party, for example, Indonesia mostly exports through Singapore. The use of export data sourced from import reports from

destination countries may be applied in future research to avoid such bias.

2. Endogenity between real exchange rate variables and export component and component variables (Frag) has not been considered in the model, so treatment is needed to overcome the problem of endogenity.
3. This study has the only limitations to prove empirically the relationship of economic volatility conditions that affect the level of participation of global production network. It has not shown the reverse direction where the participation rate of global production network affects the acceleration of the propagation of economic shock. This is to be considered in further research.

Appendix A: Graphs and Figures

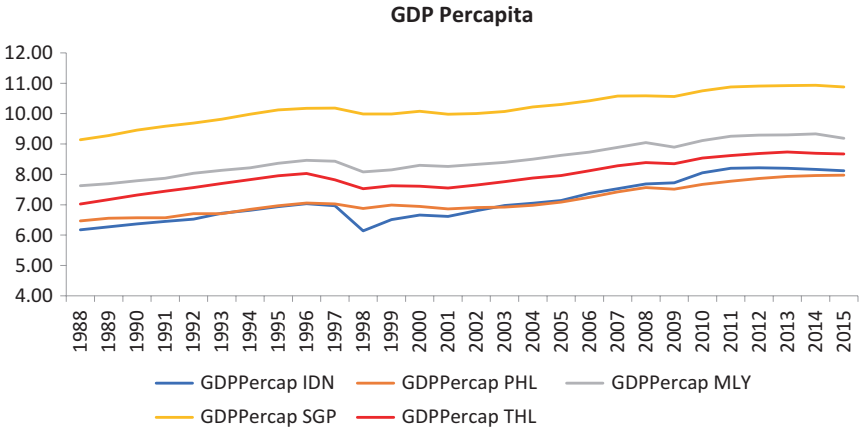

Fig. 1.4 Variable in the model. Source: Authors, from UNCOMTRADE

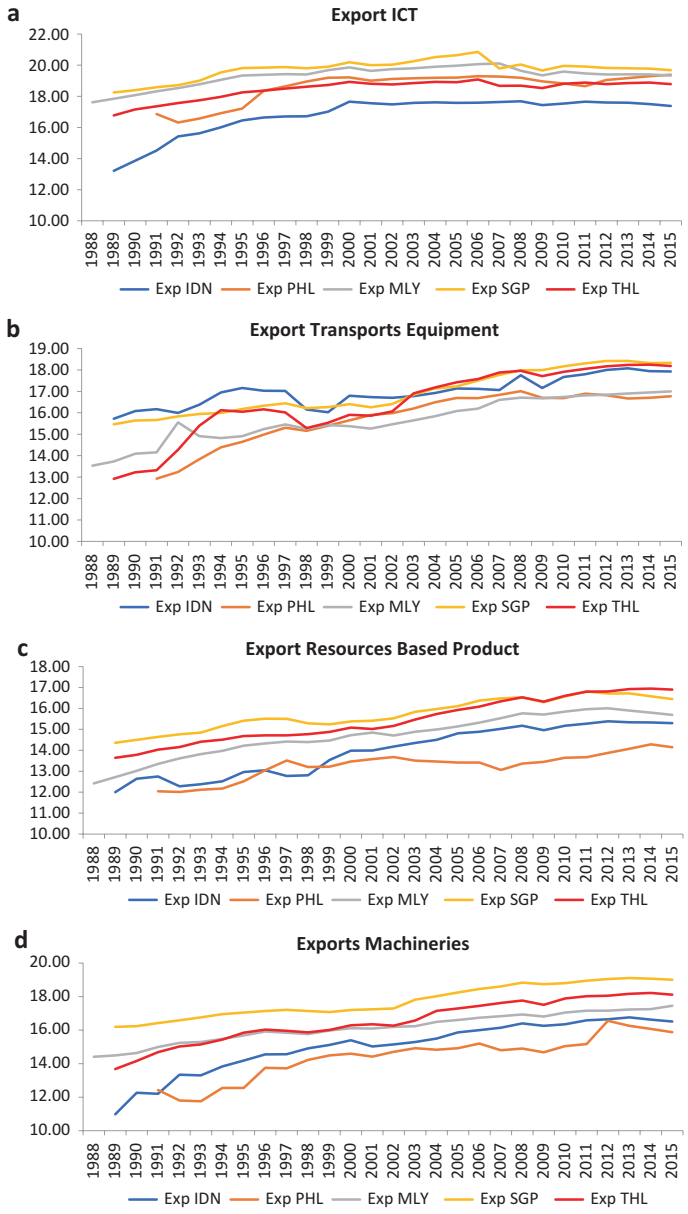

Fig. 1.5 Graphs of sectoral parts and components exports (logarithmic). Source: Authors, from UNCOMTRADE. (**a**) ICT, (**b**) Transport equipment. (**c**) Resources-based product. (**d**) Machinery

Appendix B: Tables

Table 1.8 Estimation result using production fragmentation method

Dependent variable	Real exports of intermediate goods											
Independent variable	**All industries**		**Machinery**		**ICT**		**Transport equip.**		**Resource based**		**Other Mfg**	
RER	0.776	0.00	1.173	0.00	0.742	0.00	0.886	0.00	0.905	0.00	0.604	0.00
LabCost	0.220	0.00	0.393	0.00	0.235	0.00	0.255	0.00	0.246	0.00	0.111	0.01
TradeCost	0.259	0.00	0.141	0.03	0.157	0.02	0.132	0.08	0.166	0.00	0.081	0.23
TradeOpen	0.447	0.00	–0.006	0.96	0.762	0.00	0.338	0.03	0.308	0.02	0.453	0.00
Infrastructure	0.275	0.03	0.200	0.14	0.094	0.55	0.658	0.00	0.246	0.06	0.648	0.00
FDIOpen	0.317	0.00	0.288	0.00	0.282	0.00	0.382	0.00	0.263	0.00	0.371	0.00
VTWR	0.111	0.00	0.082	0.00	0.230	0.00	0.145	0.00	0.121	0.00	0.241	0.00
GDPpercap	0.659	0.00	0.910	0.00	0.563	0.00	0.802	0.00	0.826	0.00	0.637	0.00
Dummy Euro Currency	–0.177	0.01	–0.404	0.00	–0.013	0.88	–0.420	0.00	–0.508	0.00	–0.486	0.00
Dummy Trade Contraction	0.109	0.01	0.131	0.00	0.105	0.04	0.081	0.10	0.068	0.11	0.010	0.84
Observation Number	969		940		966		927		965		960	
Adjusted R^2	0.947		0.953		0.953		0.938		0.942		0.924	

(*continued*)

Table 1.8 (continued)

Specific country intercept (a_i)												
ASEAN-4												
Indonesia	–3.699	0.00	–8.014	0.00	–2.722	0.00	–4.449	0.00	–5.183	0.00	–4.778	0.00
Malaysia	2.064	0.00	0.023	0.89	3.696	0.00	–1.018	0.00	0.573	0.00	1.350	0.00
Philippines	1.293	0.00	–2.484	0.00	2.869	0.00	–0.795	0.18	–1.053	0.00	0.076	0.74
Singapore	1.082	0.00	–0.212	0.36	2.691	0.00	–1.821	0.00	–0.159	0.46	–0.103	0.69
Thailand	0.953	0.00	–0.711	0.00	2.303	0.00	–0.769	0.00	0.556	0.00	1.145	0.00
OTHER ASIA												
China	3.845	0.00	2.553	0.00	5.253	0.00	1.775	0.00	3.485	0.00	3.932	0.00
Japan	0.115	0.74	–2.708	0.00	1.495	0.51	–1.800	0.00	–1.057	0.01	0.646	0.15
Rep. of Korea	–2.180	0.00	–6.486	0.00	–0.355	0.00	–5.000	0.00	–3.882	0.00	–1.581	0.00
India	0.710	0.00	–0.204	0.24	1.496	0.00	0.212	0.00	1.055	0.00	1.039	0.00
Israel	–1.127	0.00	–2.985	0.00	–0.094	0.00	–2.706	0.00	–0.794	0.00	–1.035	0.00
Russian Fed .	–1.426	0.00	–2.192	0.00	–0.774	0.00	–2.520	0.28	–1.104	0.00	–0.609	0.03
EUROPEAN UNION												
Austria	1.032	0.00	0.949	0.00	1.872	0.00	–0.512	0.18	1.211	0.00	1.391	0.00
Belgium	0.746	0.00	0.438	0.03	1.521	0.00	–0.311	0.00	1.681	0.00	1.224	0.00

(*continued*)

Table 1.8 (continued)

Czechia	–0.571	0.01	–2.257	0.00	0.478	0.01	–1.790	0.00	–0.761	0.00	0.437	0.11
Denmark	–1.814	0.00	–2.949	0.00	–0.771	0.00	–4.056	0.00	–2.838	0.00	–1.239	0.00
Finland	0.482	0.01	0.207	0.30	1.523	0.00	–2.383	0.00	0.438	0.02	0.181	0.43
France	2.390	0.00	2.089	0.00	3.298	0.00	1.504	0.00	2.380	0.00	2.546	0.00
Germany	3.152	0.00	2.844	0.00	4.046	0.00	1.854	0.00	3.470	0.00	3.246	0.00
Hungary	–2.619	0.00	–4.881	0.00	–1.260	0.00	–4.607	0.00	–3.558	0.00	–1.686	0.00
Ireland	–0.058	0.72	–1.631	0.00	1.467	0.69	–3.611	0.00	–0.912	0.00	0.821	0.00
Italy	2.670	0.00	2.671	0.00	3.227	0.00	1.998	0.00	3.323	0.00	3.193	0.00
Netherlands	1.076	0.00	0.550	0.01	2.434	0.00	–1.004	0.00	1.109	0.00	1.420	0.00
Norway	–2.698	0.00	–3.761	0.00	–1.571	0.00	–4.706	0.00	–3.561	0.00	–2.194	0.00
Poland	0.885	0.00	0.320	0.02	1.868	0.00	–0.214	0.58	1.016	0.00	1.669	0.00
Portugal	0.827	0.00	–0.453	0.01	2.004	0.01	–0.101	0.00	1.498	0.00	1.317	0.00
Slovakia	1.359	0.00	1.120	0.00	2.133	0.00	1.154	0.09	1.707	0.00	2.111	0.00
Slovenia	0.546	0.00	0.137	0.35	1.304	0.07	–0.287	0.00	1.146	0.00	2.119	0.00
Spain	1.713	0.00	1.255	0.00	2.398	0.45	1.412	0.00	2.311	0.00	1.704	0.00
Sweden	–0.853	0.00	–2.183	0.00	0.223	0.01	–2.586	0.00	–1.069	0.00	–1.154	0.00

(*continued*)

Table 1.8 (continued)

Switzerland	–0.561	0.00	–1.048	0.00	0.543	0.00	–3.092	0.00	–0.368	0.05	0.117	0.59
Turkey	3.089	0.00	3.679	0.00	3.869	0.00	2.553	0.04	4.014	0.00	3.472	0.00
UK	2.152	0.00	1.979	0.00	3.189	0.00	0.408	0.00	1.814	0.00	1.983	0.00
NAFTA												
Canada	0.858	0.00	0.185	0.31	1.452	0.00	–0.166	0.00	0.817	0.00	0.755	0.00
Mexico	1.741	0.00	0.413	0.01	3.172	0.00	0.530	0.00	1.208	0.00	2.572	0.00
USA	3.111	0.00	2.320	0.00	4.285	0.00	1.675	0.00	2.576	0.00	3.007	0.00
OTHERS												
Argentina (as base intercept)	12.129	0.00	8.994	0.00	11.396	0.31	10.729	0.00	7.421	0.00	10.195	0.00
Australia	–0.838	0.00	–1.418	0.00	0.203	0.00	–2.264	0.02	–1.009	0.00	–1.107	0.00
Brazil	2.204	0.00	2.506	0.00	2.691	0.00	1.785	0.42	2.585	0.00	1.136	0.00
Costa Rica	–5.531	0.00	–10.605	0.00	–3.945	0.08	–9.226	0.00	–5.755	0.00	–3.856	0.00
South Africa	–1.092	0.00	–1.724	0.00	–0.385	0.00	–2.223	0.00	–0.818	0.00	–0.286	0.18

Source: Authors

Table 1.9 Estimation result using production fragmentation method with structural break

Dependent variable	Real exports of intermediate goods							
Independent variable	**All period (198–2015)**		**Structural breaks 1 (1988–1997)**		**Structural breaks 2 (1997–2007)**		**Structural breaks 3 (2009–2005)**	
RER	0.776	0.00	0.631	0.00	0.131	0.17	0.305	0.00
LabCost	0.220	0.00	0.174	0.06	–0.124	0.10	–0.118	0.15
TradeCost	0.259	0.00	0.365	0.00	0.513	0.00	0.058	0.53
TradeOpen	0.447	0.00	0.825	0.00	0.706	0.00	0.449	0.01
Infrastructure	0.275	0.03	–0.817	0.42	3.026	0.00	0.202	0.01
FDIOpen	0.317	0.00	0.299	0.00	0.127	0.01	–0.078	0.27
VTWR	0.111	0.00	0.134	0.00	0.068	0.00	–0.042	0.07
GDPpercap	0.659	0.00	1.647	0.00	0.945	0.00	1.038	0.00
Dummy Euro Currency	–0.177	0.01	0.000		–3.615	0.00	–0.049	0.61
Dummy Trade Contraction	0.109	0.01	–		–		–	
Observation Number	969		273		348		271	
Adjusted R^2	0.947		0.984		0.981		0.991	
Specific country intercept (a_i)								
ASEAN- 4								
Indonesia	–3.699	0.00	–0.677	0.58	2.328	0.00	0.361	0.67
Malaysia	2.064	0.00	2.782	0.00	2.471	0.00	2.850	0.00

(*continued*)

Table 1.9 (continued)

Philippines	1.293	0.00	2.315	0.01	5.195	0.00	3.313	0.00
Singapore	1.082	0.00	0.854	0.38	–0.679	0.24	2.454	0.00
Thailand	0.953	0.00	2.234	0.00	2.210	0.00	2.751	0.00
OTHER ASIA								
China	3.845	0.00	5.504	0.00	4.834	0.00	5.304	0.00
Japan	0.115	0.74	1.966	0.85	–12.010	0.79	1.836	0.00
Rep. of Korea	–2.180	0.00	–1.331	0.08	1.227	0.01	1.417	0.06
India	0.710	0.00	3.478	0.00	2.827	0.00	3.138	0.00
Israel	–1.127	0.00	–1.816	0.00	–0.281	0.14	–0.309	0.17
Russian Federation	–1.426	0.00	0.009	0.99	2.577	0.00	0.028	0.93
EUROPEAN UNION								
Austria	1.032	0.00	3.482	0.00	1.786	0.00	1.431	0.00
Belgium	0.746	0.00	0.000		2.185	0.00	1.625	0.00
Czechia	–0.571	0.01	–0.398	0.44	1.529	0.00	1.798	0.00
Denmark	–1.814	0.00	–2.173	0.00	–2.541	0.00	–0.542	0.09
Finland	0.482	0.01	1.841	0.00	2.280	0.00	0.285	0.17
France	2.390	0.00	3.412	0.00	3.898	0.00	2.677	0.00
Germany	3.152	0.00	3.230	0.00	3.841	0.00	3.524	0.00
Hungary	–2.619	0.00	–2.304	0.00	1.114	0.02	1.081	0.05

(*continued*)

Table 1.9 (continued)

Ireland	–0.058	0.72	–0.522	0.51	1.388	0.00	–0.232	0.38
Italy	2.670	0.00	10.292	0.00	4.237	0.00	2.574	0.00
Netherlands	1.076	0.00	1.510	0.10	1.696	0.00	1.848	0.00
Norway	–2.698	0.00	–3.395	0.00	–3.576	0.00	–1.395	0.00
Poland	0.885	0.00	0.812	0.00	2.000	0.00	2.418	0.00
Portugal	0.827	0.00	6.440	0.00	3.594	0.00	1.046	0.00
Slovakia	1.359	0.00	4.866	0.00	3.802	0.00	2.093	0.00
Slovenia	0.546	0.00	5.852	0.00	3.534	0.00	0.570	0.00
Spain	1.713	0.00	6.811	0.00	3.993	0.00	2.087	0.00
Sweden	–0.853	0.00	–0.889	0.10	–2.109	0.00	0.433	0.18
Switzerland	–0.561	0.00	–1.446	0.03	–2.817	0.00	0.595	0.01
Turkey	3.089	0.00	3.424	0.00	1.659	0.00	2.620	0.00
UK	2.152	0.00	1.870	0.02	–0.364	0.45	2.503	0.00
NAFTA								
Canada	0.858	0.00	0.497	0.43	–0.990	0.01	1.647	0.00
Mexico	1.741	0.00	1.866	0.00	3.570	0.00	3.112	0.00
USA	3.111	0.00	2.243	0.00	1.377	0.00	3.427	0.00
OTHERS								
Argentina (as base intercept)	12.129	0.00	6.113	0.03	–2.649	0.18	4.927	0.00
Australia	–0.838	0.00	–1.101	0.05	–2.466	0.00	–0.403	0.02

(*continued*)

Table 1.9 (continued)

Source: Authors

Note: (a) Dummy euro: omitted variable because in the period 1988–1997 (break 1) euro currency did not exist. The euro currency was valid only from January 1, 1999. (b) Belgium and South Africa: omitted variables because trade export data are not available in the period 1988–1997 (first break period). (c) Costa Rica: omitted variable due to unavailability of trade export data in the period 1988–1997 (first break period), as well as in the period 1999–2003, which makes second break period not significant

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2

Does Democracy Cause Regional Disintegration? The Effect of Democracy on ASEAN Intra-regional and Extra-regional Trade

Faris Maulana and Fithra Faisal Hastiadi

Background

The Association of Southeast Asian Nations (ASEAN) is one of the most successful regional cooperations in the world. Founded in 1968 by five of its founding countries, the member countries of the organization have committed themselves toward the economic, political, security, and socio-cultural integration of the region. Over the course of time, ASEAN has proved its commitment and is striving closer toward its fundamental goal of integration in several aspects, especially economic integration. The first milestone of ASEAN economic integration was the formation of ASEAN Free Trade Area (AFTA) in 1992. ASEAN member countries have made significant progress in the lowering of intra-regional tariffs through the Common Effective Preferential Tariff (CEPT) Scheme for AFTA. The CEPT scheme for AFTA has successfully moved ASEAN toward the

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elimination of internal tariff, which ultimately fosters its internal trade, as seen in Fig. 2.1.

Despite the success of AFTA in its early years, since 2007, the intra-regional trade share has been stagnating or even decreasing, showing the possibility of other existing factors that still hinder ASEAN intra-regional trade. According to Plummer and Click (2006), in order to foster its intra-regional trade and reach a greater degree of regional economic integration, ASEAN needs to move toward common external tariff agreement, similar to that of European Union. On the other hand, according to Ing et al. (2016), ASEAN has not shown any real commitment in addressing the problem of internal non-tariff barrier (NTB) that potentially hinders ASEAN economic integration. While the general tariff of ASEAN member countries showed a declining trend throughout the observed period of 2000–2015, the non-tariff barrier demonstrated an increasing trend. Unlike internal tariff, the non-tariff barrier of ASEAN is not discriminating between ASEAN and non-ASEAN countries, thereby not giving an advantage for ASEAN member countries to trade with each other compared to trading with non-ASEAN countries that encourages intra-regional trade.

Another characteristic of ASEAN country is the diversity of governmental regimes of its member countries. This difference in the governmental regime of each countries implies a varied level of democracy.

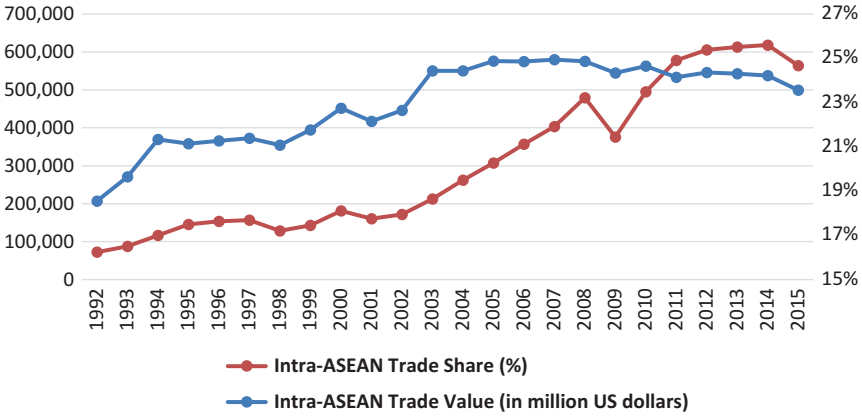

Fig. 2.1 ASEAN intra-regional trade value and trade share (1992–2015). Source: Authors, from *Asia Regional Integration Center*

According to Polity IV, a dataset which comprises democracy measurement of 180 countries over the period of 1800–2015 by Marshall et al. (2016), the polity score of an ASEAN country which indicates democracy varies from 9, indicating a democracy, to −7, indicating autocracy, as seen in Fig. 2.2. The difference in the ASEAN level of democracy indicates the difference in the political and institutional factors that affect how domestic policy is determined in each member country. The domestic policy that is affected by the political and institutional factors includes trade policy. The determination of trade policy by the country government is highly tied by the purpose of government to promote trade or the opposite. As it has been explained that trade has brought abundant benefits to the country's economy, international trade does not always benefit everyone in the country. There are several groups of economic agents who are worse off due to international trade. Government may choose to determine its trade policy depending on which part of the populace it attempts to please in order to maximize the electorate support it receives. Democracy, or how much government depends on the people to stay in power, might determine how trade policy will be decided, which in turn can affect its international trade. Therefore, ASEAN countries' difference in democracy may affect their regional integration by restricting trade among ASEAN member countries.

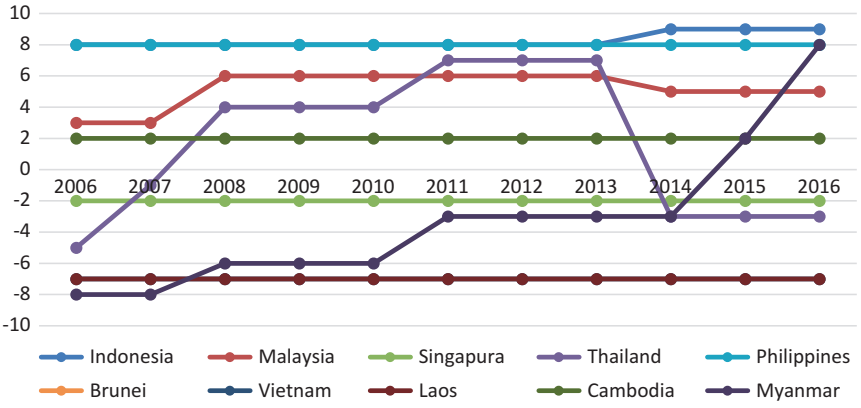

Fig. 2.2 ASEAN member countries polity score (2006–2016). Source: Authors, from *Integrated Network for Societal Conflict Research* Polity IV Project

However, as seen in the initiative of AFTA, the CEPT scheme is embraced by all ASEAN member countries, regardless of their governmental regime, which according to Emmerson (2005), shows that all ASEAN governments favor the elimination of internal tariff. However, the NTB implemented by ASEAN countries is increasing over the time, showing a contradicting act toward the elimination of trade barrier from AFTA. AFTA may have to eliminate tariff as an option for the ASEAN governments to implement a trade barrier, yet, the increase on NTB over the period shows that the governments of ASEAN member countries are still taking a protectionist stance even for the intra-regional trade. Therefore, in ASEAN, the level of democracy is no longer relevant to have impact on government to implement tariff for intra-regional trade, yet still relevant on affecting trade barriers in the form of NTB implementation by the government of each ASEAN member countries. Thus, the effect of democracy to intra-regional trade and extra-regional trade of ASEAN might be different.

From the aforementioned problems, this study attempts to answer the effect of democracy on ASEAN economic integration which is signified by comparing its intra-regional and extra-regional trade patterns and explains how democracy may affect intra-regional and extra-regional trade of ASEAN differently. Therefore this study proposes three research questions, the first being whether democracy affects ASEAN intra-regional trade, the second being whether democracy affects ASEAN extra-regional trade, and the third, whether the effects of democracy on ASEAN intra-regional and extra-regional trade are different.

Literature Review

The outcome of a country's international trade pattern is influenced by how its international trade affects the welfare of its microeconomic actors. According to Heckscher-Ohlin's theorem (1991), which is based on theory proposed by Stolper and Samuelson (1941), trade liberalization will benefit the owners of production factor which is abundant in the country. In a country where the number of labor is much more abundant compared to capital, a trade liberalization of a country will benefit the majority of its economics actor, which is labor, while the owner of non-labor

factors, namely capital, will be worse off from international trade. Grossman and Helpman (1992) state that government of a country attempt to maximize its utility by obtaining greatest possible level of electorate support in order to ratify its power and stay longer in the office. Electorate was defined as the actors that have the power over the election of the head of the government and the power to put the government out of the office. In order to get the maximum support from the electorate, the government will set a policy that satisfies the demand of the electorate. Therefore, the response of the government to the trade policy is influenced by the demand of trade policy by the majority of the electorate. This theory is further developed and proven by O'Rourke and Taylor (2006), whose study showed that a protectionist policy is more likely to be implemented in a democratic country with high endowment in capital while a liberal trade policy is more likely to be implemented in a democratic country with high endowment in labor.

However, different political system among countries and the change of political institution in one country may change the eligibility criteria for the electorates. Mansfield et al. (2002) argue that democratization of a country political system will expand the criteria of the electorate. In a country that embraces a fully democratized system, the criterion for electorate is every citizen of the country, while a less democratized, such as autocratic, country may define electorate more narrowly as much as special council of a government or a more powerful entity such as monarch. In a democratic country, the head of government is more responsive to the demand of the majority of its citizen and, therefore, is more likely to set a trade policy that is more popular to the public. Several literature also support this claim by explaining the indirect effects of democracy on international trade, for example, Barro (1996, 1999) and Rodrik (2000), who state that democracy promotes better regulation and rule of law thus encouraging trade in a country.

Milner and Kubota (2005) also extend the literature regarding the difference in behavior between a democratic government and an autocratic government on the determination of trade policy in the developing country based on the study by Grossman and Helpman. A developing country, in which the political institution has not matured yet and is still troubled with political instability and is signified by dynamic and often

unpeaceful revolution-style transfer of power, tends to reform its trade policy when it is going through the process of democratization. The democratization in developing country means shifting its electoral power from the ruling political elites to the people. In the context of labor-abundant country, these political elites are often those who hold power in strategic public-owned corporation, hence capital owners who have been using their power to bribe the policy maker for a protection in a form of restrictive trade barrier. In a situation where the government is democratic, a political scandal emerging from accepting bribery may result in a loss of support from the majority of the electorate who perceives this as an act of rent-seeking. Therefore, when a developing country is going through democratization, the government which now depends more on the majority, that is labor, to stay in power will be less likely to implement a protectionist policy and in turn implement a more open trade policy. However, in a country with an autocratic system, due to weaker political power of the labor majority not being an electorate and the absence of political opposition to point out rent-seeking behavior, the government is more likely to ratify its power by gathering support from the political elites of the country. Therefore, such government is more likely to accept bribery in exchange of implementing a protectionist policy that benefits the political elites of the country that consist of wealthy capital owners.

Kono (2006) argues that the effects of democracy to trade policy is somewhat ambiguous. While Kono agrees that democratization could lead developing countries to lower its trade barrier, which is in form of tariffs, his study shows that democracy may have a contradictory effect on another form of trade barriers such as NTBs. The proposition of the study is based on the same assumption that the government will attempt to maximize its electoral support to stay in power through the implementation of popular trade policy. However, this study utilizes additional assumption that a trade barrier in a form of tariff is simpler and more transparent to the public compared to its non-tariff counterparts. This simplicity implies that the political opposition is more likely to point out the adverse effect of emerging from tariff implementation to the welfare of the public, thereby costing the ruling government significant amount of electoral support. However, by utilizing NTB as trade barriers, government may disguise the policy as a protection measure toward consumer's

well-being, thereby minimizing the loss of electorate support from the public, compared to implementing tariff. In addition, while the effect of tariff on public welfare could be easily explained to the public by the political opposition, the effect of NTB on public welfare is not as clear as the tariff counterpart and is therefore much more difficult for the opposition to point out. This proposition implies that the government may raise trade barriers in order to gain electoral support from interest groups while minimizing its electoral support loss from the public by implementing NTB. In a democratic system, where the government tries to maximize its utility by gathering electoral support from both public and interest groups, the government is more likely to implement NTB compared to tariff. Meanwhile, in a less democratic country, due to the less dependency of public electoral support, the government is more likely to implement tariff barriers compared to NTB since tariff offers additional government revenue, while NTB does not.

Regional trade agreements often include the elimination of tariff measures between all of its member countries. The participating country has to remove all of its tariff for its regional partner and is not allowed to implement another tariff barrier for the regional partner after the trade agreements come into effect. Consequently, in the period where the trade agreements have come into effects, internal tariff is no longer a trade protection instrument option for domestic governments of the member countries. Nevertheless, according to Manchin and Pelksman-Balaoing (2008), in the situation of regional trade agreements where the member countries have removed all the tariff barriers, domestic government will more likely shift its protective trade policy toward the implementation of non-tariff barriers. Since according to the theory of optimal obfuscation the process of democratization may lower country's tariff but increase its NTB, democratization under the condition of regional trade agreements may affect intra-regional trade among the member countries negatively due to the absence of change in tariff and increase in NTB. Yet, under the situation when the countries also trade with countries outside its regional trade agreements, the domestic government still may impose and change its external tariff for imported goods from its non-regional trading partners. Therefore, democratization will decrease a country's trade with its regional trading partner and on the other hand increase its trade with its non-regional trading partner.

While several studies have attempted to explain how democracy of a country may affect its international trade behavior, for example, Mansfield et al. (2000), Morrow et al. (1998), Yu (2010), and Yogatama and Hastiadi (2016), the majority of the said studies find that importer fosters bilateral trade and only Yogatama and Hastiadi find that importer's democracy affects bilateral trade negatively. However, the said study uses a different theoretical framework compared to that used in the three previous studies. Meanwhile in this study, the theoretical framework is based on that of Mansfield, Milner, and Rosendorff.

Methodology

The model used in this study is based on gravity equation of international trade, which was first used by Tinbergen (1962). This, according to Anderson (1979), has been the most successful method of predicting bilateral trade flow between countries due to its theoretical consistency. Gravity equation is utilized to predict bilateral trade flow based on economic size of both economy and distance between two countries. In this research, the gravity model is augmented with democracy variable and the economic variable is divided into economic size and level of development.

The study will be conducted using a data panel from 2005 to 2014 on eight ASEAN member countries which fall into the category of labor-abundant countries, of which capital per labor ratio is lower than the region average of importer country. Using Penn World Table 9.0 which was formulated by Feenstra et al. (2015), by dividing the real capital stock to number of labor employed, eight countries are found to have capital per labor ratio lower than the region average and are therefore categorized as relatively labor-abundant countries. These countries are Indonesia, Malaysia, Thailand, Vietnam, Cambodia, Laos, Myanmar, and the Philippines. As for the exporter country, other than the eight aforementioned countries as the intra-ASEAN exporters, eight countries outside ASEAN which have not concluded trade agreement with ASEAN and have the highest export value to ASEAN for the year 2005 are chosen as the exporter countries, namely, the United States, Hong Kong, Saudi

Arabia, United Arab Emirates, Argentina, Brazil, Germany, and Switzerland. The country pairs will be divided into two groups, the Intra-ASEAN pair and the Extra-ASEAN pair. The sample of Intra-ASEAN pair will consist of 56 pairs and the sample of ASEAN with Extra-ASEAN will be 64 pairs. By dividing the samples into two groups, the different effects of democracy on international trade flows between country pairs with regional agreement and those without could be observed.

In order to answer the first research question, the study will conduct a panel data regression on the econometrics model specified in the earlier part of this chapter for the samples with regional trade agreement (ASEAN country with ASEAN country) as follows:

$$\begin{aligned}\ln\text{TRADE}_{ijt} = {} & \beta_0 + \beta_1 \ln\text{GDPCAP}_{it} + \beta_2 \ln\text{GDPCAP}_{jt} \\ & + \beta_3 \ln\text{POP}_{it} + \beta_4 \ln\text{POP}_{jt} + \beta_5 \ln\text{DISTW}_{ijt} \\ & + \beta_6 \text{DEMOC}_{it} + \beta_7 \text{DEMOC}_{jt}\end{aligned}$$

lnTRADE is the natural logarithm of import value to country *i* from country *j* during the period of *t* which is collected from *Centre d'Etudes Prospectives et d'Informations Internationales*' (CEPII) TRADHIST dataset. GDPCAP is the PPP GDP per capita of both countries. POP is the country's population. DISTW is the geographical distance of both countries weighted with each country's population density, which was developed by Head and Mayer (2014). GDPCAP, POP, and DISTW are collected from CEPII Gravity dataset. DEMOC is the democracy variable, which is the variable of interest of this study. The democracy variable used in this study is Polity IV score from The Integrated Network of Societal Conflict Research's (INSCR) Polity IV Dataset. Polity IV Score is utilized based on its reliability in capturing democracy as an economic variable in several past studies such as Davenport and Armstrong (2004), Gerring et al. (2005), Knack (2004), and Hollyer et al. (2011).

For the first research question, it is hypothesized that democracy of importer (ASEAN member) country affect trade negatively, therefore, the variable democ_{jt} will be negatively significant on bilateral trade value.

As for the second question, a regression with same model specification as the first question will be utilized on the samples without regional trade agreement (ASEAN country with non-ASEAN country). For the second research question, it is hypothesized that democracy of importer does affect trade positively. Thus, the variables and democ_{jt} will be statistically significant on bilateral trade value.

As for the third research question, a fixed effect regression on combined sample will be conducted using the model which has been augmented with RTA variable and its interaction with democracy variables of both countries is as follows:

$$\begin{aligned}\ln\text{TRADE} = {} & \beta_0 + \beta_1 \ln\text{GDPCAP}_{it} + \beta_2 \ln\text{GDPCAP}_{jt} + \beta_3 \ln\text{POP}_{it} \\ & + \beta_4 \ln\text{DISTW}_{ijt} + \beta_5 \ln\text{POP}_{jt} + \beta_6 \text{DEMOC}_{it} + \beta_7 \text{DEMOC}_{jt} \\ & + \beta_8 \text{RTA}_{ijt} + \beta_9 \text{RTA}_{ijt} \text{DEMOC}_{jt}\end{aligned}$$

Even though a similar model is not found in the previous studies utilizing gravity model of trade, the method of interacting dummy with explanatory variable has been discussed by Yip and Tsang (2007). Using this method, Yip and Tsang explain that, by comparing the result coefficient of observation with 0 value for the dummy variable and those with 1 value, the difference on how explanatory variable on the sample with different category can be explained. For the purpose of this chapter, in order to see the difference on the effect of democracy on ASEAN intra-regional trade and extra-regional trade, the variable RTA dummy will be interacted with variable democ_*j*. The coefficient result of the democ_*j* will be interpreted as the effect of democracy on extra-regional trade (RTA equal to 0), while the combined value of democ_*j* and its interaction with RTA dummy will be interpreted as the effect of democracy on ASEAN intra-regional trade. It is hypothesized that when two countries are engaged in the same regional trade agreement, the democracy will affect trade negatively. For that reason, the interaction variables between RTA and importer's democracy (RTAdemoc) will be statistically significant in a negative way.

Result

The regression results for all models are shown in Table 2.1. For the intra-regional trade model, the result that will be used for the model will be the result from the fixed effect regression. As it can be seen in the regression result table, the variable of interest, democ_*j*, which is the variable to represent ASEAN country democracy as the importer in intra-ASEAN trade is not statistically significant on the dependent variable or the natural logarithm form of import value. The hypothesis that democracy significantly affects ASEAN intra-regional trade is therefore rejected.

In order to treat the heteroskedasticity problem in the intra-regional trade model, the regression for this model will be using robust regression for panel data developed by Hoechle (2007). According to Gujarati (2009), by using this regression method, the influence of outlier from the data to the estimation result could be minimized. As for the extra-regional trade model, the result used for the analysis will be the result from random effect regression in order to capture the effect of exporter democracy that is omitted in the fixed effect estimation due to the time invariance in the data. From the result in the table, we can see that democ_*j*, as the variable of interest, affects ASEAN import from its non-ASEAN partner positively, which means that the result of the statistical test is to reject the null hypothesis. The increase of polity score in an ASEAN country by 1 point, which signifies democratization, will increase in its import value from its non-ASEAN trading partner by 4.46%, while the increase in 1 point of polity score by a non-ASEAN exporter country will increase export flow to ASEAN country by 1.8%.

As for the third model, the model that will be observed for the analysis is the fixed effect model. In this model, the variable of interest is not solely democ_*j*, but also the interaction variable between importer democracy and RTA dummy, or rta_democ_*j*. As seen from the regression result in Table 2.1 for ASEAN trade model, our variable of interest democ_*j* is significantly affecting trade positively, while the interaction of variable RTA_democ_*j* is statistically significant on lowering trade value. An increase in 1 polity score for ASEAN country as an importer will increase its import value by 3.70%. However, it is evident that the negative

Table 2.1 Regression results

	Intra-ASEAN model		Extra-ASEAN model		Total ASEAN model	
Model	FE	RE	FE	RE	FE	RE
Dependent variable	lntrade		lntrade		lntrade	
Lndistw	Omitted	−3.220***	Omitted	−2.422***	*Omitted*	−2.609***
	(.)	(0.000)	(.)	(0.000)	(.)	(0.000)
lnpop_*i*	5.297	2.676***	0.635	0.597**	0.715	1.321***
	(0.179)	(0.000)	(0.250)	(0.018)	(0.208)	(0.000)
lnpop_*j*	3.594	2.106***	0.905	2.335***	2.815	2.092***
	(0.156)	(0.000)	(0.715)	(0.000)	(0.133)	(0.000)
lngdpcap_*i*	0.468	0.722*	0.805***	0.518*	0.642**	0.728***
	(0.222)	(0.072)	(0.008)	(0.055)	(0.043)	(0.009)
lngdpcap_*j*	0.228	0.441	0.876***	0.930***	0.679**	0.667***
	(0.679)	(0.128)	(0.010)	(0.000)	(0.021)	(0.000)
democ_*i*	**−0.0107**	**−0.00892**	***Omitted***	**0.180***	−0.0216	0.121
	(0.446)	**(0.609)**	**(.)**	**(0.052)**	(0.218)	(0.155)
democ_*j*	**−0.00643**	**−0.00396**	**0.0294***	**0.0446****	0.0370*	0.0516**
	(0.746)	**(0.830)**	**(0.055)**	**(0.015)**	(0.056)	(0.013)
Rta					*Omitted*	−2.852***
					(.)	(0.006)
rta_democ_*i*					*Omitted*	−0.126
					(.)	(0.142)
rta_democ_*j*					**−0.0498***	**−0.0648****
					(0.090)	**(0.022)**
_cons	−21.43	14.02***	−2.703	15.91**	−6.422	15.92***
	(0.219)	(0.003)	(0.728)	(0.012)	(0.345)	(0.000)
N	560	560	640	640	1200	1200
R-sq	0.345		0.217		0.262	
Adj. *R*-sq	0.338		0.211		0.257	

p-values in parentheses
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

coefficient of the interaction variable is greater than the positive coefficient of importer democracy. If we sum both coefficients, we achieve the result of 0.0370 + (−0.0498) = −0.0128. This result shows that for the intra-regional trade, where the value of RTA dummy is 1, an increase in polity score by 1 unit will decrease ASEAN country bilateral trade with its ASEAN partner by 1.28%. Hence, to answer how the effects of democracy on intra-regional trade and extra-regional trade are different, the importer democracy has a negative effect on intra-regional trade flow and a positive effect on extra-regional trade flow.

Discussion

To explain the lack of statistical significance in the first model, according to Anderson and Van Wincoop (2004), non-tariff barriers do not always increase the cost of trade, unlike tariff. Thus the effect of NTB on trade is still somewhat ambiguous. As for the exporter democracy variable, it is found that the exporter democracy does not significantly increase bilateral trade. This could be a sign that in low- to middle-income developing countries such as the ASEAN countries used as the importer country in this study, high quality of goods from highly democratic country is not really the deciding factor for demand for goods because according to Minten and Reardon (2008) lower price is still more favorable compared to the higher quality of goods. On the other hand, this lack of statistical significance also shows that, unlike the previous research, democracy does not always increase trade. This is because democracy affects trade from the decrease of tariff. However, in the situation of regional trade agreement where internal tariff is no longer variable, a country government is no longer able to use internal tariff as a political tool to gain electorate support. Thus, when democratization happens, intra-regional trade does not increase.

This result from model 2 is explained by the theory from Milner and Kubota (2005), which states that when a developing country is undertaking a process of democratization, the government will set a lower tariff in order to gain more electorate support from the now politically empowered labor. The decrease of tariff will encourage more trade to the country

and in turn increase its import value. Consequently, the effect of importer democracy on trade is positively significant, in accordance to the existing theory and previous researches such as by Yu (2010) and Mansfield, Milner, and Rosendorff. Contrary to the result of the intra-regional trade model, in this model, exporter's democracy significantly increases trade value. The difference in this result might be caused by the more variability in quality of goods by non-ASEAN countries compared to ASEAN countries. Therefore, the quality effect caused by democracy is more apparent in this model. Nonetheless, this result is in accordance with the theory and previous research by Yu (2010) and Yogatama and Hastiadi (2016). This answers the research question of how the effect of democracy may differ on intra-regional trade and extra-regional trade of ASEAN.

This result of model 3 could be explained by looking back at the theoretical framework used by this study. The increase in democracy will cause the importer country to lower its tariff and encourage trade. Yet, this situation is only possible if the importer country still has power over its tariff above any agreements like bilateral or regional trade agreements that set or eliminate internal tariff. Therefore, ASEAN, which has established a free trade area where the internal tariff is sought to be eliminated, does not show any commitment to eliminate non-tariff barriers. This causes democratization to only affect non-trade barrier for intra-regional trade. Conversely, in the intra-ASEAN model, the result regarding the effect of democracy on intra-regional trade is different from the result in this model. While the first model shows the lack of statistical significance, this model indicates that it significantly has negative impact on intra-regional trade. The possible explanation for this is that the mixed model captures the trade diversion caused by the decrease in external tariff at the absence of the decrease in internal tariff. According to Bohara et al. (2004), the elimination of internal tariff will create a trade diversion from non-regional partner to regional partner due to the decrease of relative cost of trade to regional partner. Nonetheless, as we see in the theoretical framework used in this study, when democracy of an ASEAN country increases, its external tariff is lowered while its internal tariff stays the same. This causes a trade diversion from ASEAN to non-ASEAN partner due to the relatively lower cost of trade. This trade diversion causes the trade with regional partner to decrease, while the trading activity moves to non-

regional partner and increases its value. The net effect of this phenomenon on ASEAN total trade value is uncertain in terms of trade share, due to the increase of extra-regional trading. While the intra-regional trade does not increase, ASEAN total trade share will shift more toward extra-regional trading.

Conclusion

Departing from the problem of ASEAN countries' diverse political regimes, lack of political commitment to address problems such as the rise of internal non-tariff barrier, and lack of common external tariff in order to achieve more robust regional economic integration, this study attempts to find out whether the level of democracy among ASEAN member countries affects their intra-regional and extra-regional trade patterns. In addition, this study attempts to distinguish the effect of democracy on ASEAN intra-regional trade and extra-regional trade. This study establishes two hypotheses: democracy affects intra-ASEAN trade negatively, while it affects extra-ASEAN trade positively. The study finds that democracy does not affect ASEAN intra-regional trade. This result is produced due to the theory that argues that democracy affects tariff decrease yet increases NTB. Thus, in a situation where internal tariff is fixed, democracy only affects internal trade through NTB. However, the lack of statistical significance shows that NTB might not have a significant impact on trade. On the other hand, ASEAN democracy affects ASEAN extra-regional trade positively. This is due to the democracy that has the effect of lowering external tariff, thereby creating more opportunity for ASEAN country to trade more with its non-ASEAN trading partner. And lastly, it is found that while ASEAN democracy affects extra-ASEAN trade positively, democracy affects intra-ASEAN trade negatively. Other than how democracy might affect internal and external trade barriers differently, this result could also be explained by trade diversion caused by the lowering of external trade barrier in the absence of the lowering of internal trade barrier. Therefore, when an ASEAN country is going through democratization, it is expected that it will increase its trade with a non-ASEAN trading partner, while its trade with

an ASEAN partner decreases, which, in relative term, translates into an increase of extra-regional trade. While intra-regional trade decreases, thus driving those countries, as a consequence, the whole ASEAN itself is farther from economic integration.

Recommendation

The result of this study has shown that democracy promotes extra-regional trade while affecting intra-regional trade negatively. The implication of this result is that democratization of ASEAN member countries potentially affects the region economic integration negatively. It would be a shame if the success of greater regional integration brought by AFTA is undone by the democratization process that might or might not be inevitable for the region. Instead of being averse to the democratization of the region, the member countries of ASEAN should focus more on improving several key factors that may promote trade as overall, such as better product quality with higher value added (Yu 2010) and better domestic government institution (Yogatama and Hastiadi 2016). Better government institution will go a long way in encouraging domestic government to implement a better trade policy that focuses more on maximizing welfare instead of fulfilling political motives. By increasing the quality of institution, government will only implement NTB for a genuine purpose (Mansfield and Busch 1995) instead of political obfuscation. This will reduce the possible trade barrier that may restrict intra-regional or extra-regional trade. Moreover, other than increasing each of its member countries' domestic institutional quality, in order to further eliminate NTB, the enforcement and commitment from ASEAN governing body is also necessary. The trade diversion in this study could happen due to the lack of external tariff in the region. In order to avoid trade diversion in general, ASEAN governing body should set common external tariff for all of its member countries (Kennan and Riezman 1990). By doing so, when there is a democratization in ASEAN, government of each ASEAN member countries will be no longer able to change its tariff, thereby making the ASEAN trade more resilient from internal political shock of its member countries. Lastly, in order to avoid the adverse effect of democ-

racy to ASEAN regional integration, political commitment from each ASEAN member countries to address several problems regarding internal or external trade barrier in any form is necessary.

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3

Overcoming the Middle-Income Trap: The Role of Innovation on Switching onto a Higher Income Group for ASEAN Member States

Sarah Nadhila Hardiana and Fithra Faisal Hastiadi

Introduction

More or less, every country is on a path toward growth as sustainable economic growth is always an objective of every country to achieve and maintain welfare. Until today, several economies prosper while others stagnate. As per July 2017, the World Bank states 78 out of 218 countries have reached the upper-tier economy classified as high-income countries, 31 countries are classified as low-income countries, while 109 countries fell into the middle-income category, which makes up 50% of the world. A phenomenon called the middle-income trap has been discussed by many economists in the past decade as the share of middle-income economies are growing. The term was first introduced by Gill and Kharas in 2006 where the "trap" is characterized when economic growth is below potential. The trap is perceived as a risk toward growing economies, trig-

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gered by a country's inability to increase sufficient input and productivity causing middle-income economies to fail in transitioning toward high-income status.

Many economists had offered several definitions of the middle-income trap. Egawa (2013) recognizes the middle-income trap as a long-term economic stagnation hindering the economy to boost further toward a high-income economy. Van Tho (2013) describes the middle-income trap as a condition where an economy is stuck in between low-income countries that dominate the labor-intensive industries and high-income countries that dominate innovation and technology. On the same notion, Paus (2017) characterizes the middle-income trap as a condition where an economy can no longer compete internationally in standardized labor-intensive commodities due to rising wages, however also unable to compete in higher value-added activities due to relatively low productivity. Hence, when attempting to reach high-income level, countries need to inject sufficient input for continuous economic growth.

Following the neoclassical growth theory (Solow 1956), the output of an economy is produced through a production function that consists of capital and labor. However, the Solow model claims that continuous rise in capital will only temporarily increase the growth rate due to increasing capital to labor ratio, which eventually will reflect diminishing marginal productivity of both capital and labor.

Figure 3.1 confirms the concept of diminishing marginal effects, where we can see that rapid growth only occurs in the recovery of a crisis, while in times where the economy is stable, growth appears to be declining. Due to this diminishing marginal effect, emerging economies are prone to being stuck in the middle-income stage leading them to the middle-income trap if they fail to increase adequate input and productivity to preserve sustainable economic growth. Another central key of the neoclassical growth theory claims that the diminishing rates will eventually bring economies to reach the "steady state", where additional capital will no longer improve productivity. The neoclassical growth model predicts that every country will ultimately converge once they have reached the steady state, implying that growth of high-income countries and poorer countries will eventually converge. In reality, capital is utilized differently in each country depending on human capital quality and their productiv-

ity level. As reflected in Fig. 3.1, the economic growth between income groups does not converge although they move in the same pattern. The failure to converge with high-income countries also signals a country's vulnerability to fall into the middle-income trap.

In order to reach high-income economy, sustainable economic growth must be maintained. Fundamentally, there are two ways to magnify output of an economy, either by increasing input that goes in the production process or by inventing new ways to generate greater output with the same level of input (Rosenberg 2004), or in other words creating new innovation. Many economists have suggested innovation as a remedy to maintain sustainable economic growth and overcome the middle-income trap as it increases productivity and economic expansion. The Schumpeterian growth paradigm (Aghion et al. 2013) states that innova-

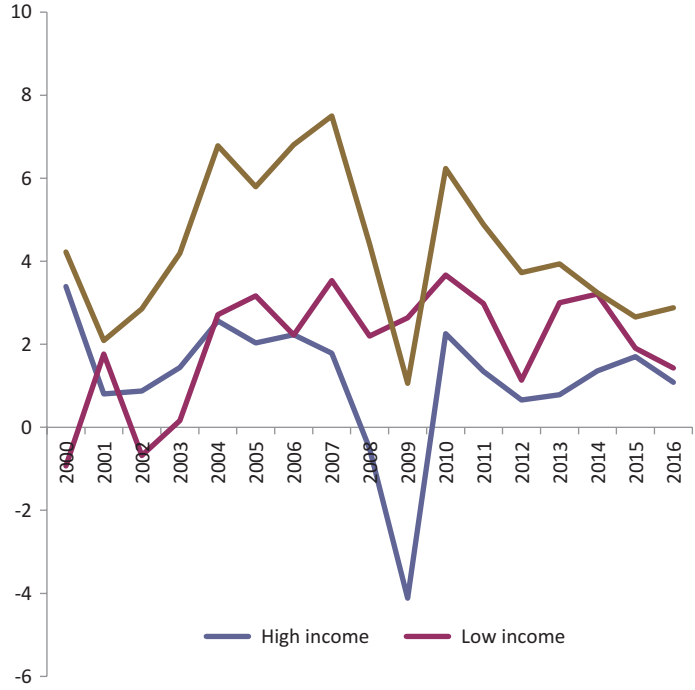

Fig. 3.1 GDP per capita growth for high-, middle-, and low-income countries from 2000 to 2016. Source: Authors, from World Bank (2017)

tion has the primary ability to create long-term economic growth through improvements in productivity as well as expansion in investments, consumption, and exports. As innovations are invented through entrepreneurial investments in R&D, training, and education, the labor quality must be refined toward high-skill intensive labors and productivity must be intensified to enable growth in the industrial sector. Additionally, capital and investment are necessary to support innovation, technology, and infrastructure needed to stimulate further economic growth.

Many discussions about the middle-income trap in the past focus on Latin America and Africa where the middle-income trap phenomenon is prevalent. Whilst according to recent World Bank data, majority of ASEAN countries have currently reached middle-income economy with the exception of Brunei Darussalam and Singapore. Majority of ASEAN member states are facing the global risk of the middle-income trap, however their abilities differ in terms of how they are addressing it and their efforts to avoid the trap. Hence, this study aims to (1) identify the role of innovation in avoiding the middle-income trap, (2) identify the role innovation plays on the probability of switching into a higher income level, and (3) discover which countries are trapped among ASEAN member states. Failure in overcoming the middle-income trap may restrain a country's full economic potential. If other countries are capable in reaching high-income status, by all means being stuck in the middle-income trap shows that an economy signals inefficiency of a country and the trap is hindering an economy to unlock its full potential. The remainder of the chapter is structured as follows: Section "Theoretical Basis" discusses the theoretical basis of the middle-income trap, section "Data and Methodology" explains methodology and data description used in the study, section "Results and Discussion" discusses results and findings, and lastly section "Conclusion and Limitations" concludes results, and limitations of the study.

Theoretical Basis

Defining the Middle-Income Level

Two well-known approaches are often discussed on how to define the middle-income level. The first one is a relative measure called the

catch-up index (CUI) proposed by Athukorala and Woo (2011) which uses relative percentage of the US per capita GDP. The CUI defines high-income level if GDP per capita is higher than 55% of US GDP per capita, middle-income level 20%–55% of US GDP per capita, and low-income level lower than 20% of US GDP per capita. However, using the CUI approach would leave most ASEAN countries to be categorized as low-income level due to substantial differences in magnitude of economies between US and ASEAN countries. Another measure to define income levels is through absolute approach established by the World Bank which is more universal and consistent rather than relying upon one single country whose GDP may fluctuate over time. The World Bank uses gross national income (GNI) per capita which is revised annually based on income growth, population changes, inflation, and exchange rates. In this study, the absolute approach developed by the World Bank will be used to define the middle-income level. By using the absolute approach, we allow the economic status of countries to be independent of the status of other countries.

In mid-2017, the World Bank published the latest income level classifications for 2017–2018 fiscal year. The World Bank classifies countries earning less than $1005 as low-income countries, countries earning $1006–$3955 as lower middle-income countries, countries earning $3956-$12,235 as upper middle-income countries, and countries earning more than $12,235 as high-income countries. Hence according to these thresholds, Table 3.1 shows income classification for ASEAN countries in accordance with the World Bank income classification.

Table 3.1 World Bank income classification for ASEAN countries

Country	GNI/Capita per 2016	Classification
Singapore	51,880 US$	High income
Brunei Darussalam	32,860 US$	High income
Malaysia	9860 US$	Upper middle income
Thailand	5640 US$	Upper middle income
Philippines	3580 US$	Lower middle income
Indonesia	3400 US$	Lower middle income
Laos	2150 US$	Lower middle income
Vietnam	2100 US$	Lower middle income
Myanmar	1190 US$	Lower middle income
Cambodia	1140 US$	Lower middle income

Source: Authors, from World Bank (2017)

Defining the Middle-Income Trap

As previously discussed, the middle-income trap is a situation where economic growth of a country stagnates. However, no universal threshold has been developed of how many years it takes to consider a country as being trapped in the middle-income economy. Bordans and Teinemaa (2016) proposed their own definition of the middle-income trap where they consider a country is considered trapped in a specific year if they are under three specific conditions. According to their definition, if a country's GDP per capita growth is below the average of global GDP per capita in its respective income level, its respective region's average growth, and also the weighted average growth of each country's trading partner, a country is considered trapped in the middle-income level. Despite their comprehensive approach on defining the middle-income trap, there is still a need for specific amount of years to be able to distinguish whether the growth of a country is considered growing normally or too slow. Consequently, the question on how many years is considered too long for a country to generate static growth remains unclear.

Felipe (2012) also offered a definition of the trap by conducting an arbitrary approach to calculate the number of years to be set as a threshold for a country to be trapped in the middle-income level. He did so by taking the median of the sample countries spent in their income categories before transcending onto the next category. His sample consists of 124 countries including 40 low-income countries, 52 middle-income countries (38 lower middle-income countries and 14 upper middle-income countries), and 32 high-income countries in 2010. The middle-income level range used in his study adopts the value GDP per capita in 1990 Purchasing Power Parity (PPP) dollars adjusted through polychoric correlation to mimic the World Bank income classification in 2010. His calculation resulted in a threshold of 28 years for the lower middle income and 14 years for the upper middle income. Following his threshold, a country must grow fast enough to reach the GNI per capita of the next income classification by at most 28 years for the lower middle-income, and 14 years for upper middle-income economy. However, Felipe's method is an arbitrary approach where the threshold is dependent on the number of years the sample

countries are in the middle-income economy, thus, if samples were to differ, threshold may be subject to change.

In addition, Felipe implies that lower middle-income economy (i.e. that reaches $2000 per capita income) has to attain an average growth rate of per capita income of at least 4.7% per annum to avoid falling into the lower middle-income trap (i.e. to reach $7250, the upper middle-income level threshold); and an upper middle-income economy (i.e. that reaches $7250 per capita income) has to attain an average growth rate of per capita income of at least 3.5% per annum to avoid falling into the upper middle-income trap (i.e. to reach $11,750, the high-income level threshold).

Theories of Economic Growth

In order to avoid the middle-income trap, sustainable economic growth must be maintained. The Solow growth model is one of the most well-known neoclassical theories explaining the mechanics of economic growth. Solow (1956) explained that output is generated through the use of capital and labor. Solow suggests that these factors exhibits diminishing returns, continuous rise in capital will only temporarily increase the growth rate due to increasing capital to labor ratio, which eventually reflects diminishing marginal productivity of capital and labor. Solow adds technological process in the model after discovering residuals treated as exogenous factor that explains economic growth other than capital and labor. However a major key assumption in the neoclassical theory is that it views technology as a public good, thus every country has the same level of technology and all are able to consume and benefit from that good. In contrary, the new economic growth theory views technological progress in a different perspective. Firstly, the new economic growth theory developed by Romer (1990) views economic growth as a result from an endogenous function rather than a result of exogenous factors. The endogenous growth theory senses that technological changes provides incentive for continuous capital accumulation which leads to productivity, thus, technological change only occurs to those who responds to the market incentives. In effort to stimulate advancement of technology

responsive to economic incentives, human capital quality needs to be emphasized through increased knowledge, education, and trainings alongside with governmental support. Mankiw (1989) on the other hand found that output growth moves in the same pattern as the Solow residuals (technological change), which suggests that technological change plays an important role as a source of business cycle fluctuations. Hence, the business cycle requires technological changes in order to stimulate economic growth.

Innovation and Economic Growth

Baragheh et al. (2009) defined innovation as a transformation of knowledge and ideas to improve an existing product or to introduce a new product to the market. As mentioned in the previous section, innovation provides great means to induce economic growth as it elevates productivity and economic expansion. Rosenberg (2004) states there are two methods to elevate output of an economy, either by increasing input that goes in the production process or by inventing new ways to generate greater output with the same level of input, or in other words creating new innovation. Many economists glorify innovation as a key driver of sustainable economic growth and development which was mainly contributed by the Schumpeterian growth theory. The Schumpeterian growth paradigm is constructed upon three main ideas (Aghion et al. 2013). First, long-run growth is achieved primarily through innovation, following Solow's theory that sustainable technological change is required for long-term economic growth. Second, following the endogenous growth theory, innovation is derived from investments in research and developments from firms that responds to the economic incentives that results from economic policies and institutions. Hence, government quality and support is needed to promote innovation. Lastly, innovation provokes creative destruction as Schumpeterian growth is perceived as a competition between the old and the new in the sense that new technology replaces old technology. With such pattern, it is believed that innovation has been responsible for continuous rise in standards of living (Grossman and Helpman 1994) as there is perpetual replacement of old technology with

new technology. Continuous innovation has the benefit of improved productivity as well as expansion in consumption, investment, and exports (Ambashi 2017). However, the impact of innovation itself relies on the creativity of its eventual users, thus knowledge and education play an important role on adapting toward new innovation. Ambashi (2017) created a typology of innovation stages of ASEAN countries (Table 3.2):

Referring to the typology above, we can infer that most ASEAN countries are beginners regarding innovation involvement. Newly lower middle-income countries (i.e. Cambodia, Laos, and Myanmar) are in the initial stage of innovation involvement where they start to develop demand for innovation and technology, while countries which have been longer in the lower middle-income stage (i.e. Indonesia, Philippines, and Vietnam) and Thailand which had reached the upper middle-income level in 2008 are in the learning stage where they benefit from imitation of imported technology. Malaysia who has been an upper middle-income country quite a while is catching up with high-income countries through initiation of creative destruction. Singapore on the other end is the leading innovation frontier in ASEAN, becoming a knowledge generator and technology shaper. This typology excluded Brunei Darussalam due to its heavy reliance on oil and gas as the main contributor to its economy, hence the country does not suit any of the stages in the innovation typology. Thus, we can conclude when it comes to innovation, ASEAN countries are still passive players that rely on market forces for new innovations.

Table 3.2 Typology of innovation for ASEAN members

Phase	Characteristics	Country
Initial	Developing demand for innovation and technology	Cambodia, Laos, and Myanmar
Learning	Imitation and learning by doing from imported technology	Indonesia, Philippines, Thailand, and Vietnam
Catch-up	Initiation of creative destruction through licensing and creative duplication	Malaysia
Advanced	Frequent R&D and patent filing	
Frontier	Knowledge generator and technology shaper	Singapore

Source: Authors, from Ambashi (2017)

When measuring innovation, patents and trademarks usually go hand in hand as a proxy to quantify innovation; however patents lean more toward inventions (specifically technological inventions), while trademark denotes legal differentiation between products. As seen from the innovation typology, majority of ASEAN countries are still beginners when it comes to innovation, especially technological innovation. Therefore, using patents when attempting to capture innovation will fail to capture all innovative activities within a country because it focuses more on inventions rather than innovation. Since we are discussing about the middle-income economies which are squeezed between labor-intensive industries and high-skilled intensive industries that dominate innovation in technology, middle-income economies by nature are likely to lack in innovation that directs toward technology. Thus, the use of patents will fail to capture full innovation activities in a country. To measure the translation of R&D activities and patents into an actual innovation output that can be used by users, trademark has the ability to capture commercialization of new inventions used by firms to signal new products in the market (Castaldi 2014). In addition, the use of trademark also enables to capture non-technological innovation such as organizational innovation, service innovation, marketing innovation, and as well as innovation in low-tech sectors. Consequently, by using trademark in the literature will enable us to fully capture technological and non-technological innovation altogether that inflates economic growth.

Data and Methodology

Variable and Data Description

This study uses a quantitative approach using secondary data from official sources. Data are obtained in the form of panel data, a combination of annual time series data from 15 countries. Table 3.3 lists the countries that are included in the study.

The selection of the chosen countries are aimed toward emerging countries who are currently classified as middle-income countries (primarily members of ASEAN), and those who succeeded to transcend to high-

Table 3.3 Countries included in the study

ASEAN	Asia	Latin America
Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam	South Korea	Argentina, Chile, Mexico, Uruguay

Source: Author's compilation

income level in recent years. In the past, South Korea and a few Latin American countries spent quite some time in the middle-income level however managed to move up the income ladder in recent years. Thus, for a better cross-country comparison and variation, South Korea and Latin American countries are perfect examples of countries which recently succeeded on acquiring high-income status. Due to limited availability, data were only acquired from 1989 up until 2016. Selected data are analyzed through the chosen econometric model. Table 3.4 presents the summary statistics of the data. Two variables were rescaled due to a wide range of value compared to other variables. Initially, the number of trademark ranges from 577 to 332,929 and productivity per person employed ranges from 600 to 84,515. Thus, these variables were rescaled by dividing them by 1000 in the regression analysis. Hence, one unit of each of the rescaled variables corresponds to 1000 units in the regression analysis.

Dependent Variables

The dependent variable of this study is the GNI per capita in current US$, which is the gross national income divided by the midyear population. The GNI per capita calculated by the World Bank does not only reflect income, however it also takes into consideration non-income aspects of welfare such as life expectancy at birth, mortality rates, and school enrollment rates.[1] The use of log transformation is due to large differences in value between countries. Furthermore, the World Bank classifies countries based on their GNI per capita into four levels: low income, lower middle income, upper middle income, and high income (Table 3.5).

[1] World Bank (https://datahelpdesk.worldbank.org/knowledgebase/articles/378831-why-use-gni-per-capita-to-classify-economies-into).

Table 3.4 Summary statistics of variables used

Variable	Observation	Mean	Std. dev.	Min	Max
logGNI	401	8.142955	1.438337	4.70048	10.92809
Trademark	367	31.16277	33.61859	0.577	182.998
FDI intensity	420	4.43119	5.092871	−2.5	45.4
Productivity	390	20.92648	22.19928	0.5996	84.5151
Literacy rate	420	90.05714	9.134044	55.7	99.2
Life expectancy	420	71.22119	9.134044	53.1	82.8
Avg. duration of schooling	420	11.76667	0.8220316	10	13
Regulatory quality	315	0.1374603	0.9873692	−2.3	2.3
Political stability	315	−0.0507936	0.8607642	−2.1	1.5
Government effectiveness	315	0.2260317	0.8973183	−1.6	2.4
Corruption control	315	−0.0333333	0.9970338	1.7	2.3
Inflation	404	22.47428	191.5041	−2.314972	3079.81
Gross savings	364	27.99775	11.69718	1.45341	64.20624

Source: Author's compilation

Table 3.5 Dependent variables and data description

Dependent variables	Description	Source
Log (GNI per capita)	Gross national income (GNI) per capita in current US$ from 1989 to 2016.	The World Bank
Income levels	The number assigned to income groups (1 = low income, 2 = lower middle income, 3 = upper middle income, 4 = high income) based on the World Bank income classification for 2017–2018 fiscal year)	The World Bank

Source: Author's compilation

Independent Variables

Following the Solow growth model that requires capital, labor, and innovation as a function of economic growth, variables mentioned are chosen to represent components of the growth function (Table 3.6):

- Trademark (as a measure of innovation): Although patent has been widely used as a proxy for innovation in prior studies, a major pitfall expressed by Ozturk (2015) is that patent fails to capture all innovative

Table 3.6 Independent variables and data description

No.	Independent variables	Description	Source
Main variables			
1	Trademark	Number of total trademark applications	WIPO
2	FDI intensity	Inflows of foreign direct investment as a percentage (%) of total GDP	Euromonitor International
3	Productivity	Output per person employed in constant prices (US$)	Euromonitor International
Human capital indicators			
4	Literacy rate	Expressed as % of population aged 15+. A person who is considered literate is a person who can read and write simple statements with understanding in his/her everyday life.	Euromonitor International
5	Life expectancy at birth	Indicates the number of years a newborn would live according to prevailing patterns of mortality at the time of its birth.	Euromonitor International
6	Avg. duration of schooling	Official number of schooling years to graduate from secondary education.	Euromonitor International
Governmental indicators			
7	Regulatory quality index	Captures perceptions of governments' ability to formulate and implement sound policies that permits and promotes development. The index ranges between −2.5 and 2.5 with higher values corresponding to better governance.	Euromonitor International
8	Political stability index	Measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or by violent means. The index ranges between −2.5 and 2.5 with higher values corresponding to better governance.	Euromonitor International
Macroeconomic indicators			
9	Inflation	Inflation, consumer prices (annual %)	The World Bank
10	Gross savings (% of GNI)	Gross savings are calculated as gross national income less total consumption, plus net transfers.	The World Bank

Source: Author's compilation

activities within a country because it focuses more on inventions rather than innovation. Since we are discussing about the middle-income economies which are squeezed between labor-intensive industries and high-skilled intensive industries that dominate innovation in technology, middle-income economies by nature are likely to lack in innovation that directs toward technology. Thus, the use of patents will fail to capture full innovation activities in a country. To measure the translation of R&D activities and patents into an actual innovation output that can be used by users, trademark has the ability to capture commercialization of new inventions used by firms to signal new products in the market (Castaldi 2014).

- FDI intensity: Inflows of foreign direct investment (FDI) as a percentage of gross domestic product (GDP). The Euromonitor definition of FDI is an investment made to obtain lasting interest or to have effective control of an enterprise operating outside the economy of the investor.
- Productivity refers to labor productivity per person employed defined as output (gross value added) of goods and services in the economy divided by the total employed population.

Model Specification

This study uses quantitative analysis to describe the relationship between dependent and independent variables through an econometric model of panel data estimation. This study aims to specifically examine the relationship between per capita income and innovation along with foreign direct investment and productivity in emerging countries across a period of time. Additionally, control variables which are believed to influence economic growth such as human capital, governmental, and macroeconomic variables are added to the model. Furthermore, an ordinal logistic regression is used to see how the variables of interest influence the probability of a country to move up the income category.

Quadratic Model

The model used in this estimation refers to Ozturk's (2015) research where she uses quadratic model to examine the curvilinear relationship between key variables along with control variables on per capita income. The quadratic form of growth factors will depict the marginal effects of improvement in growth factors. Since majority of ASEAN countries are middle-income countries, the model is suitable to detect whether there is an occurrence of diminishing marginal effects at this stage, specifically for ASEAN countries. Furthermore, the Hausman test will be used to determine whether fixed-effect model or random-effect model is more appropriate for the analysis. Below is the quadratic model:

$$\begin{aligned}\log\left(\text{GNI per Capita}\right)_{it} = {} & \alpha + \beta_1 \,\text{Trademark}_{it} + \beta_2 \left(\text{Trademark}_{it}\right)^2 \\ & + \beta_3 \,\text{FDI}_{it} + \beta_4 \left(\text{FDI}_{it}\right)^2 + \beta_5 \,\text{Productivity}_{it} \\ & + \beta_6 \left(\text{Productivity}_{it}\right)^2 + x\delta_{\text{it}} + \text{u}_{\text{it}}\end{aligned}$$

Where:

log(GNI per Capita): log GNI per capita in current US$
Trademark: Trademark (as a measure of innovation) applications at the national office
FDI: Inflows of foreign direct investment as a percentage (%) of total GDP
Productivity: USD per person employed in constant prices
xδ: Other control variables

Generalized Ordered Logistic Regression

An ordered logistic regression fits ordered logit model of an ordinal variable on independent variables. As the income levels possess the characteristic of a having larger value in higher categories, it is logical to use the model as we are attempting to examine the role of key growth factors on the probability of countries on graduating to the next higher income level. The ordered logit regression requires the parallel lines/proportional

odds assumption to be fulfilled. However, the parallel lines/proportional odds assumption is very restrictive that requires βs to be constant for each value of j. The Brant test is commonly used to determine whether the assumption has been violated or not. Williams (2006) argued that the requirement is overly restrictive and often violated, it is common for βs to differ across each values of j. The generalized ordered logit model which relaxes the requirement of the parallel lines/proportional odds assumption (Williams 2006), which can be written as

$$\mathrm{P}\left(Y_{\mathrm{i}} > j\right) = \frac{\exp\left(\alpha_j + X_i\beta_j\right)}{1 + \left\{\exp\left(\alpha_j + X_i\beta_j\right)\right\}}, j = 1,2,\ldots,\mathrm{M}-1$$

where we can see that the βs allowed to differ in contrast to the usual ordered logit model. The generalized ordered logit model is believed to provide more interpretable and reliable results compared to other non-ordinal alternatives such as multinomial logistic regression.

Descriptive Analysis

To answer the last research question, a descriptive analysis will be conducted using secondary data and previous studies. The latest World Bank income classification will be used along with GNI per capita sourced from the World Bank. Furthermore, we will use Felipe's method to analyze which countries are considered trapped in the middle-income level in accordance with the data obtained from the World Bank.

Results and Discussion

Analysis of Growth Factors Toward Per Capita Income

The results of the Hausman test shows a p-value of **0.0000**, thus we reject the null hypothesis and conclude that **fixed-effects model** is more appropriate than random-effects model. Table 3.7 shows the results of the qua-

Table 3.7 Estimation of log (GNI per capita) from the quadratic fixed-effects model

Variables	Coefficient	Std. error	t-statistic	P>|t|
Trademark	0.0167749***	0.0027244	6.16	0.000
Trademark-sqr	−0.0001026***	0.000014	−7.35	0.000
FDI intensity	0.0164851*	0.0089669	1.84	0.067
FDI intensity-sqr	−0.0004495*	0.0002286	−1.97	0.050
Productivity	0.15965***	0.0148839	10.73	0.000
Productivity-sqr	−0.0012104***	0.0001248	−9.70	0.000
Literacy rate	0.0601117***	0.0136807	4.39	0.000
Life expectancy	0.0488249**	0.0153982	3.17	0.002
Average duration of school	0.03912	0.0934503	0.42	0.676
Regulatory quality	0.2714294***	0.0693567	3.91	0.000
Political stability	0.0160624	0.03231	0.42	0.675
Inflation	0.0023048	0.003447	0.70	0.486
Gross savings	0.0152435***	0.0034667	4.42	0.000
***R*-squared**				
Overall	0.9204			
Between	0.9672			
Within	0.8104			
***F*-statistic**	77.93			
Prob > *F*	0.0000			

Source: Author's calculation
*$p < 0.1$, **$p < 0.05$; ***$p < 0.001$

dratic fixed-effects regression. The model is statistically significant ($F_{13, 237} = 77.93$, $p < 0.001$), and a within R-squared of 0.8104. All of the main variables of interest are statistically significant and has a positive relationship toward income per capita.

If we take a look on the quadratic forms of the three key variables, they show a statistically significant negative relationship with per capita income which exhibits diminishing marginal effects of the key variables on per capita income. Consistent with the findings of Ozturk (2015), the key factors contributes positively toward per capita income, however at a decreasing rate as income per capita grows to a higher level. This decreasing rate heightens the difficulty for countries to grow toward higher level of income. As the marginal rate decreases, it is more difficult to progress with the same amount of growth factors. The diminishing marginal effect concept from the convergence hypothesis is confirmed in our findings, however it occurs in the middle-income level rather than in high-income

level causing middle-income countries to reach the "steady state" too early (in middle-income level), which leads to the middle-income trap.

In context of innovation, trademark exhibits positive and statistically significant relationship with income per capita. The regression results show that one unit increase in trademark application (i.e. 1000 trademark applications) is predicted to increase GNI per capita by 1.68% holding other factors constant. The quadratic form of trademark shows significant negative effect toward per capita income with a coefficient of −0.0001026. FDI intensity also exhibits positive and statistically significant relationship toward income per capita with 1% increase in FDI intensity increases GNI per capita by 1.65% all else constant, again with a diminishing rate of −0.0004495. Lastly, one unit increase in productivity (i.e. $1000) increases GNI per capita by 16% all else constant, also with a diminishing rate of −0.0012104.

Majority of the control variables indicate statistically significant positive relationship with income per capita. Literacy rate and life expectancy reflect the human capital quality in a country through education and healthcare. One percent increase of the population who are literate increases GNI per capita by 6% all else constant, while one-year increase in life expectancy increases GNI per capita by 5%, holding other factors constant. For governmental indicator, regulatory quality was found to be positively significant toward GNI per capita, meaning that the better the ability of a country's government to formulate and implement sound policies that induces economic development has a positive impact on per capita income. One point increase in regulatory quality score increases GNI per capita by 27%, all else constant. Lastly, 1% increase in gross savings increases GNI per capita by 1.5%, all else constant. The ability of a country to save indicates that they do not engage in excessive debt, and they are able to alter savings toward investment, which in turn prompts positive significant impact toward per capita income.

Analysis of Growth Factors on the Probability of Moving Up the Income Ladder

As previously mentioned, the ordered logit regression requires the fulfillment of the parallel lines/proportional odds assumption which is often

violated. The Brant test shows that the parallel lines/proportional odds assumption is violated specifically for productivity (p-value = 0.00000), while trademark and FDI intensity was able to meet the parallel lines/proportional odds assumption (p-value = 0.208 and p-value = 0.172, respectively). Therefore, we will use the generalized ordered logit model to examine the role of key growth factors on the probability of countries on graduating to the next higher income level. Table 3.8 shows the estimation results from the generalized ordered logit estimation with a p-value <0.001 and pseudo R_2 of 0.6925.

The positive signs of all key variables indicate that innovation, foreign direct investment, and productivity contribute positively for emerging countries to move forward the income categories. Interestingly, trademark in context of innovation was only significant for lower middle-income economies on the probability of moving up to upper middle-income level. In line with the innovation typology proposed by Ambashi (2017), the initiation of creative destruction does not start directly at the initial stage, rather later when economies have sufficient demands for innovation and have learned enough knowledge from imported technologies to actually implement innovation. Second, foreign direct investment was found to be significant only for the probability of low-income economies to move up to lower middle-income level. This shows the need of additional capital inflows for lower income levels in order to step up onto the next income level, as capital circulating in a low-income level country is presumably low to begin with. Lastly, productivity showed to be significant and it strongly influences the probability of moving up to a higher income level on any level of initial income group.

From these results, we can infer that countries specifically belonging to the middle-income level should take innovation into consideration when

Table 3.8 Generalized ordered logit estimation of a country moving up to a higher income category

$P(Y_{ct} > j)$	L to LM	LM to UM	UM to H
Trademark	0.0327043	0.0378456**	0.0056989
FDI intensity	0.3077188**	0.1276984	0.0350988
Productivity	1.62827***	0.3314414***	0.2070858***

Source: Author's calculation

$p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.001$

aiming to move up the income ladder. Innovation is one of the key drivers in economic progress that results in new productive and efficient ways in expanding the economy. The use of trademark instead of patents also shows that it is not only technological innovation that matters, it is rather the translations of these inventions into a matter that is marketable and can be utilized to increase productive efforts. This also shows that other types of non-technological innovations such as organizational and service innovations also plays a significant role toward further economic growth middle-income countries. While productivity also shows great contribution toward per capita income, innovations should possess quality characteristics that have the ability to improve effectiveness of economic activities. Accordingly, meaningful innovation and productivity should be attained by improving human capital quality through education, training, and R&D, as well as government policies that promotes new innovations along with a stable macroeconomic condition that supports economic development.

As ASEAN countries are still passive in terms of innovation, these countries should become more active in contribution toward innovation whether it is through a push or pull strategy. What we can learn from the experience of Latin America is that both market and government must contribute toward innovation, relying solely on one party will not result an effective economy. Stimulating innovation through market demand should require enhancement in human quality through secondary and tertiary education which leads to increased demand for innovation in an economy for a more efficient economy and higher standard of living. At the same time, government and corporations ought to push innovation through continuous R&D and also provide incentives to promote innovations such as funding, tax incentives, and development grants. With simultaneous efforts, middle-income countries should be able to gradually move up the innovation typology.

The Middle Income Trap Among ASEAN and Other Emerging Countries

As previously discussed, many ASEAN countries recently succeeded to exit low-income level and reached the middle-income level. In contrast, several Latin American countries recently graduated onto the high-

income level after spending quite some time in the middle-income level. Figure 3.2 shows income-level movements of these countries between 1989 and 2016.

Among ASEAN member states, only two countries belong to the high-income level, namely Brunei Darussalam and Singapore. Other ASEAN countries started to surpass the low-income level in this period, Philippines in 1995, Indonesia in 1996, Vietnam in 2009, Laos and Myanmar in 2011, lastly Cambodia in 2014. Malaysia and Thailand on the other hand have been categorized in the middle-income range over the whole observed period of 27 years. If we look deeper into past data, Thailand has spent 20 years in the lower middle-income level from 1988 until 2008, and 8 years in the upper middle-income level, which exempts Thailand from being considered trapped in the middle-income level. Meanwhile, Malaysia actually entered the lower middle-income level in 1979 and entered the upper middle-income level in 1995, which translates to 16 years in the lower middle-income level, and 21 years in the upper middle-income level. Corresponding to Felipe's income threshold, we can conclude that Malaysia is trapped in the upper middle-income level.

Quah (1993) discovered that there is a tendency of thinning of the middle-income level in favor of very poor and very rich countries. Low-income levels tend to have downward mobility in which they are more likely to become poorer, although the possibility of upward mobility is still possible. While high-income levels seize balance between upward and downward mobility, in which they are more likely to persist in high-income level. Although the tendency of thinning of the middle-income level does not seem to occur in ASEAN countries as many of their members just recently reached the middle-income level, the downward mobility is still a risk that is faced by every country. The downward mobility can be found in Fig. 3.2 where several countries (Indonesia, Malaysia, and South Korea) were vulnerable to fall down toward their previous income level in a deteriorating economy from the Asian financial crisis in 1998. Indonesia specifically suffered greatly in the 1998 Asian financial crisis compared to the 2008 global financial crisis. The 1998 crisis includes depreciation of the rupiah which affects exports and imports and also rising costs of foreign debts. During this time period, Indonesia just recently reached the lower middle-income level in 1996. As poverty

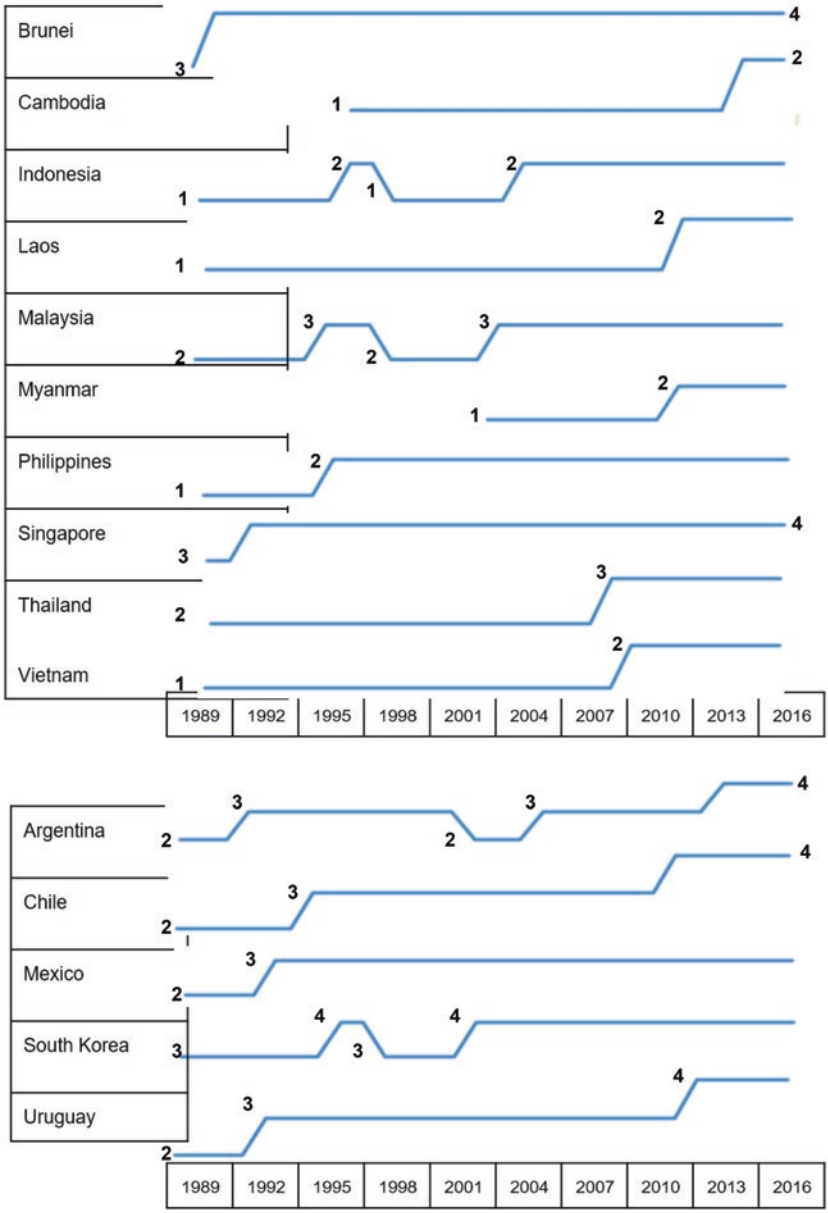

Fig. 3.2 Income classification of ASEAN and other emerging countries. 1 = Low income, 2 = Lower middle income, 3 = upper middle income, 4 = high income. Source: Author's compilation

increased due to the crisis, Indonesia fell back to the low-income level. However, we can see that Indonesia fared better in the 2008 crisis maintaining its position in the lower middle-income level. Tambunan (2010) studied that the resilience was due to more steady policies, better government housekeeping, and stronger financial sectors. Thereof, as it is easier for a country to descend toward lower income levels, countries must be able to inject adequate input and productivity circulating in the economy and strategize economic policies in order to move up the income ladder or maintain current income level. This is proven by the resilience of Thailand and Vietnam from the global financial crisis in 2008 where the two countries were able to move up toward higher income status in spite of the crisis.

According to Nidhiprabha (2011), the limited impact of the global financial crisis in Thailand was attributed to financial refinement subsequent to the Asian financial crisis which results in better banking structure and low exposure on subprime assets, supporting macroeconomic conditions also helped credit expansion that accelerates economic recovery. Similarly, Vietnam was not directly affected by the 2008 crisis due to its low exposure to international financial markets where 50% of its banks are state-owned (Le 2009). Additionally, informalization of sectors are big in Vietnam, and the crisis induced informalization even further (Cling et al. 2010) which provides alternative source of income keeping them from poverty. Therefore, the resilience of the two countries in times of crisis shows the need for sound economic policies and an active government role that induces smooth economic recovery and preventing countries to move backward toward a lower income level.

To understand the economic growth of each ASEAN countries, Table 3.9 shows the most recent GNI per capita growth for ASEAN countries.

As previously discussed, Felipe calculated the required growth per annum in order not to fall into the middle-income trap for each middle-income category. We can see that growth is larger for lower income levels where they still have room to expand. In line with convergence hypothesis, higher income countries experience larger diminishing marginal effects in growth factors compared to lower-income countries; thus its growth is limited. Majority of lower middle-income countries

Table 3.9 GNI per capita growth for ASEAN 2016

Country	Classification	2016 growth (annual %)	Required growth according to Felipe (2012)
Brunei Darussalam	High income	–2.32	–
Singapore	High income	2.06	–
Malaysia	Upper middle income	2.64	3.5%
Thailand	Upper middle income	3.05	3.5%
Philippines	Lower middle income	4.91	4.7%
Indonesia	Lower middle income	3.70	4.7%
Laos	Lower middle income	5.75	4.7%
Vietnam	Lower middle income	6.15	4.7%
Myanmar	Lower middle income	–	4.7%
Cambodia	Lower middle income	5.26	4.7%

Source: Authors, from World Bank (2018) and Felipe (2012)

grew adjacent around the required growth, except for Indonesia. However, in terms of years, Indonesia is not considered trapped in the middle-income level yet, hence Indonesia must be able to compensate for the sluggish growth in the upcoming years before it is considered trapped in the lower middle-income level. Thailand and Malaysia also yielded growth lower than required, although Thailand still has time before it is considered trapped in the upper middle income, it seems like it is harder for countries to exit the upper middle-income level. Latin American countries who recently reached the high-income level were actually trapped in the upper middle-income level as well in the past. However, with increased innovation efforts, foreign direct investment and productivity, they managed to reach high-income level.

Figure 3.3 shows the average total trademark application for ASEAN and Latin American countries as well as South Korea.

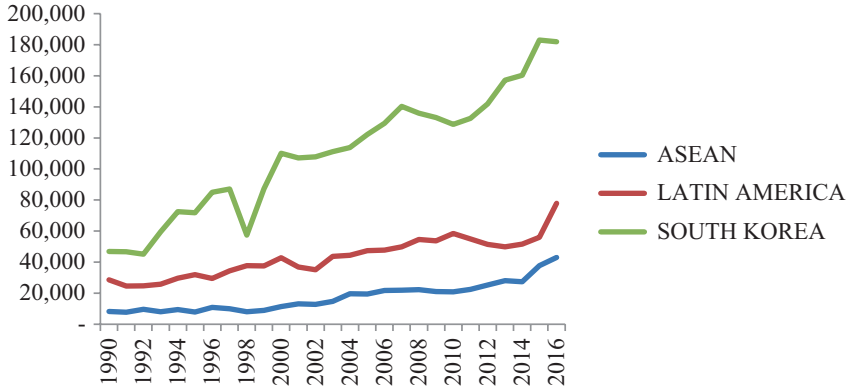

Fig. 3.3 Average trademark application of ASEAN, Latin America, and South Korea. Source: Authors, from World Bank (2018)

The figure shows synchronized movements between growth of trademark application and the shifts of a country's income level. For instance, innovation for ASEAN countries seems to peak in 2002 and 2014 where several of its members (Vietnam, Laos, Myanmar, and Cambodia) moved up the income ladder from low-income level toward lower middle-income level around the same period. Similarly, middle-income Latin American countries reached high-income level as their innovation rapidly grew in 2014. South Korea also exhibits the same pattern, where it reached high-income level for the first time in 1995, however slipped back to upper middle-income level in the 1998 crisis period as their innovation capacity also plummets. Shortly after, South Korea managed to quickly recover, boosting its innovation efforts after the crisis and attained high-income level in 2002. From the two groups of countries, we can see that the rate of innovation in Latin American countries is approximately double the number of ASEAN countries. This shows the contrast between the newly high-income countries and the newly middle-income countries. Hence, ASEAN countries should double their innovation efforts in order to achieve high-income level.

Foreign direct investment reflected in Fig. 3.4 shows that higher income countries tend to have lower levels of FDI intensity. This may be due to the fact that foreign direct investment is more critical for emerging

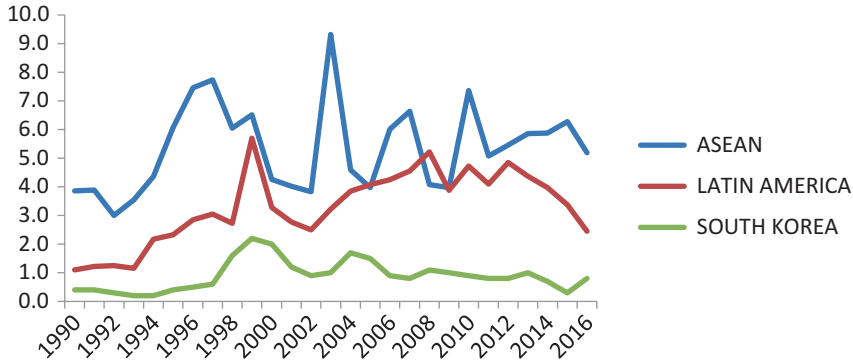

Fig. 3.4 Average FDI intensity of ASEAN, Latin America, and South Korea. Source: Authors, from World Bank (2018)

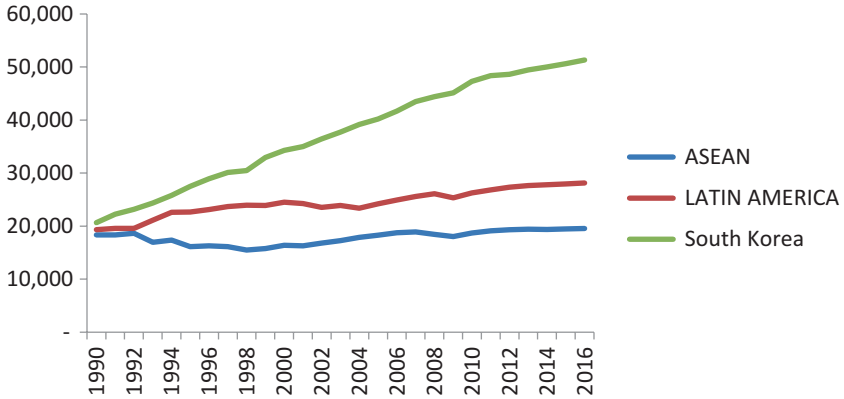

Fig. 3.5 Average productivity of ASEAN, Latin America, and South Korea. Source: Authors, from World Bank (2018)

countries to fund the economy and gain expertise from foreign multinationals. Therefore, emerging countries like most ASEAN countries become large recipients of foreign direct investment to induce economic growth compared to higher income countries such as South Korea and high-income Latin American countries.

Average productivity reflected in Fig. 3.5 shows divergence between the level of productivity between ASEAN and Latin American countries.

The average productivity level for ASEAN countries seems to be declining with no signs of rapid growth, while Latin American countries are slowly escalating their productivity level. As previously mentioned, the reason of the middle-income trap in Latin America was due to a lack of domestic innovation capabilities which in turn translated to low productivity growth (Paus 2017). This further pronounces the need for sturdy growth in innovation and productivity in moving up the income level. Therefore, stagnant or insufficient growth in key growth factors will result inadequate inputs for economic growth, which may lead to the middle-income trap, or worse, downgrading the income ladder.

Conclusion and Limitations

Concluding Remarks

In summary, this study aims to examine the role of innovation in avoiding the middle-income trap for ASEAN member states. From the descriptive and empirical evidence, we can conclude that innovation along with foreign direct investment and productivity contributes positively toward per capita income. Innovation was also found to increase the probability of moving up the income ladder, specifically for lower middle-income level toward upper middle-income level. As many ASEAN countries are categorized in the lower middle-income level, innovation should be used as a tool to graduate onto the upper middle-income level. Whereas for upper middle-income countries, productivity seems to be the key driver on moving forward toward high-income level. As productivity was found to be strongly influential toward every level of income stages, innovation efforts should possess quality characteristics that enhance productivity and effectiveness of economic activities.

This study also found a curvilinear relationship between growth factors and per capita income, which indicates that the contribution of growth factors comes with diminishing marginal effects. At initial stages of growth, key factors contribute positively toward per capita income, but only up to a certain point. As income per capita grows to a higher level,

growth factors contribute toward income at a decreasing rate. As the marginal rate decreases, it is more difficult to progress with the same amount of growth factors. The diminishing marginal effect concept from the convergence hypothesis is confirmed in our findings, however it occurs in the middle-income level rather than in high-income level causing middle-income countries to reach the "steady state" too early, which may lead to the middle-income trap.

As discussed in the previous chapter, innovation efforts and productivity of ASEAN countries are approximately half of high-income Latin American countries. Thus, ASEAN countries must strive to double its innovation efforts and productivity in order to avoid the middle-income trap. Another lesson that can be taken from the experience of Latin American countries is that there is a need for pro-active government policies to promote meaningful innovation and productivity. However, government policies alone cannot function without the appropriate market mechanism. Thus, improvements in innovation and productivity require a better knowledge-based human capital and market incentives from the government.

Although only one ASEAN member country is considered trapped in the middle-income level (i.e. Malaysia), Thailand and Indonesia are also prone to the middle-income trap due to its undesirable income growth. The middle-income trap should be seen as a risk for every middle-income country. The middle-income level is a vulnerable phase in which an economy may easily fall back to low-income level, however difficult to go beyond toward high-income level. Other ASEAN middle-income countries should aim to overcome the middle-income trap while they still have time to boost their economic growth before they are considered trapped.

Limitations

This study has a few limitations. First, the definition of the middle-income trap is difficult to gauge. The existing thresholds used to consider a country as being trapped in the previous literatures are arbitrary approaches, which leaves some blurred lines on deciding which countries are actually considered to be in the middle-income trap. Second, this study cannot capture

country-specific circumstances that are faced in each middle-income economy. Different countries may face different challenges, thus every country may need a different approaches in overcoming the middle-income trap. Future extensions of this study should examine country-specific perspectives on facing the middle-income trap along with a more clear definition of the middle-income trap.

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4

The Role of Technology as a Trade Facilitator in Upgrading Export Performance of ASEAN Countries in 2008–2014

Amalia Wardhani, Fithra Faisal Hastiadi, and Muhammad Rifki Shihab

Introduction

Krugman and Obstfeld state that international trade is one of the two branches of the theory of international economics which explains goods and services are exchanged either by using money as a means of transaction or through investment. International trade is conducted with the goals of each country. Krugman and Obstfeld explain that the parties involved in trade relations—in this case is a country that conducts international trade, both acting as a seller or buyer—will get something from a transaction that aims to make each of the parties involved in the transaction to be better off. Judging from the producer who will receive profit, it can be analyzed that effectiveness of production strategy is determined by the producer. With limited resources, each country must

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establish the choice of goods or services to be produced with the most effective strategy in terms of both expenditure and income. Then, each country sells goods and services produced to other countries so that trade among countries takes place.

In this study, the authors examine the effect of the quality of trade facilities by using four indicators of real exports in ASEAN (Association of Southeast Asian Nations) countries. Trade facilities become one of the issues in the spotlight of policy makers to improve the quality and quantity of economic growth in ASEAN countries. A report entitled the ASEAN Trade Facilitation Framework (ATFF) (http://asean.org/storage/2016/08/ASEAN-Trade-Facilitation-Framework.pdf) suggests that trade facilities play an important role in promoting economic development and regional integration among ASEAN countries. Trading facilities play a pivotal role in achieving the ASEAN goal of being a large market and stable production base with high levels of competition and an integrated economy.

In 2016, ASEAN as a form of economic integration initiated an idea of trade facilities within the ATFF. This idea aims to improve the quality of the economy by improving the quality of regional trade facilities. The main focus of the ATFF is to streamline the implementation of obligations, commitments, and instruments relating to trade facilities among ASEAN countries. There are four groups of distribution of trade facilities such as licensing and transportation, transparency of trade rules and procedures, uniform quality of trade facilities, and private sector involvement, as well as business facilities.

The ASEAN Trade Facilitation Framework seeks to create efficiencies in the movement of goods that become the object of trade among ASEAN countries. It also aims at increasing trade and production networks, becoming more participative in global value chains, and enhancing economic integration. In addition, the ATFF endeavors to improve the oversight mechanisms against the implementation of trade facilities.

This study analyzes the role of trade facilities to trade to substantiate evidence from other research results conducted in several other countries. This research belongs to the scope of bilateral trade between countries in ASEAN.

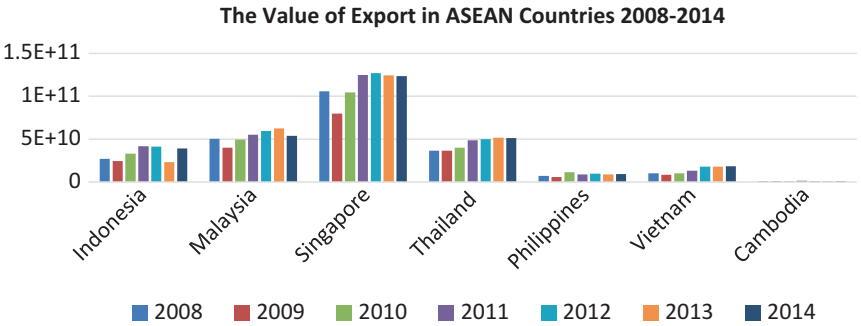

Fig. 4.1 The value of export in ASEAN countries 2008–2014. Sources: Authors, from *Comtrade*

Figure 4.1 illustrates that countries in ASEAN are engaged in trading activities, namely exports. From 2008 to 2014, Malaysia and Singapore became the most exporting countries to ASEAN countries, followed by Thailand and Indonesia. This was indicated by the highest export value. This signifies that countries in ASEAN are actively engaged in trade activities which are shown from the export value of each country to other countries in the ASEAN region. Trade activities of ASEAN countries need to be maintained and enhanced to improve the economies of ASEAN countries. In order to improve the economies of ASEAN countries, trade facilities owned by a country play a crucial part in supporting the trade of a country. Within the ASEAN Trade Facilitation Framework, it has been explained that trade facilities encourage economic development and economic integration.

Trade facilities are closely related to the trade costs borne by countries that engage in trading activities, particularly exports. Figure 4.2 denotes the costs incurred by countries in ASEAN in conducting trade activities, that is, exports. The Philippines has the highest trade (export) costs compared to other ASEAN countries, followed by Cambodia. The trade costs included in the border compliance are the trade costs borne by these countries which are related to matters of economic and regulatory boundaries of certain institutions. Figure 4.3 indicates the costs borne by countries in ASEAN in trading, that is, exports. Indonesia has the highest cost

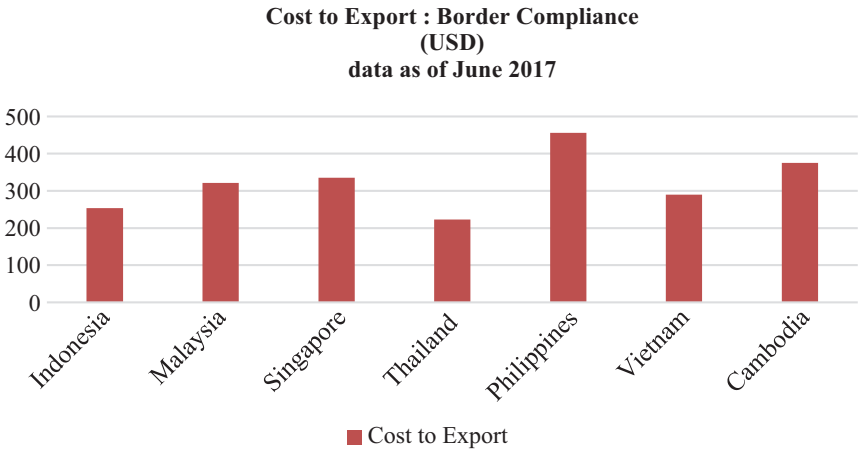

Fig. 4.2 Cost to export: border compliance. Source: Authors, from *Doing Business*

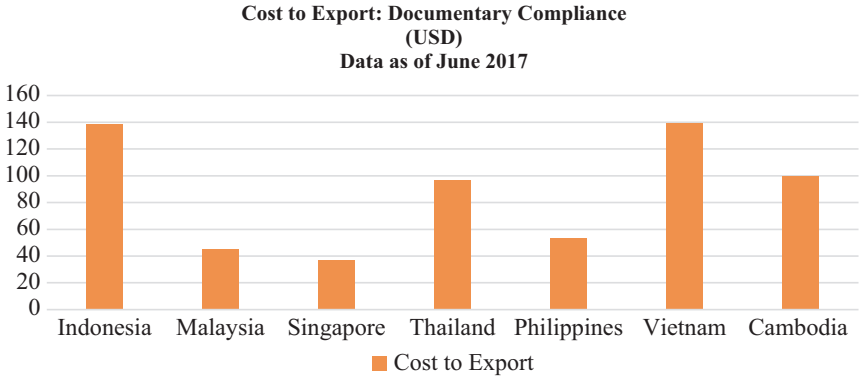

Fig. 4.3 Cost to export: documentary compliance. Source: Authors, from *Doing Business*

in terms of trade costs related to documents required to conduct trading activities, that is exports, followed by Vietnam and Cambodia. Meanwhile, Singapore has the lowest cost.

Theoretical Review

Trade Facilities in International Trade Economics Theory

Trading facilities in economic theory are essential in and are closely related to trade costs. Ricardian explains the effect of trade costs on a particular country trade in classical trading theory. In his theory, Ricardian explains that the motivation of a country in trading is the difference in labor productivity of these countries. When these countries do not trade, each country will have a different price relative. If it is assumed that the absence of trade costs on trade occurs between countries, the price difference of goods traded between countries becomes an opportunity for countries in the world to improve their welfare because the price is determined by consumer preferences and its relative size. Inefficient trade procedures will lead to high trade costs and cause differences in goods across the country. Each country will specialize in the production of goods that they are capable of producing, but will reduce consumption which then leads to a decline in economic welfare. Van Marrewijk states that factors such as abundance of natural resources, technological differences, or various preferences of society influence or shape trade flows. Both the poor trade facilities affect the trade flows of one country. The poor trade facilities cause the cost of transportation or trade costs to be more expensive, so it is considered trade barrier. Thus, the trade facility in the logistics sector gives effect to the trade flows. Baldwin and Wyplosz argue that poor trade facilities and inefficient trading procedures include non-tariff trade barriers. Asian Development Bank and the United States in its report entitled *Designing and Implementing Trade Facilitation in Asia and the Pacific* highlight that trade facilities are the keys that can be used to increase profits caused by trade conducted by a country to another country. Tariff is no longer a barrier for a country to trade more than 60 years ago. Since 1970, non-tariff barriers such as import quotas or export restriction agreements have decreased significantly. The cost of trade or often referred to as trade cost becomes significant affecting trade international.

Trade facilities are able to capture the movement of trade costs, which is influenced by several things such as trading procedures which then affect the time spent by a country so that the longer it takes to trade due to complicated procedures, the more trade costs that must be borne by the country involved in trading. The World Trade Organization in the Asian Development Bank and United Nations report states that trade facilities are a form of simplification and harmonization of international trade procedures, in which international trade procedures comprise activities, actions, and formalities that include collection, offerings, communication and data processing, and other information used to assist the movement of traded goods. The United Nations Center for Trade Facilitation and Electronic Business (UN/CEFACT) utters that trade facilities are a form of simplification, standardization, and harmonization of trade procedures and information associations related to the flow of goods traded from seller to buyer through payment system. The Asia-Pacific Economic Cooperation (APEC) asserts that trade facilities are a form of simplification and rationalization of licensing and other administrative procedures that imply a decrease in the costs incurred in trading by shipping goods from one country to another and/or from several countries to some other countries. Based on the definition of trade facilities above, it can be concluded that trade facilities are closely related to trade costs. This is explained in the theory of A Simple "Iceberg" Partial Equilibrium Model. World Trade Report entitled *The WTO Trade Facilitation Agreement* elaborates the partial equilibrium theory of Iceberg by Samuelson. It points out how the inefficiency of trade procedures increases trade costs and leads to a significant price difference between the price received by the producer and the price received by the consumer. This can be seen from the increased value of deadweight loss.

ASEAN Trade Facilitation Framework

Trade facilities in sectors that are not less important to be improved is an effort to improve the export performance of countries in both international and regional trades such as that of ASEAN. ASEAN as a tangible form of economic integration is paying full attention to efforts to improve

the quality of trade facilities, one of which is the establishment of the ASEAN Trade Facilitation Framework. The ASEAN Trade Facilitation Framework defines trade facilities as an imperative factor in economic development and regional integration. It is a form of realization of the ASEAN objectives of becoming a single market and stable production base, increasing revenue, having high level of competition, and being economically integrated with the existence of an effective trading facility for trading and investment that will facilitate the movement of trade in goods and services as well as investment.

Technology in Theory of Economics

Technology is one of the important variables in the economy. World Economic Forum shed light on the importance of technology as the world grows and the world becomes increasingly unlimited from the ongoing flow of globalization, technology increases and becomes an important element for companies to compete and directly and indirectly affect the economy. Mankiw Gregorey (2012) suggests that technology can be explained through the Solow growth model. The term used in the theory is technological progress.

Effective Workers (The Efficiency of Labor)

In analyzing the role of technology in economic growth through the Solow growth model, the following production functions are utilized:

$$Y = F(K,L) \tag{4.1}$$

$$Y = F(K,L \times E) \tag{4.2}$$

Equation (4.1) denotes the initial production function, while Eq. (4.2) signifies a production function consisting of K capital and the effective worker L × E. Effective workers reflect the people of certain countries who have knowledge of the production method caused by the increasing quality of technology, thereby causing the increase in effective workers.

Technology—specifically termed as technological progress—is very influential on the productivity of each worker which then contributes to the increase in production of goods and services. In this model, technological progress is also called labor augmenting. The steady state with technological progress that improves the quality of technology within an economy does not cause the number of workers in the economy to increase, but causes an increase in the number of effective workers. In analyzing steady state of an economy, the following equation is used:

$$k = K / (L \times E) \tag{4.3}$$

$$y = Y / (L \times E) \tag{4.4}$$

$$\Delta k = sf(k) - (\delta + n + g)k \tag{4.5}$$

Equation (4.3) indicates the effective capital per worker, Eq. (4.4) shows the output per worker is effective, while Eq. (4.5) depicts changes in capital stock that can explain the analysis of economic growth. Steady state can be achieved when establishing k becomes constant, δk to replace capital depreciation, nk to provide new workers and to produce effective workers created through technological progress.

Empirical Studies

Seetanah et al. (2016) utilize data from 20 African countries in the 2007–2014 period in their research on trade facilities arguing that trade facilities amplified trade flows in some African countries. In addition, economic growth, investment, and the existence of international trade agreements are also found to have an effect on trade flows. In the analysis, the researchers used the Logistic Performance Index (LPI) data from 2007 to 2014. The researchers argue that LPI is a data that can be used to calculate how a country can be connected with international logistics network. Based on information obtained from the World Bank, it is stated that LPI helps a country in identifying the challenges and opportunities they face in improving the quality of the logistics sector and the steps that can be taken to improve it. LPI is an index used to analyze the

performance quality of a country's logistics sector which includes assessment of several aspects. LPI does not only describe the quality of the logistics sector of a country, but also reveals the development trend of the sector over time. Hoekman and Nicita employ the Logistic Performance Index as the economic indicator variable that describes the trade facilities. Logistic Performance Index is considered to describe the condition of a country's supply chain. The index is built on several supporting aspects, such as the length of travel time of distribution of goods and the infrastructure of each component that has their respective scoring numbers. However, the LPI is not the only variable approach that can be used to analyze trade facilities. Zarzoso, Ramos, and Wilmsmeier conducted a study on the impact of trade facilities on sectoral trade in Latin America. In the study, the researchers apply three variables which are used as maritime transport infrastructure and other trading facilities such as the number of port container, the time lag of goods distribution, and the number of bureaucratic procedures. In the study, it is found that natural trade barriers that transport costs play a more crucial role than institutional trade barriers or factors of trade facilities in Latin American trade. In general, however, transport infrastructure and trade procedures are the determinants of transportation costs. Fernandes, Hillberry, and Matto argue that trade facilities affect the decline in transportation costs and the decline in time distribution of goods so as to affect the standard of living and boost the acceleration of economic growth. Economic indicators that can be used as a proxy indicator that is considered able to describe the trade facility is exceptionally diverse. Freund and Rocha suggest that the length of transit time augments the country's exports. Indicators applied to describe the quality of trade facilities are domestic transit, documentation, ports, and fees for entry and exit of traded goods. Wilson, Mann, and Otsuki state that trade facilities affect the export of manufactured goods. The researchers utilize several indicators of trading facilities, namely port efficiency; port and airport quality measure; customs environment; measuring the quality of transparency and administration of trade facilities measure, regulatory environment; measuring economic regulations relating to trade facilities and e-business usage; measuring supporting infrastructure that improves economic acceleration. Shepherd and Wilson reveal that improvements

to trade facilities result in a country increasing its trade. The study employs data of ASEAN countries from 2000 to 2005 using four indicators of trade facilities, namely the quality of marine infrastructure, air infrastructure quality, irregular payment in trade transactions, and Internet Service Provider (ISP) competition level.

The research results indicate that the quality of air infrastructure and competition levels of ISPs affect trade flows, but some other indicators including trade facility indicators do not significantly affect the imports of these countries, such as import tariffs, marine infrastructure quality, and irregular payments in export/import transactions. The authors opine that this is due to the relative lack of data used to have an insignificant impact. For example, import tariff rates are inversely correlated with the quality of infrastructure and various payment systems that are not in accordance with the provisions. Perez and Wilson (2011) argue that trade facilities have a significant impact on exports. Based on earlier studies, trade facilities are central in determining trade flows by using different indicators. Hoekman and Nicita contend that trade facilities are part of the cause in influencing trade flows. Based on the results of their research, Hoekman and Nicita suggest that a policy to improve the quality of trade facilities is needed because it gives an enormous and significant impact compared to trade policies implemented to reduce trade costs, that is, the cost to be paid by a country to finance the trading procedures. The research model was prepared using panel data of countries in ASEAN from 2008 to 2014. The model specifications are logarithmic equations and utilize gravity model. Jan Tinbergen's gravity model is used to predict trade volume between two countries. In this study, the gravity model is applied to analyze the bilateral trade flows of the countries studied. The model applied in this study was adopted from that of Perez and Wilson (2011) studies. The research model is formulated as follows:

$$\begin{aligned}\ln\text{Trade}_{ijt} : \beta &+ \beta_1 \ln\text{TR}_{it} + \beta_2 \ln\text{BTE}_{it} + \beta_3 \text{WGI}_{it} + \beta_4 \ln\text{TDASAR}_{ijt} \\ &+ \beta_5 \ln\text{GDPPC}_{\_it} + \beta_6 \ln\text{GDPPC}_{\_jt} + \beta_7 \ln\text{POP}_{\_it} + \\ &\beta_8 \ln\text{POP}_{\_jt} + \beta_{10} \ln\text{DIST}_{\_ijt} + e_{ijt}\end{aligned}$$

Type and Source of Data

Research result: This study is conducted to identify and analyze the indicators of trade facilities and other economic factors in the export performance of ASEAN countries (Table 4.1). The estimation method used is fixed effect. Exports are influenced by several variables: technological readiness, border and transport efficiency, and world governance indicator as trade facilities, import tariff, GDP per capita, population, and distance between countries.

Table 4.1 Type and source of data

No.	Variable	Definition	Unit	Source
1	Real export	The nominal export value has been adjusted to the CPI value	Million dollar (US$)	*Comtrade*
2	*Technological readiness*	Indicators showing the speed of an economy in improving the productivity of a particular industry using information and communication technologies (ICT) on daily activities and production processes to improve the efficiency and level of a company's competition. This indicator demonstrates the ability of firms in certain countries to have access in using technology to increase the number of products produced and blueprint and the ability to use them.	Index 1–7	*Global Competitiveness Report*

(*continued*)

Table 4.1 (continued)

No.	Variable	Definition	Unit	Source
3	*Border and transport efficiency*	The BTE indicator shows the time to trade between countries.	Days and Documents	*World Bank*
4	*Worldwide Governance Index* (WGI)	The WGI indicator exposes the quality of the business environment that supports to improve the quality of the economy.	Index	*Worldwide Governance Index* (WGI)
5	Import tariff	Tariffs imposed on the imported goods of a particular country	Percentage (%)	*Trade Analysis Information System* (TRAINS)
6	GDP per capita	Gross domestic product value per capita	Million dollar (US$)	*World Bank*
7	Population	The population of a particular country	People	*World Bank*
8	*Distance*	Economic distance of a country to another particular country		*World Bank*

Discussion

Pursuant to the Hausman test results, it can be seen that the best estimation method applied in this research is fixed effect method. Estimation results in Table 4.2 denote that the most significant trading facility indicator influencing trade flow is technological readiness variable. Based on the results of regression estimation above, it is shown that technology is a variable that affects real exports significantly. It is clear that the *p*-value of the variable is 0.012 and the sign of positive coefficient which is in accordance with the hypothesis and research conducted by Perez and Wilson (2011). The study discusses technological variable which have a significant positive effect on export performance, although the results of research conducted by Shepherd and Wilson using ISP or Internet Service Provider variables as technology proxy variables indicate a positive relationship between variables with export value, but with different level of significance, that is, significant at the level of 10%. Nevertheless,

Table 4.2 Regression estimation result

Variables	Pooled OLS	Fixed effect	Random effect
lnTR	2.57	2.12	2.56
	(0.001)***	(0.009)***	(0.001)***
lnBTE	−0.95	−1.77	−0.95
	(0.266)	(0.09)*	(0.266)
WGI	0.11	0.155	0.11
	(0.168)	(0.05)**	(0.168)
lnTDASAR	0.02	0.007	0.02
	(0.475)	(0.815)	(0.475)
lnGDPPC_i	1.01	0.91	1.101
	(0.001)***	(0.186)	(0.001)***
lnGDPPC_j	1.05	−1.033	1.05
	(0.000)***	(0.094)*	(0.000)***
lnPOP_i	1.07	8.13	1.07
	(0.000)***	(0.023)**	(0.000)***
lnPOP_j	0.44	7.403	0.44
	(0.01)*	(0.068)*	(0.010)
lnDISTij	−0.09	−0.11	−0.09
	(0.412)	(0.314)	(0.412)
_cons	−24.86	−252.89	−24.86
	(0.000)***	(0.000)***	(0.000)***
Observation	*206*		

Number of countries: 7
Estimated by fixed effect methods
*Significant at 10%, **Significant at 5%, ***Significant at 1%

it can be concluded that technology is a significant variable affecting export performance. This is also supported by the results of research conducted by Nasir and Kalirajan (2013) which argue that new technologies play an important role in increasing trade in service trade in the modern era. Their research also says that internet usage variables show a positive sign and are significantly good for countries that do export and import activities, but more estimation results indicate that internet usage variables more significantly affect the countries that do export. The second indicator is the business environment indicator that uses the World Governance Index (WGI) and significantly affects the trade flow with the level of significance at the same level of 5% with the value of *p*-value 0.20 and has a sign of influence in accordance with the research hypothesis. This indicates that the business environment indicator used to conduct

trading activities plays a chief role which signifies the real export value of the country.

These results are supported by research conducted by Perez and Wilson (2011) which states that business indicators affect export performance positively: the better the quality of business in the country, the more the value of real exports of the country. The third variable is the border and transport efficiency variable which is the variable that becomes the indicator of the trading facility that describes the length of time and the number of documents required for trading. These variables have different levels of significance in affecting exports. The border and transport efficiency variables are negatively related to real export values and both are significant at the same level of significance. This signifies that the technology and administrative quality which is the proxy of time required for a country to trade is a key trade facility which, when quality is improved or enhanced, will result in the increase of value of real exports. These results are supported by research conducted by Perez and Wilson (2011). In their research, they argue that the technology has a positive effect on export performance. In the study it is also stated that countries that increase exports are likely to obtain higher returns which are then used to improve the quality of infrastructure. The relationship between export performance and the quality of infrastructure as a trade facility has a causal relationship so that it can be explained by using another perspective that the better the quality level of infrastructure as a trading facility including the quality of trading facilities associated with the trade administration, the greater the direct impact on the amount of export value that can be done by the country. The next variable is the GDP variable per capita of the importing country. The GDP per capita of the importing country has a sign of a significant positive coefficient at the 5% significance level. This designates that GDP per capita has a positive and significant effect on the value of real exports. When the per capita GDP of the imported country surges, the real export value of the exporting country also enhances. GDP per capita of exporting countries does not significantly affect the value of real exports. This is apparent in the significance level of above 10%, but with the sign of a positive coefficient corresponding to the hypothesis. It can be concluded that the higher GDP per capita of a country in ASEAN, the more encouraged are other countries located

in the same ASEAN region to increase exports to the country. The population variables of exporting and importing countries significantly affect the value of exports and have a positive relationship albeit at different levels of significance. This is reflected in the significance value of the population variable of the exporting country which stands at 5% level with positive sign of coefficient as well as by the significance value of the population variable of the importing country which is at the 10% level with the sign of the negative coefficient. This implies that the greater the population of exporting countries, the higher the export value of the country. Such result is supported by the research conducted by Perez and Wilson (2011) and Hoekman and Nicita in a World Bank study which also shows a significant positive relationship between the total population of the exporting country and the country's export value. Import tariff variables and distance calculated using the economic approach of ASEAN countries do not significantly affect the export due to the relatively few data utilized in the research. The study by Shepherd and Wilson also supports this fact as it generates estimation of import tariff variables, indicator of trade facilities, that is, ports and irregular payments in trading transactions as well as other dummy variables that do not significantly affect trade flows due to the relatively small amount of data used.

Conclusion

Following the results of regression estimation which employ fixed effect method, it can be concluded that technological readiness variable is the most significant trading facility indicator affecting export performance of ASEAN countries. Moreover, the WGI indicator is significant in influencing export performance. WGI is an indicator of business environment as a trading facility that comprises six indicators, namely voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. The next indicators that affect the export performance of ASEAN countries are border and transport efficiency which serve as indicators of time and amount of documents required for trading. These three indicators are those of trade facilities that play a great role

in influencing export performance of ASEAN countries. This argument is supported by the research conducted by Perez and Wilson (2011) which suggest that the above three variables, which serve as indicators of trade facilitation, have a significant effect on the trade flows of export performance. The results of this study also support the policies adopted for ASEAN countries through the ASEAN Trade Facilitation Framework. This framework contains a plan to develop the quality of trade facilities of countries in ASEAN to improve the quality and quantity of trade flows since trade facilities are assessed as drivers of economic development and regional integration and are considered playing an essential role as a form of realization of ASEAN goals of becoming a single and stable market as well as a competitive and economically integrated production base. Moreover, the total population of exporting countries and GDP per capita of export destination countries affect export performance of ASEAN countries. Technology is the most significant indicator of trade facilities affecting export performance. The role of technology is also explained through the Solow growth model which signifies that in the long term, technology or technological progress is a determining factor of economic resilience because technology plays a role in creating effective workers and eventually provides a significant effect on the economy.

In designing trade policy, analysis of the effect of trade facilities on export performance is needed because trade facilities are an important variable in analyzing export performance and a supporting factor in trading. The estimation results reflect the priority scale of efforts to improve the quality of trade facilities. Further, the estimation results demonstrate that technology as an indicator of trade facilities mostly influences export performance, so the policy to improve the quality of technology should be increased which eventually can increase production capacity and will give impact to the economy, particularly export performance. Policies on technology are also explained by Jall who divide technological policies applied by a country into two goals. First, the policy is implemented to address market failures. Second, the policy is implemented for long-term development. Jall also argues that policy to improve the quality of technology is an imperative policy in industrial development. The technological differences of each country will have an impact on the

country's dependence on information and knowledge such as firms, consultants, suppliers of capital goods, and technological institutions. Further, it is also explained that imported technologies indirectly provide the best input to technological developments in developing countries. On the other hand, it has been elaborated that not all technologies that are indirectly imported enhance technological development since it is also related to the availability of technological complement factors.

Furthermore, policies to create a sound business environment must also be made to improve export performance and to improve ease of doing business. This can be analyzed from the policies made on the six indicators of the World Governance Index, one of which relates to government efforts in improving the quality of the private sector. Policies to create time and administrative efficiency in trading should also be the focus of governments of ASEAN countries as this will also determine the export performance of each country. Analysis of the effect of trade facilities on export performance is extremely important in an effort to increase the export of a country, especially that of ASEAN. The analysis can be used to strengthen and create policies related to improving the quality of trade and can be useful in establishing trade facilities that are prioritized for strengthening and enhancement.

Suggestion. Therefore, further research that can be developed from this research is the use of other trading facility indicators that can affect the export performance of a country and can analyze the difference of trade facilities among certain regions.

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5

Impact Analysis of Normalized Revealed Comparative Advantage on ASEAN's Non-Oil and Gas Export Pattern Using a Gravity Model Approach

Umar Fakhrudin, Fithra Faisal Hastiadi, and Banu Muhammad Haidir

Introduction

International trade occurs when two or more countries that trade with each other enjoy advantages. The expected profit is through comparative advantage which comes in the form of increased production efficiency where each country is able to purchase products at a lower price. Conversely, a country is able to sell its products abroad at a relatively higher price (Sarwedi 2010).

Market openness through the establishment of free trade agreements, in theory, is able to provide either advantages or possible losses to the countries involved in the cooperation. The advantage is a more efficient allocation of natural resources in production specialization, which means

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increasing comparative advantage of countries (trade creation). On the contrary, this will further lower comparative advantage with the presence of trade diversion (Widyasanti 2010).

The early establishment of the Association of Southeast Asian Nations (ASEAN) in 1967 had a major agenda to continue to develop economic cooperations, one of which was trade. ASEAN is one of the regional market export destinations that continue to evolve into an increasingly open market, especially for its member countries. ASEAN realizes that the best way to cooperate is by opening up each economy in order to create regional economic integration, followed up by, among others, the establishment of the ASEAN Free Trade Area (AFTA) in 1992.

There are at least four periods in ASEAN milestones: pre-AFTA (pre-1993), post-AFTA pre-Asian Crisis (1993–1998), post-AFTA post-Asian Crisis (1999 to present), and AFTA open trade cooperation with partners outside ASEAN (ASEAN Plus). ASEAN Plus implementation phase began in mid-2005 with the implementation of ACFTA (ASEAN-People's Republic of China Comprehensive Economic Cooperation Agreement). Furthermore, the phase continued with the establishment of the ASEAN Economic Community (AEC) in 2015 and the planned merger of several ASEAN Plus cooperations into Regional Comprehensive Economic Partnership (RCEP) (ASEAN 2011).

According to UNComtrade data (2014), the Standard International Trade Classification (SITC) trade data nomenclature version 2, as presented in Fig. 5.1, recorded a total intra-ASEAN trade in 1967 (when ASEAN only comprised five founding states) of US$1.63 billion or 16.66% of total ASEAN trade to the world which later increased to US$ 26.99 billion or 18.71% of the total ASEAN trade to the world in 1983—one year before Brunei Darussalam joined ASEAN. This means that for a period of 16 years an increase in the average intra-ASEAN trade reaches 20.18% per year with the highest increase in 1979 (45.98%) and a slight decrease (−1.84%) in 1975.

In 1993 when AFTA began to take into effect, the market share of intra-ASEAN trade was still unable to hit 25% until 2012, although the value of intra-ASEAN trade had reached US$584.67 billion. In addition, the increase in trade since the establishment of ASEAN in 1967 until the year 2012 was 14.35% per year. This indicates 12.36% increase per year since AFTA was implemented (1993–2012) or only 11.91% per year

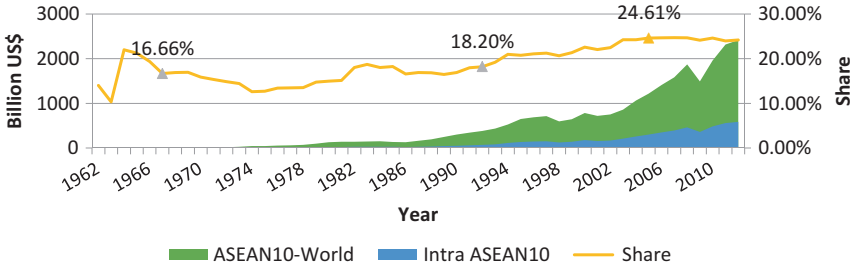

Fig. 5.1 Intra-ASEAN trade, 1962–2012. Source: Authors, from UNComtrade (2014, processed)

since the establishment of ASEAN Plus for the first time (2005–2012). Likewise, the share of intra-ASEAN exports and imports in the period of 1967–2012 jumped from 13.66% to 25.85% (for exports) and from 15.01% to 22.48% (for imports).

In addition, total intra-ASEAN non-oil trade in 1967 as shown in Fig. 5.2 was recorded at US$1.48 billion. This value is equivalent to 16.18% of the total value of non-oil trade of ASEAN to the world. Then, the value climbed to US$14.47 billion, but its share dropped to 14.58% in 1983. In general, ASEAN trade over a period of 16 years since the formation of ASEAN, posts an increase on an average of 15.37% per year. During the period, the highest increase occurred in 1973 (53.56%), while the lowest decline (−7.60%) took place in 1975.

Meanwhile, intra-ASEAN non-oil trade also has not been able to touch 25% until 2012 even though the trade value has reached US$428.75 billion in 2012. This means that the increase in non-oil trade intra-ASEAN in 1967–2012[1] was 14.09% per year. In other words, there is an increase in intra-ASEAN trade by 11.56% per year since AFTA is implemented (1993–2012) or only 9.57% per year since the formation of ASEAN Plus for the first time (2005–2012).

Similarly, the share of intra-ASEAN exports and imports in the period 1967–2012 soared from 20.78% to 23.15% (for exports) and from 12.59% to 20.51% (for imports). Nevertheless, the market share increase

[1] The intra-trade assumption here only reflects trade among ASEAN member states without including trade with members of ASEAN Plus and non-ASEAN (China, Japan, Korea, India, Australia and New Zealand).

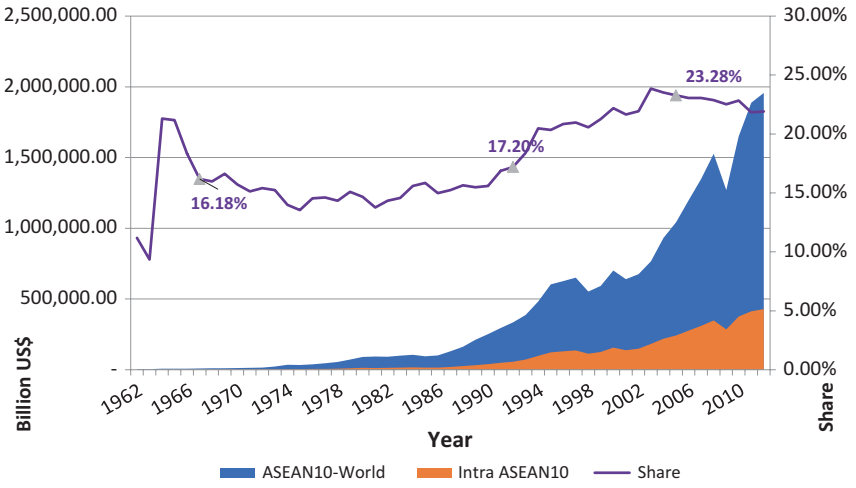

Fig. 5.2 Non-oil and gas Intra-ASEAN trade, 1962–2012. Source: Authors, from UNComtrade (2014, processed)

remained at the range of 25%. The share of intra-ASEAN trade is still relatively small compared to that of intra-European Union trade. The European Union (EU) is a form of economic integration which is considered the most advanced in the world today. The share of intra-EU trade has reached an average in the range of 66%, both for the whole commodity and for non-oil commodities, during the period 2003–2012 (UNComtrade 2014). Lowering intra-regional ASEAN trade is in line with what was mentioned by Elliott and Ikemoto (2004) who argued that the orientation of foreign trade of member countries of ASEAN (both exports and imports) generally still tended to be oriented from and to non-ASEAN nations, such as China, Japan, United States and the countries of Western Europe.

As global challenges upsurge, which result from the impact of the Asian crisis in the late 1990s and the global financial crisis in 2008, as well as from the rapidly growing China and India economies, ASEAN is spurred to further deepen its economic integration. In 2003, the idea of the AEC emerged. AEC has a goal to make ASEAN as a single market and production base, competitive economic region, a region with equitable economic development and integration with the global economy.

AEC covers liberalization and facilitation of trade in goods, trade in services and investments, including protection and promotion of investment; narrowing differences in development; and openness of trained manpower and capital flows (Chia 2013). In addition to the establishment of the AEC, ASEAN has also developed FTA cooperation with several trading partners within ASEAN Plus and plans to merge numerous ASEAN Plus[2] cooperations into RCEP (ASEAN 2011).

As previously discussed, amid deepening economic integration, the share of intra-ASEAN trade stays at the range of 25% although it only covers non-oil exports. The concern is that the ASEAN member countries need to know the extent of non-oil exports pattern in the ASEAN market. In this case, they need to find out commodities that have comparative advantage, especially those having the largest and most significant influence on the pattern of ASEAN's non-oil exports.

The knowledge clearly becomes necessary to avoid ASEAN member countries only being target market when ASEAN actually opens up AEC market within RCEP concept. According to Chia (2013), the spirit of establishment of AEC itself is to make ASEAN a single market and production base, a competitive economic region, and a region with equitable economic development and global economy integration. Coverage of AEC includes liberalization and facilitation of trade in goods, services and investments, together with protection and promotion of investment; narrowing development differences; and openness of trained manpower and capital flows.

With regards to trade patterns[3] (in this case is a pattern of non-oil exports), studies that employ gravity models are already quite abundant, particularly those related to trade flows (Kepaptsoglou et al. 2010).

[2] ASEAN Plus is ASEAN-*People's Republic of China Comprehensive Economic Cooperation Agreement (*ACFTA), implemented in mid-2005; ASEAN-Korea *Comprehensive Economic Cooperation Agreement* (AKFTA), implemented in mid-2007; ASEAN-Japan *Comprehensive Economic Partnership* (AJCEP), implemented in late 2008; ASEAN-India *Comprehensive Economic Cooperation Agreement* (ASEAN-India CECA) and ASEAN-Australia and New Zealand *Free Trade Agreement* (ASEAN-ANZ FTA) which was implemented in early 2010.

[3] Trade pattern is anything that is traded by a country (be it goods or services), with whom, and to which direction (export or import) the trade is conducted. Trade pattern itself is one of the main goals of trade theory, particularly in terms of which goods or services that will be exported or imported by a country (Deardorff 2010).

Nevertheless, studies applying approach of commodities trade pattern remain limited.

Studies related to ASEAN trade flows are, among others, the ones conducted by Elliott and Ikemoto (2004) and Hapsari and Mangunsong (2006). Both studies utilize export pattern approach in viewing trade flows. Both researches have taken into account a variable which is a derivative product of comparative advantage, namely complementarity and similarity indices. Both of these variables are considered able to capture a comparative advantage in terms of differences in endowment factor and to explain product differentiation and inequality in product demand. Yet, the comparative advantage is in aggregate, whilst the difference in either each commodity or each group of commodities cannot be shown by these two variables.

Yue and Hua (2002) in their study which aims to identify the effect of comparative advantage on export patterns do not use the gravity model, but the model of export supply instead. Such research is able to explain that the comparative advantages affect export performance with index variable of revealed comparative advantage (RCA) as an approach. Considering also that RCA has several drawbacks, the authors also refer to Yu et al. (2009) who modify RCA index equation into normalized revealed comparative advantages (NRCA) index which can cover the shortcomings of RCA index.

Therefore, to answer the two questions related to the pattern of non-oil export of ASEAN member countries in the ASEAN market, this study will use gravity model by adding index NRCA as one of the variables. It is then expected that NRCA has impact on the pattern of ASEAN non-oil exports. Moreover, this can be one of the considerations for ASEAN member countries in determining trade policy, particularly in terms of which commodities that need to be focused on to increase non-oil exports.

In general, this study aims to identify the determinants of ASEAN's non-oil exports in the ASEAN market. Furthermore, this study seeks to determine the effect of comparative advantage, that is, NRCA, on the pattern of ASEAN's non-oil exports during the period 1989–2012.

Utilizing panel data analysis, this research finding suggests that comparative advantage has positive effect on non-oil exports and comparative advantage of natural resources-based commodities has the greatest impact.

This chapter consists of section "Conceptual Framework" describing the conceptual framework of comparative advantage and trade patterns through gravity model approach; section "Empirical Research Review" outlining a number of relevant empirical researches; section "Methodology" introducing the model, variables, data and estimation methods in this study; section "Results and Analysis" discussing the results of the estimates; and section "Conclusion".

Conceptual Framework

Comparative Advantage, Pattern Export and NRCA

Comparative advantage or Ricardian model is a classical economic theory which argues that a country to another are interdependent and can mutually benefit each other, and one of which is economic benefit. The two countries can conduct exchange transactions in accordance with their comparative advantage, in this case is the comparison of number of labors used to produce one unit of product (Ricardo 1817; Edward and Schoer 2002). Ricardian models show that countries with a higher comparative advantage in a product will tend to focus its production factors on producing and increasing the amount of production and subsequently exporting to countries that have lower comparative advantage for that product. In opposition, the country will tend to reduce or even not to produce products that have lower comparative advantage and subsequently will import such product from countries that have higher comparative advantage (Appleyard et al. 2006).

In further development, the difference in production endowment factor is considered having an impact on international trade (Hecksher 1919; Ohlin 1933). Based on Heckscher-Ohlin theory, Edward and Schoer (2002) suggest that exports are made by countries with abundant production endowment factor as they have lower opportunity cost compared to other countries. Therefore, differences in production endowment and opportunity cost are the core of comparative advantages, in addition to differences in technological development (Salvatore 2002; Costinot 2009).

In line with the above explanation, it can be said that comparative advantage is considered being able to show export performance pattern. This is consistent with the definition of trade pattern, that is, anything traded by a country (either goods or services), with whom trade transactions are carried out, and to which direction (export or import). Trade pattern itself is one of the main objectives of trade theory, especially in terms of goods or services that will be exported or imported by a country (Deardorff 2010).

Index of revealed comparative advantage (RCA) or Balassa revealed comparative advantage (BRCA) is one tool to measure the level of comparative advantage in empirical studies (Balassa 1965). Although useful in examining whether a country has a comparative advantage in specific products, it has some limitations (Hillman 1980; Bowen 1983, 1985, 1986; Ballance et al. 1985, 1986; Deardorff 1994; Hoen and Oosterhaven 2006). Most researches apply BRCA index only to identify the relative ranking of the comparative advantages of a country for different commodities even though generally it remains problematic in its relative order (Yeats 1985).

Some RCA alternatives have been developed to overcome the weaknesses of BRCA, among others, BRCA log (Vollrath 1991), symmetrical revealed comparative advantage (SRCA) (Laursen 1998), weighted revealed comparative advantage (WRA) (Proudman and Redding 1998), additive revealed comparative advantage (ARCA) (Hoen and Oosterhaven 2006). Although the indices develop some aspects of BRCA, but none of those indices could be the one that can be generally applied to comparison between spaces (either commodities, state or region) and time.

To answer the problem of BRCA limitations and some of the alternative RCA indices, Yu et al. (2009) have developed BRCA index into an NRCA. NRCA possesses attributes that can indicate the rank and comparable in comparative advantage across commodities, countries and time spans and it is expected to show a country's trade pattern, thereby enabling identification of the types of commodities that have good potential in a market and at a specific time. NRCA index value for each commodity from each country as a whole is zero or neutral. This is in line with the assumption that no country has a comparative advantage for all commodities.

The NRCA equation is as follows:

$$\mathrm{NRCA}_k^i = \frac{\Delta X_{ik}}{X} = \frac{X_{ik}}{X} - \frac{X_k X_i}{XX} \tag{5.1}$$

where,

NRCA_k^i is the difference in the comparative advantages of country i for product k in a specific market;
X_{ik} is commodity export k of country i to a specific market;
X_i is the total exports of country i to a specific market;
X_k is the world's commodity exports k to certain markets; and
X is the world export to a specific market.

NRCA value span ranges from neutral value (0) is $-0.25 <$NRCA < 0 and $0 <$NRCA < 0.25. This signifies that a commodity has actual export value lower than the comparative advantage in its neutral value if the NRCA value is smaller than 0. On the contrary, a commodity has actual export value greater than the comparative advantage in its neutral value if the NRCA value is smaller than 0.

The symmetrical range of values causes the total number of NRCA for all commodities of a country or trading market to become zero or neutral. Consequently, in a country or market, if one of the commodities from a country experiences increase in comparative advantage, the same commodity from other countries will experience a decline in comparative advantage.

NRCA can be used to determine the level of specialization of a country. In this condition, NRCA can be used to look for the comparative advantage among commodities in a country using the following equation:

$$\Delta\mathrm{NRCA}_{kl}^i = \frac{\Delta X_{ik}}{X} - \frac{\Delta X_{il}}{X} = \left[\left(\frac{X_{ik}}{X} - \frac{X_k X_i}{X * X}\right) - \left(\frac{X_{il}}{X} - \frac{X_l X_i}{X * X}\right)\right] \tag{5.2}$$

where,

$\Delta \text{NRCA}_{kl}^{i}$ is the difference in the comparative advantages of commodity k with commodity l in country i;
X_{ik} is a commodity export k of country i to a specific market;
X_{il} is a commodity export l of country i to a specific market;
X_i is total exports of country i;
X_k is commodity export k of country i;
X_l is commodity export l of country i; and
X is world's exports to a specific market.

When comparing comparative advantage of commodity with partner countries within a particular market, be it country, regional or global, the NRCA equation becomes

$$\Delta \text{NRCA}_{k}^{i-j} = \frac{\Delta X_{ik}}{X} - \frac{\Delta X_{jk}}{X} = \left[\left(\frac{X_{ik}}{X} - \frac{X_k X_i}{X * X} \right) - \left(\frac{X_{jk}}{X} - \frac{X_k X_j}{X * X} \right) \right] \quad (5.3)$$

where,

$\Delta \text{NRCA}_{k}^{i-j}$ is the difference in the comparative advantages of commodity in country i with commodity j for product k in a specific market;
X_{ik} is a commodity export k of country i to a specific market;
X_{jk} is a commodity export k of country j to a specific market;
X_i is total exports of country i to a specific market;
X_j is total exports of country j to a specific market;
X_k is a world's commodity export k to a specific market; and
X is world's exports to a specific market.

In the interim, the equation of comparative advantage comparison of commodity in time range changes becomes:

$$\begin{aligned} \Delta \text{NRCA}_{k,t+1}^{i} &= \frac{\Delta X_{ik,t+1}}{X_{t+1}} - \frac{\Delta X_{ik,t}}{X_t} \\ &= \left[\left(\frac{X_{ik,t+1}}{X_{t+1}} - \frac{X_{k,t+1} X_{i,t+1}}{X_{t+1} * X_{t+1}} \right) - \left(\frac{X_{ik,t}}{X_t} - \frac{X_{k,t} X_{i,t}}{X_t * X_t} \right) \right] \end{aligned} \quad (5.4)$$

where,

$\Delta NRCA^{i}_{k,t+1}$ is the difference in the comparative advantages of commodity in country i for commodity k between a time range of $t + 1$ and t;
$X_{ik,\,t+1}$ is a commodity export k of country i at time $t + 1$;
$X_{ik,\,t}$ is a commodity export k of country i at time t;
$X_{i,\,t+1}$ is total exports of country i at time $t + 1$;
$X_{i,\,t}$ is total exports of country i at time t;
$X_{k,\,t+1}$ is world's commodity export k at time $t + 1$;
$X_{k,\,t}$ is world's commodity export k at time t;
X_{t+1} is world's exports at time $t + 1$; and
X_t is world's exports at time t.

According to Yu et al. (2009), NRCA is considered consistent in measuring the comparative advantage that is symmetrical, additive for the range of countries and commodities, and comparable across countries, commodities and time. Therefore, NRCA can be used in time-series analysis as well as in comparative analysis of comparative advantage among countries with panel data analysis.

Gravity Model in International Trade

The use of the gravity model approach in international trade flows is developed separately by Tinbergen (1962) and later Pöyhönen (1963). Linnemann (1966) adds the variable and moves further by establishing a theoretical justification in the form of Walrasian general equilibrium system.

Although initially there was no theoretical support for gravity model, since the late 1970s, there were numerous developments that had filled this gap. Anderson (1979) conducted the first formal attempt to derive the equation of gravity based on Cobb-Douglas expenditure system, assuming identical homothetic preferences between regions and products were differentiated by region of origin. Bergstrand (1985, 1989) also explored the theoretical support of bilateral trade in some papers, where the gravitational equation was associated with the model of monopolistic

competition and product differentiation (not intercountry-based). Helpman (1987) used the framework of product differentiation with increasing returns to scale (IRS) to justify the gravity model.

Deardorff (1995) derived the gravitational equation from two extreme cases based on Heckscher-Ohlin (H-O) model. The first case is in the form of free trade with homogeneous products where both producers and consumers do not differ in choosing one of the many trading partners. The second case is where the country produces different goods and each has different Cobb-Douglas or constant elasticity of substitution (CES) preference. Deardorff drew the conclusion that the gravity model was consistent with the existing trading model. Eaton and Kortum (1997) as cited by Rahman (2003) derived the gravity equation in a Ricardian framework. Evenett and Keller (1998) argued that the gravitational equations could be derived from the H-O model with both perfect and imperfect product specialization conditions.

In the past ten years, development of gravity model indicates that out of 75 studies using this model, most are related to the impact of FTA trade policy, particularly regional FTA, the rest is related to the flow of trade in general (Kepaptsoglou et al. 2010). Similarly, in the new determinant in international trade, there are several variables that have good potential to explain the gravity model of trade, namely the level of development, trade policy, affinity of language and colony, geography, relative population density, common currency, and membership in a regional trade agreement (Yamarik and Ghosh 2006).

Empirical Research Review

Empirical studies using gravity model in terms of economic integration (FTA) against flows and trade patterns have been commonly conducted until the last decade. The use of gravity model is empirical model other than the computational general equilibrium (CGE) model. With regards to the use of gravity model in examining the pattern of trade in ASEAN, Elliott and Ikemoto (2004) as well as Hapsari and Mangunsong (2006) both apply the augmented gravity model to investigate the determinants of trade flows among AFTA member states. Both studies identify the

influence of AFTA formation on intra-regional and extra-regional trades by comparing the trade patterns among countries involved in AFTA scheme and non-AFTA countries.

Gravity model on both studies utilize some basic variables by adding some other control variables. These basic variables have some connections with trade, consistent with the results of empirical studies with other gravity model. In their studies this time, Elliott and Ikemoto (2004) as well as Hapsari and Mangunsong (2006) add two variables, namely Complementarity Index (COM) and Similarity Index (SIM). COM and SIM are added into the model because though differences in economic level are able to describe the differences in endowment factor, the variable is explicitly unable to explain product differentiation and demand inequality (Deardorff 1984 in Elliott and Ikemoto 2004).

Ng and Yeats (2003) suggest that COM can separate the effect of the commodity composition from other factors that encourage trade flows. Besides, it represents the alignment between export and import structures in a bilateral trade with the assumption that traded commodity reflects innate ability factor. It is also said that complementarity is one of the products of comparative advantage if assuming that the pattern of export and import describes resource endowment and demonstrates the existence of economic resources and which production structure that complements (Drysdale 1967). At the interim, SIM, according to Ng and Yeats (2003) provides information on whether the export structure of trading between two countries has a common key export product or not. One of the shortcomings of COM and SIM is its more aggregate nature. In this regard, both indices cannot capture the comparative advantage which later can portray the difference in endowment factor from different commodities, both within a country or in its comparison with other countries.

In their study, Elliott and Ikemoto (2004) have a specific purpose, in addition to those described above, to determine whether an increase occurs in trade between AFTA members (intra-trade) or in trade with partners outside AFTA. Thus, the effect of increased trade will be utilized as much by members of AFTA. Furthermore, it will become part of trade policy-making and negotiations.

Specification of estimates made in this study is by making a comparison between the time before AFTA and the time afterwards. The division of the period for comparison purposes comprises time periods of 1982–1987, 1983–1987, 1988–1992, 1993–1997 and 1998–1999 as well as a summary of two periods, 1983–1997 and 1993–1999. Moreover, the estimations are conducted three times, namely (1) using a single intra-regional bias dummy Regional Trade Agreement (RTA) to determine the pattern of bilateral trade with comparable RTA other than ASEAN; (2) using two intra- and extra-regional bias to identify trade creation and trade diversion; and (3) is similar to stage (1), but is only intended for ASEAN.

In the meantime, Hapsari and Mangunsong (2006) employ data of 1988–2003 and in the model (which is almost similar to that of Elliott and Ikemoto) they utilize price as an additional control variable. Next, estimation is conducted in three stages using ordinary least square (pooled data), namely (1) estimating standard gravity model equation (economic size and distance variables) which is added with tariff and geographical dummy variables; (2) estimating the same model as step (1) and adding tariff, dummy RTA (ASEAN), trade creation, and trade diversion variables; and (3) estimating the same model as step (2) by adding a variable index of complementarity and similarity.

The results obtained from these two studies are slightly different, yet they give complementary explanation. In general, AFTA affects increase in trade among ASEAN member countries and it also causes slight reduction of welfare for non-ASEAN countries, due to the diversion of trade to ASEAN countries (Hapsari and Mangunsong 2006).

According to Elliott and Ikemoto (2004), based on the range of AFTA implementation period in the first five-year period, there is no significant improvement in trade flows in ASEAN, due to the limitations of institutional progress of each ASEAN government. Moreover, this is attributable to the effects of enlargement of share of non-ASEAN exporters, such as China and Latin American countries. The Asian crisis in the late 1990s actually spurred the increase in trade among ASEAN member countries and after the crisis passed, trade situation returned to become more outward looking.

The research related to the use of comparative advantage, in this case the RCA index, as a determinant of exports or export performance pattern was conducted by Yue and Hua (2002). This study aims to determine whether comparative advantage, which is identified through the RCA index, affects the development of China's exports. Estimations are made by two-stage least square (2SLS) regression to find out the export determinant from both the demand and supply sides as well as panel data regression to examine the relationship of comparative advantage with export performance.

The assumption used in this study is China as a price taker. The comparative advantage index used is RCA for chemical products (RCA5), raw materials RCA, and finished goods manufacturing industry (RCA 68), and machinery and transportation equipment RCA (RCA7). The data used cover the period 1980–2000 for export data, in accordance with SITC 1-digit level, that is SITC 0–8 and SITC level 3. The results and conclusions of the study signify that RCA index is able to explain the pattern of China's export growth evolving in accordance to their comparative advantage.

Hypothesis

As presented in the previous section, this study aims to find out the determinant of non-oil exports of ASEAN countries, especially to identify the effect of comparative advantage on the pattern of non-oil exports of the ASEAN member states.

The hypothesis to be tested in this study is that the greater the difference between the comparative advantage of one of the member countries of ASEAN with its trading partner country in the ASEAN market (ΔNRCA), the bigger the non-oil exports. Comparative advantage will have a significant positive relationship with non-oil exports. As for this study, the comparative advantage used is based on commodity groups. It is then expected that the size of influence of comparative advantage of each commodity on non-oil exports from ASEAN member countries is obtained.

Methodology

This study refers to and modifies the model used by Elliott and Ikemoto (2004) and Hapsari and Mangunsong (2006) which modifies augmented gravity model from basic model variations of Tinbergen (1962) and Pöyhönen (1963). Additionally, this research model also refers to Yue and Hua (2002) and Yu et al. (2009). Therefore, the modification in this study to the models used in the two previous studies mentioned above is replacing the complementarity index variable with NRCA variable index, which can present the export pattern based on of comparative advantage comparison from commodity groups. The equation model in this study is

$$\log\left(X_{ijt}\right) = \alpha_0 + \alpha_1 \log\left(\mathrm{PGDP}_{it}\right) + \alpha_2 \log\left(PGDP_{jt}\right) + \alpha_3 \log\left(POP_{it}\right) + \alpha_4 \log\left(POP_{jt}\right) + \alpha_5 \log TC_{ijt} + \alpha_6 \mathrm{AFTA}_{jt} + \alpha_7 \mathrm{ASEANPLUS}_{jt} + \alpha_8 \mathrm{CRISIS}_{t} + \sum \alpha_{9k} \Delta \mathrm{NRCA}_{kt}^{i-j} + \mu_{ijt} + \varepsilon_{ijt} \quad (5.5)$$

where each variable can be described as follows:

1. X_{ijt} is a non-oil exports from country *i* to country *j* at time *t*. Exports are dependent variable as an approach to trade among ASEAN member countries as well as between an ASEAN member country and a non-ASEAN country. Numerous independent variables are used as determinant of those exports. Use of exports as dependent variable is initial variable from gravity models (Tinbergen 1962 and Pöyhönen 1963).
2. PGDP_{it} and PGDP_{jt} is the gross domestic product (GDP) per capita of exporter (*i*) and importer (*j*). This variable is used as an indication of purchasing power of both exporter and importer. Besides, GDP per capita is a proxy of capital endowment ratio (Bergstrand 1985; Sohn 2005). The GDP per capita is also considered a proxy to determine the influence endowment factor on fragmentation (Kimura et al. 2007) as well as the proxy of infrastructure endowment and the skills of the workforce in the trading country (Türkcan 2011). GDP per capita is also an approach to economic development level that has positive impact on international trade (Frankel and Rose 2000; Elliott and Ikemoto 2004).

3. POP_i and POP_{jt} are population of the exporter country *i*, and population of the trading partner's country (importer) *j*, respectively. The population itself can be used as a proxy for the magnitude of demand or market. Population can also signify presence of import substitution effect where domestic production receives incentives on the expanding market. It also shows the effect of absorption where, despite rising population and increasing production, the produced goods are more absorbed in the domestic market than for export (Razzaghi et al. 2012). On the other hand, population can depict the economic direction of a country. If the direction is outward-oriented, the import demand will increase with the increase in population. Conversely, if the orientation direction is inward-oriented, the demand for imports declines along with the increase of population (Tayyebi 2005).
4. TC[4] is the index of the cost of transportation from country *i* to country *j*, where there is the assumption that the amount of bilateral trade increases with the size of their economies and decreases with increasing transportation costs due to differences in distance (Tinbergen 1962; Pöyhönen 1963). Index *Trade Cost* is the trading cost which is calculated using inverse gravity framework based on a research by Novy (2009). TC is an estimate of the cost of trading based on the cost of bilateral trade and gross national output.
5. The dummy variables in this research model are AFTA, ASEANPLUS and CRISIS. AFTA is worth 1 if the importer is a country belonging to AFTA, while 0 if the importer is a non-AFTA. ASEANPLUS is worth 1 if the importer is a country that joins in the scheme of ASEAN Plus, while 0 if the importer is a non-ASEAN Plus country. In the interim, CRISIS is intended to show the time of the economic crisis. Dummy CRISIS' value is 1 if the economy is in crisis, that is the Asian crisis in 1997–1999 and the global financial crisis in 2007–2009, and is valued 0 if there is no crisis.

[4] The trade cost data are available from ESCAP only for the period 1992–2011. Therefore, this study requires data period 1989–2012 and the available data are processed with extrapolation so that the appropriate data are obtained.

6. $\Delta NRCA_{kt}^{i-j}$ is a variable used to reflect the different comparative advantages of a country commodity *i* with its trading partner (*j*) in the ASEAN market. $\Delta NRCA_{kt}^{i-j}$ is calculated based on Eq. (5.3). Given the relatively small ΔNRCA value, ΔNRCA is multiplied by 100. In line with the findings by Yue and Hua (2002) that comparative advantage is considered capable of showing patterns of exports, it is expected that the higher the $\Delta NRCA_{kt}^{i-j}$, the greater the impact on the amount of exports from *i* to *j*.

Sources of data used in the study are in accordance with the variables in the empirical model described in Table 5.1.

The trade data used in the calculation of NRCA is based on the data of three-digit SITC version 3 (SITC3) which are then grouped according to UNCTAD (2013a, b). This is a grouping of commodities based on the origin of the raw material and the level of technology and skills of the workforce of an industry. The use of SITC data at three-digit level is because at this level the characters of commodities by technology similarity and production factors can be seen (Greenaway and Milner 1986; Menon 1996). The commodity grouping in this research can be seen in Table 5.2.

As for the purpose of analysis, the researchers create three alternative combinations of commodities grouping by commodity group codes, namely:

- Combination I: **1A, 2, 3, 4** and **5**
- Combination II: **2, 3, 41A** and **5**; and
- Combination III: **2, 3A, 3B, 3C1, 3C2, 3C3, 3D1, 3D2, 3D3, 41A** and **5**.

Combination I and II are similar to one another. Combination II integrates Coal and Derivatives (Code 1A) with Mining Goods (Code 4) into Mining Goods including Coal and Derivatives (Code 41A). Combination III are similar to combination II but the commodities in combination III are disaggregated into numerous groups of industry or manufacturing commodities based on the different skill levels of the workforce and technology.

Table 5.1 Variables, descriptions and sources of data

Variables	Descriptions	Relationship	Sources
$\text{Log}(X_{ijt})$	Log of bilateral trade between countries *i* and country *j* in year *t*, in million US$ according to SITC classification version 3		UNComtrade 2014, accessed through WITS
$\text{Log}(\text{PGDP}_{it})$	Log of constant GDP per capita in 2005 of country *i* in year *t*, GDP is in US$	+	WDI, World Bank 2014
$\text{Log}(\text{PGDP}_{jt})$	Log of constant GDP per capita in 2005 of country *j* in year *t*, GDP is in US$	+	WDI, World Bank 2014
$\text{Log}(\text{POP}_{it})$	Log of POP of country *i* in year *t*	–	WDI, World Bank 2014
$\text{Log}(\text{POP}_{jt})$	Log of POP of country *j* in year *t*	+	WDI, World Bank 2014
$Log(\text{TC}_{ijt})$	Trade cost index of country *i* and country *j* in year *t*	–	ESCAP, World Bank 2014
AFTA_{ijt}	Cooperation dummy of AFTA in year *t*	+/–	
ASEANPLUS_{ijt}	Cooperation dummy ASEAN PLUS in year *t*	+/–	
CRISIS_{ijt}	Economic crisis dummy	+/–	
$\Delta\text{NRCA}_{kt}^{i-j}$	Comparison between comparative advantage of country *i* and country *j* for commodity *k* in year *t*	+	Own calculations based on UN Comtrade data

Descriptive analysis of the calculation results of NRCA will be addressed using combination III coupled with other energy commodities (1B, 1C and 1D). The descriptive analysis not only focuses on non-oil commodities alone, but will be more thorough. NRCA calculation is based on Eq. (5.1). In addition, to identify changes in comparative advantage over time, the following periods are used: 1989 (the period prior to AFTA), 1996 (the period after AFTA and before the 1998 crisis), 2004 (after the Asian crisis, before the establishment of the ASEAN Plus, and before the global financial crisis) and 2012 (after the establishment of the ASEAN Plus and post-global financial crisis).

In the meantime, the gravity model estimation is carried out in five scenarios, namely: (1) the estimates specification **[1]** of basic gravity

Table 5.2 Grouping of SITC3 commodities at Level 3 digit based on production factors and level of technology

Commodity group code	Description
1. Energy commodity	
1A	Coal and coal-based products (except gas)
1B	Petroleum and petroleum-based products (except gas) including lubricants and asphalt (tar)
1C	Gas, including liquefied natural gas, gas from oil and coal
1D	Electric power
2. Agricultural commodities	
2	Agriculture, animal husbandry, plantation and other agricultural products
3. Industrial/Manufacturing products commodities	
3A	Labor-intensive and resource-intensive manufacture products
3B	Low-skill and technology-intensive manufacture products
3C1	Electronics including medium-skill and technology-intensive manufacture Products
3C2	Parts of electronic and electrical products that include medium-skill and technology-intensive manufacture products
3C3	Non-electronic and non-electrical products that include medium-skill and technology-intensive manufacture products
3D1	Electronics that include high-skill and technology-intensive manufacture products
3D2	Parts of electronic and electrical products that include high-skill and technology-intensive manufacture products
3D3	Non-electronic and non-electrical products that include high-skill and technology-intensive manufacture products
4. Mining commodities	
4	Minerals (other than coal), metals, and other minerals
5. Other commodities	
5	Other commodities *(unspecified)*

Source: Authors, from UNCTAD (2013a, b)

model; (2) model specification **[2]** of basic gravity model estimation is added with dummy AFTA, ASEANPLUS and CRISIS; (3) model specification **[3]** shows the gravity model **[2]** which is added with $\Delta \mathbf{NRCA}_k^{i-j}$ variables for commodities that are based on combination I; (4) specifica-

tion [4] is the gravity model with specification similar to specification [3], but using ΔNRCA variables of commodities based on combination I; and (5) model specification [5] is gravity model specification that is similar to specification [4], but with ΔNRCA that is based on combination III.

Results and Analysis

Comparative Advantage of ASEAN Trade Commodities in ASEAN Market Based on NRCA

General overview of the average change of NRCA ASEAN as a single state entity in the ASEAN market during the period 1989–2012 is illustrated in Fig. 5.3. The average NRCA value is the average of the NRCA commodities that have NRCA value above zero. Figure 5.3 illustrates that the trend of comparative advantage average change of ASEAN tends to

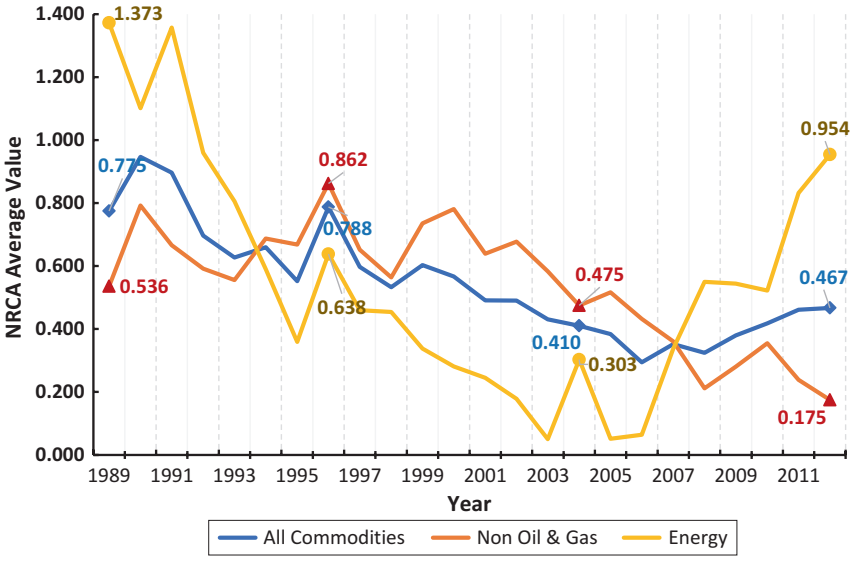

Fig. 5.3 The average change of ASEAN's NRCA in ASEAN market, 1989–2012. Source: Author's own calculation

fall by 3.73% during 1989–2012. NRCA average value of all commodities, namely energy commodities other than coal (consisting of oil and gas and electricity) and non-oil commodities was 0.775 in 1989 and then climbed to 0.788 in 1996. However, the NRCA average increase contracted to 0.410 in 2004 then slightly jumped to 0.467 in 2012. Of these changes, it appears that in the period before the Asian economic crisis in 1997, the comparative advantage of ASEAN in ASEAN market was twice as much as that of post-crisis.

For the meantime, the trend of ASEAN's average non-oil commodity comparative advantage indicates a sharper decline (−4.69%) when compared to that of the entire commodities (−3.73%) during 1989–2012. The decline in ASEAN's non-oil commodity comparative advantage is the result from changes in the pattern that occurred before the global financial crisis. The changes are mainly in the increase in comparative advantage of energy commodities which indicated an annual increase of 20.03% over the period 2007–2012. The rise of energy commodities' advantage is able to slightly drive increase in comparative advantage of all commodities, but also compensates in a form of pressure to the decline in non-oil commodities' advantage. This also indicates that intra-ASEAN trade in over the last decade is more focused on energy commodities, especially oil and gas.

To find out how much NRCA value and ranking of each commodity traded by ASEAN countries as a single entity in the regional market in a given year, refer to Table 5.3. This table describes that, in general, in the ASEAN market, petroleum commodities and their processed products (1B) have the highest comparative advantage compared to that of other energy commodities (gas (1C) and electric power (1D)) and of non-oil commodities. The calculations indicate that petroleum and its products always rank first or second. When explored further, it is found that ASEAN member that has the highest comparative advantage for petroleum and its products in the ASEAN market is Singapore. The comparative advantages of Singapore petroleum also become a major contributor to the high NRCA value for ASEAN petroleum. This finding becomes evidence that a country which possesses natural resources does not always have the advantage in the natural resources products, while a non-producing country can actually become a central and control the

commodity trade. Additionally, logistics readiness and adequate trade services are the driving factors that boost the comparative advantage. Singapore in this case took fifth position in global Logistics Performance Index (LPI 2014) and ranked first in ease of doing business (Doing Business 2014).

ASEAN commodities including non-oil show diverse changes in their comparative advantage. Commodities that belong to the low-skill and technology-intensive manufacture products (3B), non-electronic and electrical products which belong to medium-skill and technology-intensive manufacture products (3C3), non-electronic and electrical products which are classified as high-skill and technology-intensive manufacture products (3D3), minerals (including coal), metals, other minerals (41A), as well as other commodities (unspecified) (5) are one of five groups of commodities that experience discomparative advantage, where NRCA value during the period 1989–2012 is relatively always below zero.

On the side of the competitor, 3C3 commodities from Japan have the highest comparative advantage and are always ranked first in the ASEAN market during the period 1989–2012, although the level of excellence in 2012 dropped to half compared to that of 1989. The fall of Japan's 3C3 commodity advantage is attributable to, among others, the increasing advantage of European Union's 3C3. Meanwhile, China has begun to emerge as a new competitor of 3C3 commodities with comparative advantage in the ASEAN market since 2011. The emergence of China as an exporter which has a relatively high comparative advantage for electronic products with medium-level technology is one of the factors that cause the increasingly fragmented electronics industry in the country. This is evident from the increasing number of such products as laptops and mobile phones which are manufactured and marketed from China to ASEAN. Meanwhile, the European Union and the United States remain 3D3 commodity exporters with the highest comparative advantage over the period 1989–2012.

The ASEAN commodities which are labor-intensive and resource-intensive manufacture products (3A) showed superiority in the ASEAN market in the late 1980s to the early 1990s, but the trend continued to decline so that in the period 1995–1996 it turned into discomparative advantage products and remained that way until 2012. The condition

Table 5.3 NRCA results and ranking of entire ASEAN commodities in ASEAN market

Commodity group code	1989			1996			2004			2012		
	NRCA	PAKDSN[a]	PAKAN[b]	NRCA	PAKDSN	PAKAN	NRCA	PAKDSN	PAKAN	NRCA	PAKDSN	PAKAN
1B	2.696	1	2	1.172	2	5	0.803	2	8	2.424	1	2
1C	0.049	6	38	0.105	6	33	0.098	6	32	0.437	3	19
1D	0.000	8	47	0.000	7	49	0.008	8	47	0.001	8	43
2	1.891	2	4	0.401	4	13	0.152	5	28	0.026	7	40
3A	0.613	3	11	−0.123	10	106	−0.491	11	128	−0.784	12	133
3B	−1.000	12	134	−0.754	12	134	−0.717	13	134	−1.083	14	136
3C1	−0.032	10	84	−0.021	8	79	0.025	7	44	0.031	6	38
3C2	−0.029	9	83	0.202	5	20	0.289	3	18	0.101	5	30
3C3	−2.853	14	140	−2.200	14	140	−0.892	14	137	−0.880	13	135
3D1	0.045	7	39	0.946	3	6	0.264	4	20	0.207	4	24
3D2	0.078	4	31	1.900	1	2	1.644	1	3	0.509	2	17
3D3	−1.342	13	138	−1.164	13	137	−0.556	12	132	−0.475	11	131
41A	0.052	5	37	−0.389	11	125	−0.340	10	122	−0.159	9	101
5	−0.167	11	109	−0.074	9	101	−0.287	9	120	−0.356	10	119
Average NRCA values of commodities with NRCA >0	**0.775**			**0.788**			**0.410**			**0.467**		

(*continued*)

Table 5.3 (continued)

Commodity group code	1989			1996			2004			2012		
	NRCA	PAKDSN[a]	PAKAN[b]	NRCA	PAKDSN	PAKAN	NRCA	PAKDSN	PAKAN	NRCA	PAKDSN	PAKAN
Average NRCA values of non-oil and gas commodities with NRCA >0	**0.536**			**0.862**			**0.475**			**0.175**		
Average NRCA values of oil and gas commodities including electrical power with NRCA >0	**1.373**			**0.638**			**0.303**			**0.954**		

[a]PAKDSN: Inter-commodity Ranking in a Country
[b]PAKAN: Inter-commodity Ranking among Countries

was made possible because of the growth of the advantages of the electronic commodities that belong to medium-skill and technology-intensive manufacture products (3C1) as well as spare parts and parts of electronic and electrical goods which belong to medium-skill and technology-intensive manufacture products (3C2).

Similarly, agricultural, livestock, plantations and other agricultural commodities (2), even though they are in the advanced category (NRCA> 0) during the years 1989–2012, they indicate a decreasing pattern of comparative advantage and lean toward discomparative advantage. This is probably due to the lack of intra-ASEAN trade for this commodity. This is evidenced by the increasing NRCA value of commodities 2 from Australia, India and the United States.

For the meantime, the electronic commodities belonging to high-skill and technology-intensive manufacture products (3D1) as well as spare parts and parts of electronic and electrical goods belonging to high-skill and technology-intensive manufacture products (3D2) apparently need to become product focus of ASEAN considering that two commodity groups demonstrate a sufficiently good comparative advantage. The main competitor of commodities 3D1 in the ASEAN market is China. The potential to take over the Chinese market gap is also quite large provided that ASEAN market's exporters for 3D1 which has the relative advantage are only China and ASEAN countries. As for commodities 3D2 in the ASEAN market, the comparative advantages of ASEAN outpace other competitors such as Korea and China.

Gravity Model Estimate with Additional Dummy and ΔNRCA

In this study, the estimated gravity model employs fixed-effect model (FEM) to estimate panel data. The method is chosen because it is considered being able to overcome the multilateral trade resistance (MTR) with proxy. It is acceptable in theory through country-specific fixed-effect MTR, which is the concept that the bilateral trade between the partner countries is influenced not only by partner countries but also by their

interaction with other countries in the global region (Adam and Cobham 2007; Feenstra 2004; Mélitz 2007; Rose and van Wincoop 2001).

The FEM estimation results with numerous ΔNRCA indices are based on three combinations previously described in the methodology section in Table 5.4. There are five scenarios of estimated gravity model. Scenario [1] exhibits the estimation results from basic gravity model and signifies that all the basic variables of the gravity model has high significance and shows sign of an appropriate relationship with the existing theory. The specification estimation results of scenario [2] is to add the basic gravity model with trading partner membership in AFTA and ASEAN Plus dummy as well as CRISIS dummy.

The estimation results of model scenario [3] reveal the results of the gravity model estimation by incorporating $\Delta\,\Delta\mathbf{NRCA}_k^{i-j}$, variables, where there is ΔNRCA between the exporter's NRCA and importer's NRCA for Combination A. Scenario [4] unveils the results of gravity model estimation with similar specifications to scenario [3] using ΔNRCA variable commodity based on combination B. Next, scenario [5] is based on combination C. Therefore, the main purpose of Table 5.4 is to demonstrate the robustness test of variable group test in the model and the basis for selecting which specification model that will become the research focus.

Based on Table 5.4, it can also be concluded that the AFTA and ASEANPLUS variables are dummy that need to be included in the model. This is reflected in the level of significance of both variables (see scenarios [2], [3], [4] and [5] in Table 5.4). In addition, if the dummy is not included as a variable in the model, it would reduce the significance of the other variables, especially ΔNRCA, the main variable in this study. Similarly with CRISIS variable, although it is not a significant variable, it affects the significance of the other variables if they are omitted from the model. Related to the significance of the variables in the model, CRISIS variable will not be discussed further.

The model that becomes the focus of research is the model [4] while model [5] is a further modification to model [4] as an additional discussion that tries to look deeper at how big the influence of ΔNRCA of manufacturing commodity groups that are disaggregated according to differences in levels of labor skills and technology.

Table 5.4 FEM estimates in different scenarios

Regressand	Model specifications				
$Log(X_{ij})$	[1]	[2]	[3]	[4]	[5]
C	–7.3532*** (2.350912)	–9.101739*** (2.398969)	–10.81938*** (2.489238)	–6.210795*** (2.455375)	–13.39251*** (2.714252)
$Log(PGDP_{it})$	1.914438*** (0.06286)	1.891433*** (0.064094)	1.750732*** (0.082768)	1.993184*** (0.07588)	1.856974*** (0.092573)
$Log(PGDP_{jt})$	1.273707*** (0.042106)	1.224691*** (0.042942)	1.255565*** (0.048675)	1.214314*** (0.048635)	1.146371*** (0.056535)
$Log(POP_{it})$	–0.443149*** (0.113862)	–0.502671*** (0.114341)	–0.354787*** (0.114015)	–0.477653*** (0.114419)	–0.394052*** (0.128541)
$Log(POP_{jt})$	0.438797*** (0.141069)	0.641821*** (0.141866)	0.641756*** (0.146203)	0.419105*** (0.146196)	0.819746*** (0.162279)
$Log(TC_{ijt})$	–1.223267*** (0.059217)	–1.285705*** (0.060284)	–1.268065*** (0.059653)	–1.278837*** (0.060258)	–1.244777*** (0.062055)
$AFTA_{jt}$		–0.148625*** (0.03541)	–0.159802*** (0.034756)	–0.182333*** (0.03547)	–0.168761*** (0.036219)
$ASEANPLUS_{jt}$		0.072423*** (0.019036)	0.09481*** (0.020133)	0.08853*** (0.020555)	0.093463*** (0.022418)
$CRISIS_{jt}$		0.02056 (0.012783)	0.007544 (0.012523)	0.012648 (0.012815)	–0.05609 (0.013405)
$\Delta NRCA_{1At}^{i-j}$			0.892188*** (0.12822)		
$\Delta NRCA_{2t}^{i-j}$			0.054658 (0.038332)	0.109195*** (0.038584)	0.186367*** (0.045076)
$\Delta NRCA_{3t}^{i-j}$			0.066943*** (0.011501)	0.058419*** (0.011592)	
$\Delta NRCA_{3At}^{i-j}$					–0.031382 (0.02876)

(*continued*)

Table 5.4 (continued)

$\Delta NRCA_{3Bt}^{i-j}$					0.080431** (0.034523)
$\Delta NRCA_{3C1t}^{i-j}$					0.422641 (0.464218)
$\Delta NRCA_{3C2t}^{i-j}$					0.157684 (0.106042)
$\Delta NRCA_{3C3t}^{i-j}$					0.105891*** (0.019969)
$\Delta NRCA_{3D1t}^{i-j}$					0.072898* (0.040335)
$\Delta NRCA_{3D2t}^{i-j}$					0.03534** (0.01593)
$\Delta NRCA_{3D3t}^{i-j}$					–0.00816 (0.025617)
$\Delta NRCA_{4t}^{i-j}$			0.066397** (0.033602)		
$\Delta NRCA_{41At}^{i-j}$				0.135475*** (0.031982)	0.176966*** (0.033784)
$\Delta NRCA_{5t}^{i-j}$			0.140072*** (0.034849)	0.085459*** (0.033767)	0.129712*** (0.036458)
R-squared	0.981038	0.981642	0.983054	0.982303	0.983236
Adjusted R-sq	0.980135	0.98071	0.982104	0.98133	0.98219
F-statistic	1085.423***	1052.674***	1034.854***	1009.223***	939.3961***
Num of Obs	1056	1056	1056	1056	1056

Standard error in parentheses
*$p \leq 0.1$, **$p \leq 0.05$, ***$p \leq 0.01$

Based on scenario [4], several findings can be described in more details as follows. *First*, GDP per capita of ASEAN as exporter and GDP per capita of its trading partners display the same results and are consistent with research that utilizes gravity model; that is, GDP significantly and positively affects exports (Frankel and Rose 2000; Elliott and Ikemoto 2004). The estimation results indicate that the level of ASEAN economy as exporter has a greater influence on the increase in ASEAN non-oil exports, when compared to the economic level of its trading partners (both ASEAN and non-ASEAN) as importers. This also means that from the results of model estimation, the elasticity of GDP per capita increase of ASEAN is greater than GDP per capita of its trading partners. Based on the rule of ceteris paribus, every 1% increase of GDP of ASEAN will increase ASEAN non-oil exports by nearly 2.00%. Meanwhile, the rise of GDP of ASEAN trading partner by 1% will increase ASEAN's non-oil exports by 1.21%. It means that the export pattern of ASEAN follows the concept of growth leads to export, where the internal factors of economic growth become the greater benchmark when compared to its export market conditions.

The GDP per capita which is a proxy of the capital endowment ratio, in addition to indication of purchasing power (Sohn 2005), shows increased domestic capability as an incentive for domestic producers to at least improve production quality or quantity. This will create larger economies of scale able to produce export goods, which in turn can boost exports. On the other hand, the economic capacity of partner countries (importers) leads to an increase in demand for goods that have an impact on an increase in imports of goods from outside.

Second, the POP or population variable which is indicated by the population of exporting countries (ASEAN) that demonstrates a significant effect and is contrary to the non-oil export of ASEAN. The population of importers (ASEAN and non-ASEAN) gives contrary effect, that is, positive effect on the increasing exports of ASEAN. An increase in the population of ASEAN member states by 1% causes a decline in the value of non-oil exports of ASEAN by 0.48% (ceteris paribus) and an increase in the population of importers by 1% causes an increase in ASEAN's non-oil exports by 0.42%.

The influence of population on exports is in line with the studies by Filippini and Molini (2003) as well as Razzaghi et al. (2012). Both studies suggest that the negative effects of the population, particularly in exporting countries, on exports indicate an incentive for domestic products as a result of an increase in the number of markets in the country, which can be referred to as import substitution effect. There is also the effect of absorption where domestic production that increases with the number of population will be absorbed in the domestic market first before being exported abroad. Meanwhile, the increase in the population of the importing country will increase the market size. Market growth in trading partners will eventually become one of the factors for the increase in demand in the export market.

Third, differences in the value of non-oil exports that is the result of Free Trade Agreement (FTA) in ASEAN also show significant gains. If the ASEAN trading partners are countries belonging to the AFTA scheme, then there are differences in the value of non-oil exports amounting to 18.23%, lower than that of the trading partners not included in the AFTA scheme. This condition matches with the findings of Elliott and Ikemoto (2004) who argue that the member countries of ASEAN are more likely to be outward looking, so that more trade (in this case export) is conducted with trading partners outside ASEAN. It is also reinforced in the findings in this study, that the presence of ASEAN Plus, which was marked by the commencement of ACFTA in 2005, shows differences in non-oil exports by 8.85%, greater when exports are made to the partner without a trade agreement.

AFTA and ASEANPLUS also indicate that ASEAN intra-regional market is considered less beneficial for ASEAN member countries themselves. Besides, the estimation of dummy AFTA and ASEAN Plus demonstrates that in order to increase intra-regional trade, seen from the side of exports, ASEAN countries need to adopt policies to better utilize the ASEAN Plus scheme which will then be merged into RCEP.

Fourth, the trade cost index (Trade Cost, TC index), as a proxy for the cost of trade, shows a negative effect on exports. A 1% increase in costs affects the decline in the value of non-oil exports by 1.28% (ceteris paribus). This is consistent with the statements of Tinbergen (1962) and Pöyhönen (1963) that exports will decline as the cost of trade increases.

Trade costs are not only material, but also include the quality of trade facilitation itself.

Lastly is the influence of the main variables, ΔNRCA, against non-oil exports. Results from this study indicate that the impact of ΔNRCA is positive and significant on the increase in non-oil exports to ASEAN trading partners that can be described as follows: (1) increase in one unit of agricultural commodities ΔNRCA will increase non-oil exports by 10.92% (ceteris paribus); (2) increase in one unit of manufacturing commodities ΔNRCA will lead to 5.84% rise in non-oil exports; (3) increase of one unit of mining commodities ΔNRCA (including coal, mineral and gemstone) will translate into a 13.55% increase in non-oil exports; and (4) increase of one unit of other commodities ΔNRCA will lead to an increase in non-oil exports amounting to 8.55%. The above findings are in accordance with the Theory of Comparative Advantage or Ricardian model stating that comparative advantage will increase export. Since ΔNRCA is the comparative advantage NRCA index of exporting countries which is subtracted from NRCA index of importing countries, the increase in ΔNRCA index can be interpreted as an increase in the comparative advantage of the exporter or the comparative decline of importer. Thus, exporting countries will tend to focus its factors of production to produce and increase the amount of production and subsequent export to countries that have lower comparative advantage for these products (Appleyard et al. 2006). Additionally, it appears that non-oil exports in ASEAN are more reliant on exports of agricultural commodities and mining. This means that natural resource products remain top ASEAN's non-oil exports as the impact of changes in comparative advantage for mining and agricultural commodities is significant.

Overall, the results of the estimation **[5]** above point out that the determinants of ASEAN's non-oil exports are (a) the level of economy proxied by GDP per capita of ASEAN member countries and their trading partners with each impact is positive; (b) the size of the market with a population approach in ASEAN member countries and their trading partners, where the population of ASEAN has positive influence and the population of ASEAN trading partners has a negative impact; (c) the cost of trade from exporters (ASEAN) to importing countries (ASEAN's trading partners) which has a negative impact; (d) there is a difference in

value of non-oil exports with the presence of AFTA cooperation. ASEAN's non-oil exports value is lower when trade is performed with trading partners under AFTA cooperation; (e) non-oil exports of ASEAN become larger when trade is done with members of the ASEAN Plus compared to when it is conducted with non-ASEAN Plus trading partners; and (f) if ΔNRCA between ASEAN and its trading partners are greater, the non-oil exports from ASEAN to its trading partners will increase.

Further, the value of adjusted *R*-square specifications **[4]**, which amounts to 0.9823, indicates that the model is capable to identify 98.23% of the variation of ASEAN's non-oil exports through the free variables inside the model. The remaining 1.77% are a variable influence outside the model. This means that the goodness of fit of the model **[4]** is 98.23%. In the specification of this model, all variables have a high significance, which is significant at α = 1%. All coefficients in the model are also visible in accordance with the model, characterized by a high F-statistic with probability of 0.000000.

Becoming more interesting to find out further is how big the effect of the difference changes in comparative advantage relative of manufacturing commodities to non-oil exports turns out to be when manufacturing commodities are disaggregated according to the skill level of its workforce and the level of technology. For this purpose, the results of the estimate are shown in Table 5.4 scenario **[5]**.

The estimation results of scenario **[5]** shows that the biggest influence and significant changes in ΔNRCA, especially ΔNRCA for manufacturing commodities, to the non-oil exports is the ΔNRCA change for electronic and electrical products belonging to medium-skill and technology-intensive manufacture products (Commodity Code 3C3); some examples of 3C3 are various kinds of tires, engine blocks, textile machinery and other mid-sized industrial machinery parts. Hence, an increase of one unit of $\Delta NRCA_{3C3}$ leads to an increase in non-oil exports by 10.59% (ceteris paribus). The second largest impact occurs at 3B commodities (commodities that are classified as low-skill and technology-intensive manufacturing products). Examples of commodities and derivative products are steel pipes, steel plates, household appliances and so forth. Every increase of one unit $\Delta NRCA_{3B}$ translates into an 8.04% increase against non-oil exports of ASEAN.

Manufacturing commodities ΔNRCA that has an influence on other non-oil exports is $\Delta NRCA_{3D1}$ which is ΔNRCA of commodities classified as electronic commodities belonging to high-skill and technology-intensive manufacture products. The estimation results find that an increase of one unit of $\Delta NRCA_{3D1}$ will have an impact on increasing non-oil exports by 7.29%. Commodities that are grouped under 3D1 are, among others, digital computers, digital processing units, color television receivers and digital radios. Additionally, an increase of $\Delta NRCA_{3D2}$ by one unit will impact the increase in non-oil exports of ASEAN by 3.53%. 3D2 commodities are spare parts and parts of electronic and electrical goods which belong to high-skill and technology-intensive manufacturing products. Examples of commodities 3D2 are, among others, non-cellular phone telecommunications equipment, spare parts of radio and television tubes spare parts.

In the meantime, ΔNRCA for manufacture commodities in group 3A (labor-intensive and resource-intensive manufacture products), 3C1 (electronic commodities which belong to medium-skill and technology-intensive manufacturing products), 3C2 (spare part commodities and parts of electronic and electrical goods classified as medium-skill and technology-intensive manufacture products) and 3D3 (commodities from non-electronic and electrical products included in high-skill and technology-intensive manufacture products) do not show a significant effect.

Based on the findings in model **[5]**, several elements need to be studied further. In this study, commodities that are used in the calculation of ΔNRCA are still in a relatively aggregated form. There is a possibility of aggregate bias from the ΔNRCA index results which will then affect the results of model estimation. It becomes necessary to disaggregate variable component which is still aggregate in terms of commodity side. The possibility of aggregate bias seen in the model of this study is the large variation of significance and influence of ΔNRCA against non-oil exports when industry/manufacture commodities (commodity 3) are disaggregated into numerous groups based on the level of workforce skills and the level of technology.

Moreover, it is interesting to further research on the interaction of changes in comparative advantage of a commodity to changes in com-

parative advantage of other commodities. Such assumption is necessary to find empirical evidence of trade specialization from the concept of comparative advantage of a commodity in a country.

In the research model, evidence of such interactions has not been found, yet an indication toward further proving of the theory of comparative advantage is made possible by the discovery of negative marks on a few commodities in the model specification **[5]** although the estimation results are not statistically significant. For instance, if in case there was a justification variable in the model that demonstrated the interaction between commodity 3A with 3C3, it could be said that when ΔNRCA of commodities categorized as labor-intensive and resource-intensive manufacture products was down by one unit, it would have an effect on increasing non-oil exports by 3.13%. The increase is the compensation of one unit increase of commodities ΔNRCA that include electronic and electrical products classified as high-skill and technology-intensive manufacture products that impact the increase in non-oil exports by 10.59%. It can therefore be said that the ASEAN countries have more specialization in electronic and electrical products commodities classified as high-skill and technology-intensive manufacture products rather than in those of labor-intensive and resource-intensive manufacture products.

Conclusion

In general, the study finds that non-oil exports of ASEAN are influenced by the level of ASEAN economies and that of their trading partners, the population of ASEAN and trading partners reflecting the market size of exporters and importers, trading costs, the status of AFTA and ASEAN Plus cooperations, as well as changes in the difference between ASEAN's comparative advantage as exporter and trading partner's comparative advantage for certain commodities in the ASEAN regional market.

Specifically, the study proves that comparative advantage has an influence on the pattern of non-oil exports. It explains that the increasing changes of ASEAN's NRCA against its trading partner's NRCA in the

ASEAN market will increase the non-oil exports of ASEAN to its trading partners. In other words, the increase in the comparative advantage in exporting countries or the decline in comparative advantage in importing countries increases the volume of exports from the exporter to the importer. This is in line with the Theory of Comparative Advantage or Ricardian model, in which a country will have specialization in exporting goods that have higher comparative advantage.

The study also reveals that the effects of ΔNRCA changes on ASEAN non-oil exports is ΔNRCA changes for mining commodities (including coal), agricultural commodities and other commodities. Meanwhile, ΔNRCA changes for industrial products/manufacture commodities indicate the smallest effect on non-oil exports. This signifies that non-oil exports of ASEAN tend to depend on commodities that derive from natural resources.

If the industrial/manufacture commodities are disaggregated, the estimation results suggest that ASEAN has a tendency to specialize in manufacture products other than electronic and electrical products that belong to medium-skill and technology-intensive manufacture products as well as products derived from the low-skill and technology-intensive industries. Furthermore, it also indicates that ASEAN has enough advantage in spare parts for high-tech electronic products. Meanwhile, ASEAN actually has a very small comparative advantage in, electric and electronic parts products for medium technology as well as high-tech electrical products and electronics.

This paper also recommends that, first, further research is required by disaggregating ΔNRCA of commodities that are still aggregate because of possible bias aggregate. This is indicated from the presence of significant variations and major variations in the effect of the ΔNRCA change against non-oil exports if industrial/manufacture commodities (commodity 3) are disaggregated into groups based on the level of several manufacture commodity groups, based on the work force skills and the level of technology.

Second, it is interesting to study further the interaction of changes in one comparative advantage of a commodity with changes in comparative advantage of other commodities. Assuming the existence of this interaction becomes important, it can be used as one empirical method to find

evidence of trade specialization of the concept of comparative advantage. Viewed from the concept of trade specialization according to comparative advantage, we will show more about the pattern of export and trade of a country in a given market.

Third, ASEAN member states need to adopt policies to better utilize the ASEAN Plus scheme which will then be merged into RCEP. The consideration is the empirical results of this study that signify that it is actually exports to trading partners under ASEAN Plus that give higher exports difference, compared to those of non-ASEAN Plus countries. Meanwhile, when ASEAN's trading partners are included in AFTA cooperation, it indicates that the value of exports is lower.

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6

Trade Creation and Trade Diversion Effects of the ASEAN-China FTA, ASEAN-Korea FTA, and ASEAN-India FTA Implementation on the Export of Indonesia's Food and Beverages Industry Products

Wahyudi Setia Darma and Fithra Faisal Hastiadi

Introduction

The number of Free Trade Agreement (FTA) surged during the last two decades and provided significant impacts to the development of international trade. Based on World Trade Organization (WTO) report, there are more than 270 schemes of regional FTAs that at present actively apply in the world (WTO 2015). This shows that the international trade development leads to a more free trade with various international cooperation patterns, either bilaterally or regionally.

The total free trades in the Asian region and its surroundings increased at the beginning of 2000. This is because Asia is considered one of the

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emerging markets and is a target market thanks to its above-average economic growth. Moreover, the expanding production network, as the materialization and establishment of the FTA, which is supported by productive manpower availability as well as abundant resources, makes Asia the target in the middle of the global economic crisis (ADB 2011). The ASEAN free trade area (AFTA) is one of the FTA cooperation forms in the Asian region, which was established in 2002 and is the regional free trade agreement among Southeast Asian countries. With regard to the implementation of AFTA, many circles believed that this cooperation is not significantly increasing the trade among its members, and several studies mentioned that AFTA is not successful in increasing the trade volume of its members, one of those is according to the report of Badan Kebijakan Fiskal (BKF). The Ministry of Finance implies that the *utilization rate* of AFTA is only 30.43% (BKF 2012).

Along with the global economic growth, the government of Indonesia ratified the establishment of FTA jointly with countries incorporated in ASEAN, namely the frameworks of ASEAN-China FTA (ACFTA), ASEAN-Korea FTA (AKFTA), and ASEAN-India FTA (AIFTA), where such FTA was fully implemented in 2010 (BKF 2012). The entry of Indonesia, which is a country with the largest population and market in ASEAN, simultaneously provides consequences on two matters: the opportunity to increase the market access of domestic products at the international market and simultaneously the challenge of the domestic industrial competitiveness against foreign products.

One of the industries in the country that has the opportunity and is facing challenges due to this existing agreement implementation of ACFTA, AKFTA, and AIFTA is the food and beverage industry. The food and beverage industry products are commodities included in the ACFTA, AKFTA, and AIFTA agreements and this industry is one of the strategic industries that provides large contribution to the economy of Indonesia. The food and beverage industry provided during the period of 2011–2015 the largest non-oil and gas processing industrial contribution to the GDP, that is, 31%. In addition, the growth of the food and beverage industry experienced a higher growth in 2015, that is 8%, compared to the growth of the non-oil and gas industry of only 5%. In view of the importance of the processed food and beverage

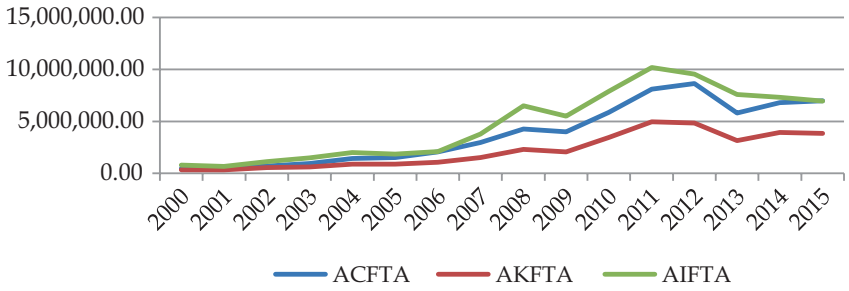

Fig. 6.1 Development of export value of Indonesian food and beverage industry products with ACFTA, AKFTA, and AIFTA countries. Source: Authors, from World Integrated Trade Solution (WITS 2017)

industry toward the national economy, this industry is included in the group/cluster of priority industries, which is contained in the Regulation of the President of the Republic of Indonesia Number 28 of 2008 concerning National Industry Policy.

Figure 6.1 depicts that the export trade value of the food and beverage industry products of Indonesia with the member countries of ACFTA, AKFTA, and AIFTA, namely China, Korea, India, and ASEAN member countries was increased after such FTA was fully implemented in 2010. The value of export to the member country of ACFTA of US$3.99 billion in 2009 increased to US$6.99 billion in 2015. The value of export to the member country of AKFTA of US$2.06 billion in 2009 increased to US$3.84 billion in 2015. The value of export to the member country of AIFTA of US$5.50 billion in 2009 increased to US$6.95 billion in 2015.

Figure 6.2 suggests that the import trade value of food and beverage industry products of Indonesia with the member countries of ACFTA, AKFTA, and AIFTA, namely China, Korea, India, and member countries of ASEAN also increased after such FTA was fully implemented in 2010. The value of import from the member country of ACFTA of US$1.14 billion in 2009 increased to US$2.23 billion in 2015. The value of import from the member country of AKFTA of US$995 million in 2009 increased to US$1.92 billion in 2015. The value of import from the member country of AIFTA of US$1.09 billion in 2009 increased to US$1.96 billion in 2015.

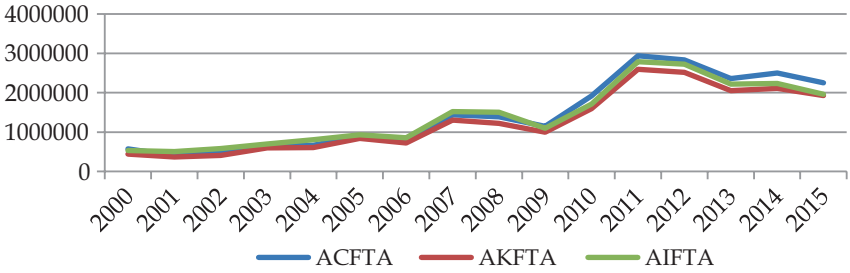

Fig. 6.2 Development of import value of Indonesian food and beverage products by country of ACFTA, AKFTA, and AIFTA. Source: Authors, from World Integrated Trade Solution (WITS 2017)

Viner (1950) argues that the economic integration may cause the trade creation among member countries and/or cause the occurrence of trade diversion with non-member countries, so that the main question of this research is namely whether the increase of the export trade of food and beverage industry products of Indonesia with the member countries of ACFTA, AKFTA, and AIFTA is the result of the *trade creation* effect due to the impact of the implementation of ACFTA, AKFTA, and AIFTA. Further, whether such trade development causes the occurrence of the *trade diversion* effect on the trade of Indonesia with the main trade partner countries of food and beverage industry products that are not members of ACFTA, AKFTA, and AIFTA. The main objective of this research is to analyze the effects of *trade creation* and *trade diversion* that occur due to the implementation of ACFTA, AKFTA, and AIFTA toward the export of the food and beverage industry products of Indonesia with trade partners that are members of ACFTA, AKFTA, and AIFTA as well as with non-members of ACFTA, AKFTA, and AIFTA during the period of 2005–2015.

Reference Review

The economic integration occurs when several countries join together in order to establish a larger economic unit with a special inter-member relationship (Appleyard 2006). The trade agreement between two or

more countries, either in form of the bilateral, regional, or multilateral trade system, has a similar principle, that is reducing or eliminating all forms of trade obstructions, either tariff or non-tariff.

The discriminative treatment occurs in the economic integration between member countries and non-member countries outside the economic integration, so that it will provide the *trade creation* and *trade diversion* effects to the member countries (Salvatore 2004). The most basic objective of the economic integration is to increase the goods and service trade volume, enhance the capital and manpower mobility, improve the productivity, improve the production efficiency, and increase the product competitiveness. Such condition will enhance the economic growth of member countries in an economically integrated region and thereby improving the community welfare. Krugman (1991) has the opinion that naturally the trade blocks are based on the geographical approach, which later on may provide efficiency and improve the welfare of its members.

Viner was the first person who explained about the difference of the *trade creation* and *trade diversion* effects that emerged from the establishment of the *custom union*. This theory of Viner is the relevant international economic theory related to the economic policy on the economic integration. Viner uncovered that an FTA will be able to improve welfare based on the *trade creation* and *trade diversion* effects that ensue. The economic integration will be very advantageous if the *trade creation* effect is larger compared to the *trade diversion* effect (Viner 1950).

The *trade creation* basically takes place if the establishment of an FTA is able to create trade that never occurred before. The countries that are incorporated in one FTA, with the existence of the *trade creation*, are able to obtain produced goods more efficient than the other members. It means that there is a shift from high-cost domestic goods to goods with lower cost from the FTA fellow member countries. *Trade creation* is the benefit obtained from the establishment of trade blocks, by assuming that all economic resources are fully used before and after the establishment of the *custom union*, so that the establishment of the *custom union* will improve the welfare of member countries that leads to the improvement of the production specialization based on the comparative superiority (Salvatore 2004).

The *trade diversion* is namely the occurrence of trade shift from non-member countries to member countries (Salvatore 2004). The *trade diversion* occurs since the goods from non-member countries with low cost (*lower cost import*) are replaced by goods from member countries with high cost (*higher cost import*). This occurs due to the preferential treatment to fellow member countries, namely the reduction or elimination of tariff, so that the products from non-member countries, which are actually cheaper, become more expensive as they should still bear the tariff (Salvatore 2004).

Empirical Review

The economists in the past have the opinion that the Regional Trade Agreements (RTA) may improve welfare and is an effective measure into the direction of free trade and then Viner (1950) uncovered that an RTA will be able to improve welfare based on the size of the *trade creation* and *trade diversion* effects that befall, where the free trade or regional cooperation is strongly determined by one of the more dominant effects. In case the *trade creation* is larger, the regional cooperation can improve the welfare of its members, and conversely, in case the *trade diversion* arises, then it may cause detriment to its member countries. This existing controversy in the RTA free trade agreement attracts the economists and researchers to conduct the empirical research related to those two trade effects.

There are two empirical method approaches in the analysis on the RTA implementation impacts that are normally used. The first approach is by using the *ex-ante approach* model, that is the simulation analysis using the *computable general equilibrium* (CGE) model in order to estimate the effects of reduction or elimination of trade obstructions prior to the RTA implementation. One of the researches conducted in order to analyze the ACFTA implementation impacts on the export of Indonesia employs the Global Trade Analysis Project (GTAP) model, namely the CGE *multi regional* model (Ibrahim et al. 2010).

The second approach in the analysis of RTA impacts is by using the *ex-post approach* which is used to analyze the trade effects after the RTA implementation. This approach normally applies the *gravity model* in order to look at the RTA impacts on trade. Several empirical researches

utilize the *gravity model*, which is modified by adding two variables, the *dummy trade creation* and *trade diversion*, since proxy of the RTA implementation impacts on the RTA inter-member countries and non-member countries trade. This is carried out in order to identify that RTA is not only providing impacts on the member countries, but also providing impacts on the non-member countries. The empirical research that employed this *gravity model* was carried out by Jayasinghe S. and Sarker (2008), who investigated how the *trade creation* effect and *trade diversion* effect ensued from the RTA implementation on the export in the North American Free Trade Agreement (NAFTA) member countries and made the *gravity model* estimation by using two *dummy* variables—the *trade creation* and *trade diversion*.

The empirical research then developed in the RTA impact analysis by using the *gravity model* that is modified by using three FTA *dummy* variables, namely *trade creation, export trade diversion*, and *import trade diversion*. The *export trade diversion* and *import trade diversion* showed the RTA impacts on the extra-regional trade, where *trade diversion* is distinguished from the aspects of export and import in order to know the RTA impacts on the trade with non-member countries viewed from the aspects of export and import. Several researches that applied this model were performed by Endoh (1999), Carrère (2006), Zidi and Dhifallah (2013), and Yang and Martinez-Zarzoso (2014). The research of Endoh (1999) was the first that utilized the term *export trade diversion* that has a different definition than the *trade diversion* used by Viner (1950).

The impacts of the FTA implementation on trade may be distinguished based on its trade data analysis. Nearly most of the empirical studies aggregately used the trade data. The RTA implementation impacts will also give different effects on the commodity or product level, which is in general since the decline or reduction of tariff is also distinguished based on each commodity or product. Several researches that employed the gravity model which is modified by using the trade data based on the sector or commodity trade, such as what was carried out by Yang and Martinez-Zarzoso (2014), Jayasinghe and Sarker (2008), Urata and Okabe (2010). Yang and Martinez-Zarzoso (2014) conducted the analysis concerning the *trade creation* and *trade diversion* impacts on the export in the ASEAN-China FTA region from 1995 to 2010 utilizing the *aggregated* and *disaggregated* export data for agriculture raw materials, manufacture goods and

chemicals, as well as machine and transportation equipment. The result obtained from this analysis was that on the overall ACFTA provided *trade creation* impacts to its member countries. For the meantime, Jayasinghe and Sarker (2008) performed the research in order to analyze the *trade creation* and *trade diversion* effects of the NAFTA member countries on the bilateral trade of agri-food products. Urata and Okabe (2010) made the research on 20 commodity groups based on Standard International Trade Classification (SITC). It was found from the research that the establishment of FTA would provide different results for each different commodity, where the establishment of the *European Union* (EU) was able to create the *trade creation*, particularly at the agricultural products, while for ASEAN the largest *trade creation* impacts took place at the machine group and its derivative products and motor vehicles.

The empirical research related to the implementation of RTA experienced another development by looking at the *trade creation* and *trade diversion* of all RTAs that have been implemented using the trade data at the commodity or product level by using the *gravity* model. Karemera (2016) investigates the impacts of *trade creation* and *trade diversion* in the cooperation of NAFTA, EU, ASEAN, MERCOSUR on the export of processed meat products. The results of the above empirical researches signify that the implementation of FTA/RTA will provide the *trade creation* and/or *trade diversion* effects on the intra-regional trade with member countries and extra-regional trade with non-member countries.

This research refers to the researches that have been carried out by Urata and Okabe (2010) and Yang and Martinez-Zarzoso (2014) in order to analyze whether the establishment of ACFTA, AKFTA, and AIFTA has *trade creation* or *trade diversion* impacts, particularly for the export of the food and beverage industry products of Indonesia with members and non-members of ACFTA, AKFTA, and AIFTA. No previous research has used the product/commodity approach and looked at the *trade creation* and *trade diversion* effects on export of food and beverage industry products. Previous researches have not either looked from the perspective of only one country, Indonesia, on all the already running FTAs, consisting of ACFTA, AKFTA, and AIFTA. In addition, in order to answer the objective of research, the *dummy trade creation* and *trade diversion* are used in the regression model by including the FTA implementation time element.

Research Method

This research applies the *gravity* model in order to find out the *trade creation* and *trade diversion* effects on the establishment of an FTA from the research model conducted by Urata and Okabe (2010) and Yang and Martinez-Zarzoso (2014). The gravitation model in this research utilizes the FTA dummy variable as proxy of the effects on the implementation of ACFTA, AKFTA, and AIFTA, that is, the *trade creation* and *trade diversion.* The *trade creation* and *trade diversion* effects that occur are distinguished based on the membership status, the inter members (intra-regional trade) and non-members (extra-regional trade), so that the specification of model that is used in this research has the gravitation function and equation as follows:

$$\begin{aligned}\ln\left(X_{j,t}\right) = {} & \alpha_0 + \beta_1 \ln\left(\mathrm{GDP}_t\right) + \beta_2 \ln\left(\mathrm{GDP}_{jt}\right) \\ & + \beta_3 \ln\left(\mathrm{DIS}_j\right) + \beta_4 \ln\left(\mathrm{POP}_{j,t}\right) \\ & + \beta_5 \left(\mathrm{FTA}_{1j,t}\right) + \beta_6 \left(\mathrm{FTA}_{2j,t}\right) + \epsilon_{j,t}\end{aligned}$$

The explanation on the *dependent* variable and *independent* variable that are used in this research is as follows:

Export ($X_{j,t}$) as the *dependent* variable is the initial variable of the gravitation model (Tinbergen 1962). The export that is used in this research signifies the bilateral trade performance of the food and beverage industry products between Indonesia and the trade partners that are included in the member countries of ACFTA, AKFTA, and AIFTA and non-member countries of ACFTA, AKFTA, and AIFTA (Yang and Martinez-Zarzoso 2014).

***Gross Domestic Product* (GDP_t, $GDP_{j,t}$)** is the total value of goods and service production in a country at a certain period. The GDP is used as proxy for the economic size of a country, which shows the size of the economic ability of a country, where the larger the GDP produced by a country, the larger the ability of such country to implement trade. This research model employs the real GDP, where the GDP variable used is the GDP of Indonesia (GDP_t) and the GDP of the trade partner countries ($GDP_{j,t}$) (Urata and Okabe 2010).

Distance (***DIS***$_j$) is the geographical distance between the capital city (economy center) of Indonesia and the trade partner countries, either the member countries or non-member countries of ACFTA, AKFTA, and AIFTA. This variable is used as proxy of the transportation costs (Urata and Okabe 2010).

Population (*POP*$_{j,t}$) is the total population domiciled and settled in a country area. The population is measured with the inhabitant unit, which in this research is the population of the member countries ACFTA, AKFTA, and AIFTA as well as non-member countries (Urata and Okabe 2010).

Dummy variable $FTA_{1\,j,t}$ has the value of 1 if the exporting country is Indonesia and the importers are member countries of ACFTA, AKFTA, and AIFTA (country *j*) after 2009, and has the value of 0 if otherwise. In case the coefficient of the $FTA_{1j,\,t}$ variable has a positive value, this variable reflects the existence of the *trade creation* effect (Yang and Martinez-Zarzoso 2014).

Dummy $FTA_{2\,j,t}$ variable is 1 if the exporting country is Indonesia and the importers are non-member countries of ACFTA, AKFTA, and AIFTA (country *j*) after 2009, and has the value of 0 if otherwise. In case the coefficient value of the $FTA_{2j,\,t}$ variable is positive, this variable demonstrates that the existence of the *trade diversion* positively affects the export with non-member countries of ACFTA, AKFTA, and AIFTA, which means that there is no decline of the export of Indonesia with non-member countries of ACFTA, AKFTA, and AIFTA, but in case $FTA_{2j,\,t}$ has a negative value, it shows the existence of *trade diversion* on the export, which means that there is a decline of export with non-member countries of ACFTA, AKFTA, and AIFTA owing to the diversion of trade (Yang and Martinez-Zarzoso 2014).

Hypothesis of Research

This research uses the *dummy* variable to see the *trade creation* and *trade diversion* effects of the ACFTA, AKFTA, and AIFTA implementation on the export of food and beverage industry products of Indonesia with the trade partners that are member or non-member countries of ACFTA, AKFTA, and AIFTA. The explanation on the interpretation and hypothesis of such *dummy* variable is shown in Tables 6.1 and 6.2.

Table 6.1 Interpretation of dummy variable

Effects on exports	Interpretation
$\beta_5 > 0 \beta_6 > 0$	The implementation of ACFTA, AKFTA, and AIFTA may increase the intra-regional trade among the member countries and there is no trade diversion with the non-member countries.(Yang and Martinez-Zarzoso 2014)
$\beta_5 > 0 \beta_6 < 0$	The implementation of ACFTA, AKFTA, and AIFTA may increase the intra-regional trade among the member countries and the *trade diversion* occurred with the non-member countries.(Yang and Martinez-Zarzoso 2014)
$\beta_5 < 0 \beta_6 < 0$	The implementation of ACFTA, AKFTA, and AIFTA has negative impacts as it reduced the trade of Indonesia, either with member or non-member countries of ACFTA, AKFTA, and AIFTA.(Yang and Martinez-Zarzoso 2014)

Table 6.2 Hypothesis and variable

Independent variable	Hypothesis	*Reason use variable*
GDP_t	(+)	GDP_t has positive relation with the export variable and is used as the *economic size* proxy of the exporting country (Indonesia), where the larger the GDP, the larger the produced products, so that it may increase the export of Indonesia.
$GDP_{j,t}$	(+)	$GDP_{j,t}$ has positive relation with the export value, and is used as the *economic size* proxy of the demand of importing countries, where the larger the GDP of the trade partner countries, either member or non-member countries, the larger the demand, so that it may increase the demand of the importing countries.
DIS_j	(–)	The *distance* has a negative relation with the export variable and is used as proxy of the transportation cost for the geographical distance between the capital city (economy center) of Indonesia to other trade partner countries, either member or non-member countries.
$POP_{j,t}$	(+)	The *population* has a positive relation with the export variable, where each increase of population of the member and non-member countries will increase the export of Indonesia.

(*continued*)

Table 6.2 (continued)

Independent variable	Hypothesis	*Reason use variable*
$FTA_{1j,\,t}$	(+)	It is as proxy of the *trade creation* effect of the impacts on the implementation of ACFTA, AKFTA, and AIFTA on the bilateral export trade of Indonesia with trade partners that are member countries of ACFTA, AKFTA, and AIFTA, where the creation of trade has a positive effect and will increase export among member countries (increase of intra-regional trade).
$FTA_{2j,\,t}$	(+)/(−)	It is as proxy of the *trade diversion* effect from the implementation of ACFTA, AKFTA, and AIFTA on the bilateral export trade of Indonesia with trade partners that are non-member countries of ACFTA, AKFTA, and AIFTA. It is expected that the *dummy* variable coefficient has a positive value, so that the export diversion will not occur but conversely, in fact the increase of trade with non-member countries will occur.

The explanation on the test of such *dummy* variable parameter is as follows:

The $\boldsymbol{\beta_5}$ parameter is used to see the *trade creation* effect of the impacts of the ACFTA, AKFTA, and AIFTA implementation on the export of food and beverage industry products of Indonesia to the member countries of ACFTA, AKFTA, and AIFTA.

The $\boldsymbol{\beta_6}$ parameter is used to see the *trade diversion* effect of the impacts of the implementation of ACFTA, AKFTA, and AIFTA on the export of food and beverage industry products of Indonesia to non-member countries of ACFTA, AKFTA, and AIFTA.

The more detailed explanation on the hypothesis of other independent variables is illustrated in the following table.

Results and Discussion

This variable used the data estimation method of the *random effect model* (REM) panel, where REM is the best model based on the selection of the test result method of Hausman (attached). The overall result of this

research panel data estimation is shown in Table 6.1, where most of the free variables in this model have high significance at α = 1% and α = 5%, except the population value variable, which is not significant. The *R*-squared value of 0.5256 is obtained based on the result of estimation, which shows that the ability of the free variables to explain the non-free variables is 52.56% and the remaining is affected by other variables outside the model.

The main variable that is used to respond to the problem in the research is namely by adding two FTA *dummy* variables as proxy of the impacts on the implementation of ACFTA, AKFTA, and AIFTA, namely the *trade creation dummy* (FTA1) and *trade diversion dummy* (FTA2). The results of estimation based on Table 6.3 display the two main variable coefficients, namely the *trade creation dummy* (FTA1) and *trade diversion dummy* (FTA2), which provide positive and significant effects to the export trade of food and beverage industry products of Indonesia.

The *trade creation dummy* (FTA1) variable has a positive coefficient value of 0.6746171 and significant probability at α = 1%, and this shows that the *trade creation* effect of the ACFTA, AKFTA, and AIFTA implementation has positive and significant effect on the bilateral export trade of food and beverage industry products of Indonesia with partner countries that are member countries of ACFTA, AKFTA, and AIFTA. The positive and significant value at the *trade creation* variable indicates that the implementation of ACFTA, AKFTA, and AIFTA is able to create the *trade creation* effect by increasing the intra-regional trade of food and beverage industry products of Indonesia with member countries of

Table 6.3 Panel data estimation results

Variable	Coefficient	Std. error	*Z*	*P*>|*Z*|
C	−8.291113	6.745116	1.97	0.219
Lngdpindonesia	0.4335227**	0.2198185	2.18	0.049
Lngdpnegaralain	0.4287036**	0.1963213	−2.11	0.029
Lnjarak	−1.062397**	0.5042299	1.17	0.035
Lnpopulasi	0.3333781	0.3333781	4.54	0.244
Variabeldummyfta1	0.6746171***	0.6746171	4.48	0.000
Variabeldummyfta2	0.7089768***	0.7089768	−1.23	0.000
R^2	0.5256			
Wald Chi 2	493.84			
Prob > Chi 2	0.0000			

ACFTA, AKFTA, and AIFTA. The development of the export value of food and beverage industry products of Indonesia on the trade partners that are member countries of ASEAN-China FTA, ASEAN-Korea FTA, and ASEAN-India FTA is shown in Fig. 6.3.

The export of food and beverage industry products of Indonesia to member countries of ACFTA, AKFTA, and AIFTA experienced a quite significant increase after the enforcement of those three FTAs. The export value of Indonesia to the member country of ACFTA of US$3.99 in 2009 jumped to US$6.99 billion in 2015. The export value of Indonesia to the member country of AKFTA of US$2.06 billion in 2009 climbed to US$3.84 billion. The export value of Indonesia to the member country of AIFTA of US$5.50 billion in 2009 surged to US$6.95 billion. This is in accordance with the research conducted by Frankle (1997), who found that the ASEAN cooperation was able to create the *trade creation* effect, so that the economy and welfare of its members was improved. Additionally, Robert (2004) in his research on ASEAN-China FTA found that the *trade creation* effect for member countries is more dominant compared to its *trade diversion* effect. In the interim, the research conducted by Lee and Shin (2006), who have investigated more than 15 RTAs/FTAs throughout the world, mention that AFTA tends to have the *trade creation* effect, so that the trade and welfare of its members is increased.

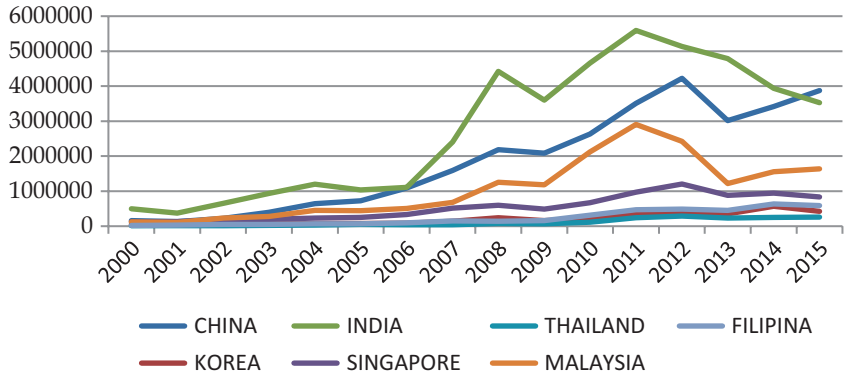

Fig. 6.3 Exports of Indonesian food and beverage products by member countries ACFTA, AKFTA, and AIFTA. Source: Authors, from World Integrated Trade Solution (WITS 2017)

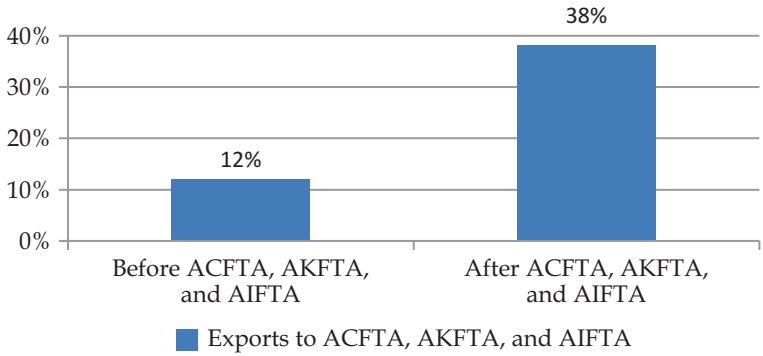

Fig. 6.4 Average export growth of Indonesian food and beverages industry products with ACFTA member countries, AKFTA, and AIFTA in 2005–2015. Source: Authors, from World Integrated Trade Solution (WITS 2017)

Figure 6.4 depicts that the average export growth of food and beverage industry products of Indonesia to member countries of ACFTA, AKFTA, and AIFTA soared after the full implementation of such FTA in 2010, when the average growth of export prior to the enforcement ACFTA, AKFTA, and AIFTA was 12% and significantly rose to an average of 38% after enforcement of those three FTAs. The export of food and beverage industry products in 2015 was dominated by the largest value of export to China, namely US$3.87 billion. This is in accordance with the finding of Ibrahim et al. (2010) who represented that viewed from the export aspect the commodities of Indonesia have the opportunity to increase by 2.1%, particularly sourced from the increase of export to China. The opportunity to expand the export to China is supported by characteristics of the export commodities of Indonesia that have a relative low competition degree. As such, the export of goods from Indonesia is relatively easier to expand.

The *trade diversion dummy* (FTA2) variable has a positive coefficient value of 0.7089768 and significant probability at α = 1%, which shows that *trade diversion* effect from the implementation of ACFTA, AKFTA, and AIFTA has a positive and significant effect on the bilateral export trade of food and beverage industry products of Indonesia with main trade partners that are non-member countries of ACFTA, AKFTA, and AIFTA. The positive and significant value at the *trade diversion* variable

indicates that the implementation of ACFTA, AKFTA, and AIFTA does not cause the *trade diversion* and the increase of the extra-regional trade of food and beverage industry products of Indonesia ensues with the main trade partners that are non-member countries of ACFTA, AKFTA, and AIFTA.

Figure 6.5 demonstrates that the average growth of export of the food and beverage industry products of Indonesia to non-member countries of ACFTA, AKFTA, and AIFTA experienced an increase after the full implementation of such FTAs in 2010, where the average growth of export prior to the implementation of ACFTA, AKFTA, and AIFTA was 7% and rose to an average of 18% after the enforcement of those three FTAs. This is in accordance with the research conducted by Krugman (1991) who mentions that a country will agree to establish cooperation with another country if such country is the main trade partner due to the opinion that it is more profitable. In line with such representation of Krugman, Robert (2004) finds in his research on ASEAN-China FTA that the *trade creation* effect for member countries is more dominant compared to its *trade diversion* effect. In the meantime, the research conducted by Lee and Shin (2006), related to his investigation on the RTAs throughout the world, finds that AFTA, as one of the cooperation in the Asian region, is not only increasing the trade among its member countries but is successful in creating the trade with non-member countries, which is the highest compared to the other RTAs.

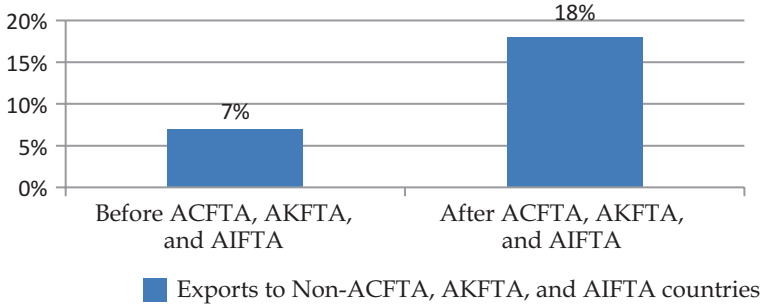

Fig. 6.5 Average export growth of Indonesian food and beverage industry products with non-member countries ACFTA, AKFTA, and AIFTA 2005–2015. Source: World Integrated Trade Solution (WITS 2017), (Re-processed)

The main export destination country of the food and beverage industry products of Indonesia to trade partners that are non-member countries of ACFTA, AKFTA, and AIFTA are the United States of America, the Netherlands, Australia, Brazil, and Argentina, where United States of America is the third largest export market after China and India for food and beverage industry products of Indonesia with the export value of US$1.95 billion in 2015. There are several factors that cause the export increase of food and beverage industry products of Indonesia to the main export destination countries that are non-member countries of ACFTA, AKFTA, and AIFTA, and according to the association of food and beverage entrepreneurs of Indonesia (GAPMMI 2016), the food and beverage products sector of Indonesia has a high competitiveness since it is supported by quite potential natural resources, such as agriculture, marine, farming, plantation, and forestry.

The **GDP variable of Indonesia (GDP_t)** has a positive coefficient value of 0.4335227 and significant probability at α = 5%, which means that the GDP increase of Indonesia of 1 unit will increase the export of 0.433 unit, with the assumption that the other variables are constant. This showed that the GDP of Indonesia has a positive and significant effect on the export of food and beverage industry products of Indonesia. This research utilizes the GDP as proxy of the production of food and beverage products of Indonesia. The estimation result of this research is in accordance with the research hypothesis or theory, where the larger the GDP, the larger will be the produced products, so that it may increase the export from the exporting country. This research result is in accordance with that of Robert (200), Urata and Okabe (2010) and Yang and Martinez-Zarzoso (2014).

The **GDP variable of the trade partner country ($GDP_{j,t}$)** has a positive coefficient value of 0.4287036 and significant probability at α = 5%, which means that the increase of GDP of the trade partner country of 1 unit will increase the export of 0.423 unit, with the assumption that the other variables are constant (ceteris paribus). This shows that the GDP of the trade partner countries has a positive and significant effect on the export of food and beverage products of Indonesia. The GDP of trade partner countries shows the purchasing power of the consumers of the trade partner countries. This research estimation is in accordance with

the research hypothesis or theory, whereas the larger the GDP of the partner country, the larger the purchasing power of consumers of the trade partner country. The result of this research is in line with that of Robert (2004), Urata and Okabe (2010), and Yang and Martinez-Zarzoso (2014).

The ***Distance*** **(DIS$_j$) variable**, as proxy of the distance in the *gravity* model has a negative coefficient value of −1.062397 and significant probability at α = 5%, which means that each increase of distance of 1 unit of both countries that are trading will reduce the trade flow of 1.062 units, with the assumption that the other variables are constant (ceteris paribus). This shows that the distance has a negative and significant effect on the export of food and beverage products of Indonesia. This estimation result is in accordance with the research hypothesis or theory, which explains that the distance coefficient with negative value indicates that the larger the inter-country distance, the smaller the implemented trade. This research result is aligned with that of Urata and Okabe (2010), Zidi and Dhifallah (2013), and Yang and Martinez-Zarzoso (2014).

The **population variable (POP$_{j,t}$)**, as proxy of the total population of the trade partner country has a positive coefficient value with non-significant probability, that is, with the probability of 0.244, which is larger than the significance level of 10%. This denotes that the population of the trade partner country (POP$_{j,\,t}$) has statistically no significant effect on the export of food and beverage products of Indonesia.

Conclusion

Based on the estimation result analysis that is conducted in the previous chapter, it is indicated that this research is intended to see whether the implementation of ACFTA, AKFTA, and AIFTA has *trade creation* and/or *trade diversion* impacts on the export of food and beverage products of Indonesia. Following are the conclusions that can be drawn in accordance with the research issues and objective that have been explained in the previous chapter:

1. *Trade creation* effect from the implementation of ACFTA, AKFTA, and AIFTA that has positive and significant effects on the export of the food and beverage industry products of Indonesia to the trade partners that are members of ACFTA, AKFTA, and AIFTA. The positive and significant value at the *trade creation* variable indicates that the implementation of ACFTA, AKFTA, and AIFTA is able to create the *trade creation* by increasing the intra-regional trade of the food and beverage industry products of Indonesia with the member countries of ACFTA, AKFTA, and AIFTA.
2. This significant increase of the intra-regional trade with ACFTA, AKFTA, and AIFTA is the implication of the existing *preferential* tariff that applies among the member countries of ACFTA, AKFTA, and AIFTA. Additionally, the estimation result of this research also implies that the *trade creation* from the implementation of ACFTA, AKFTA, and AIFTA may provide the quite large opportunity for the market access of the food and beverage industry products to the markets of China, Korea, India, and ASEAN, where the market opportunity of 3.3 billion people is created.
3. This research also shows that the *trade diversion* effect from the implementation of ACFTA, AKFTA, and AIFTA has positive and significant effect on the export of food and beverage industry products of Indonesia to the main trade partner countries that are the non-member countries of ACFTA, AKFTA, and AIFTA. The positive and significant value at the *trade diversion* variable suggests that the implementation of ACFTA, AKFTA, and AIFTA does not cause the *trade diversion* and the extra-regional trade increase occurs for export of the food and beverage industry products of Indonesia with non-member countries of ACFTA, AKFTA, and AIFTA.
4. The estimation result of this research also implies that the implementation of ACFTA, AKFTA, and AIFTA is not only increasing the intra-regional trade among the member countries of ACFTA, AKFTA, and AIFTA but also increasing the extra-regional trade with non-member countries of ACFTA, AKFTA, and AIFTA, without causing the occurrence of *trade diversion*.

Suggestions and Policy Implication

The participation of Indonesia in the cooperation framework of ACFTA, AKFTA, and AIFTA provides positive impacts on the export of food and beverage industry products of Indonesia, and therefore, such partnership relation needs to be continued and enhanced into the direction that provides more benefits. Furthermore, Indonesia can expand the membership with FTA that is still in the preparation process, either in form of exploration, reviewing, or negotiation by ASEAN, among others, ASEAN-European Union FTA, ASEAN-USA FTA, ASEAN-Canada FTA, and Comprehensive Economic Partnership in East Asia (CEPEA). The positive *trade creation* and *trade diversion* effects in the implementation of ACFTA, AKFTA, and AIFTA may increase the export of the food and beverage commodities/products of Indonesia to the markets of China, Korea, India, and ASEAN member countries, so that it should be utilized in order to create long-term advantage, namely by improving the competitiveness and improving the efficiency of the food and beverage industry products of Indonesia. The increase of the intra-regional trade and extra-regional trade in the implementation of ACFTA, AKFTA, and AIFTA toward the food and beverage industry products of Indonesia may provide a large economic contribution to the national economy, where the existing export of the food and beverage industry products of Indonesia may absorb larger amount of workers and add larger amounts of businesses and investments in this sector, so that it may ultimately improve the welfare of the Indonesian community.

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7

Analysis of the Imposition of Export Tax on Indonesian Cocoa Beans: Impact on the Processed Cocoa Export in Indonesia and Malaysia

Hendy Yudyanto and Fithra Faisal Hastiadi

Introduction

One of the aims to impose export tax is to increase the added value of domestic industries. According to Bouët and Laborde (2012), the imposition of export tax will cause the export volume of raw materials to decrease due to higher export prices, compared to the international price. The decline of the export supply will lead to an increased domestic supply, causing a decrease of the raw materials domestically. Thus indirectly, the imposition of export tax is an incentive provided by the government to ensure the availability of raw materials for domestic processing industries at a lower price. The low price of raw materials will lead to a decrease in production costs so that the selling price of the downstream products in the export market will be more competitive.

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On the other hand, the imposition of export tax on raw materials may also affect the performance of the importing countries of raw materials. Bouët and Laborde (2012) add that the imposition of export tax will lead to a decreased import of the raw materials supply so that it may affect the increase of raw material prices in the international market. Fung and Korinek (2014) are of the opinion that the imposition of export tax on raw materials may lead to a decreased production and profit for downstream industries in importing countries because importing countries have to pay a higher price for imported raw materials from the restricting partner countries, which will cause increased production costs for the user industries and will ultimately increase the cost of the final products for the consumers.

The policy of export tax imposition on cocoa beans was issued by the government through the Minister of Finance Regulation Number 67/PMK.0ll/2010 dated 22 March 2010 regarding the Stipulation of Export Goods Subject to Export Tax and the Export Tax Tariff. In this regulation, cocoa beans are one of the export commodities that are subject to a particular tariff with a progressive percentage, depending on prevailing international prices. The objective of the export tax imposition on cocoa beans is to encourage the downstream side of cocoa processing industries because, prior to 2010, most of the Indonesian cocoa beans were exported than processed domestically, leading to a shortage of raw materials for domestic industries. This is marked by the low installed capacity utilization of the Indonesian cocoa processing industries in 2009 which was only 42%.

According to the International Cocoa Organization (ICCO) data, in 2009, the Indonesian cocoa beans production is the third largest in the world (15% share) after the Ivory Coast (34% share) and Ghana (17% share), with 550,000 tons. In the above mentioned year, the export of the Indonesian cocoa beans reached 439,305 tons (US$1,087,485), with Malaysia having the largest market share of 41%. The need for cocoa beans raw materials for the processed cocoa production in Malaysia is mostly fulfilled by Indonesia owing to the very low cocoa beans production in Malaysia amounting to 15,000 tons. Processed cocoa products are divided into three types, namely cocoa paste, cocoa butter, and cocoa powder. All product types only use cocoa beans as raw materials. In 2009,

the use of the Indonesian cocoa beans raw materials for the need of cocoa processing industries in Malaysia reached 69%. In this year, Malaysia was the largest exporter of processed cocoa in Asia with an export value of US$797,939, followed by Indonesia in the second position with an export value of US$295,575. The data indicate that Indonesia is the main producer of cocoa beans in Asia; yet, the added value generated remains very low because Indonesia exports more cocoa beans than processed cocoa products. The export value of the Indonesian processed cocoa products is even below Malaysia that precisely utilizes most of the cocoa beans raw materials from Indonesia for the production of processed cocoa.

The export tax policy on cocoa beans is issued by the Government of Indonesia to increase the supply of cocoa beans raw materials for domestic use by reducing the export volume of the raw materials. The increased supply of cocoa beans raw materials is expected to stimulate the increase of Indonesian processed cocoa production so that it may also improve the competitiveness of processed cocoa products in the global market. Considering that Malaysia is the largest consumer of cocoa beans from Indonesia, the policy of the export tax imposition on cocoa beans may reduce the cocoa beans supply to Malaysia. The decline in the supply of cocoa beans may obstruct the production of Malaysian processed cocoa so that the processed cocoa industry from Indonesia can capture the market share of the Malaysian processed cocoa in the world.

Therefore, the success of the application of the export tax policy on cocoa beans in the long term is not only observed from the effect of the policy on the export of processed cocoa products from Indonesia, but it should also consider the impact to Malaysia which is the main competitor for processed cocoa products in Asia.

Reference Review

A country applies the policy for export tax on products for various purposes. According to Liefert and Westcott (2016), the main reasons for the government to impose export tax tariffs or other export restrictions are (1) increased revenues, (2) increased profits from export products by using the market power to increase selling prices; (3) increased competitiveness

and also the added value of domestic industries by providing cheaper raw materials so that production costs are lower than competitor countries; and (4) improving domestic food security by increasing the product volume at lower prices.

The imposition of export tax on raw materials will lead to a decreased price of raw materials in the domestic market. In addition, export tax may also increase the price of raw materials in the international market, depending on the market share. Bouët and Laborde (2012) group the market share of a country into small countries and large countries and further perform a partial equilibrium analysis to identify the impact generated from the imposition of export tax. Small countries refer to countries with a small market share, while large countries are countries with large market shares. In this analysis, it is assumed that domestic prices are equal to international prices and domestic demands are lower than domestic supply. The difference between domestic supply and domestic demand is the exported quantity.

In small countries, the imposition of export tax will make domestic producers prefer selling their products to the domestic market to exporting because the product is not taxable if sold domestically. The imposition of export tax will lead to decreased domestic prices. Domestic consumers will benefit from the export tax policy by the increased consumption at lower prices attributable to decreased export quantities. Increased domestic consumption with lower prices will create a consumer surplus. Moreover, the government will also benefit from the application of export tax, namely from the revenue of the export tax. Nonetheless, this policy precisely creates disincentives to domestic producers that are marked by a decreased surplus of producers.

In large countries, the imposition of export duties will lead to increased world prices. The imposition of export tax on countries with significant market shares in the world drives export supply in the world to decline and causes increased global prices. The decline in the export supply will lead to increased domestic consumption so that domestic prices will decrease. The policy to impose export tax on large countries will create a surplus of producers and also a surplus of consumers.

The imposition of the export tax policy may decrease export supply and increase export prices. However, in the context of raw materials,

the imposition of this policy may also affect the added value in the importing countries of the raw materials. According to Murray and Walter (1975), a country may increase the export of downstream products by imposing export tax on raw materials or semi-finished materials and thereby reducing the effective rate of protection (ERP) on the downstream products of the importing country. The imposition of export tax on raw materials in exporting countries will increase production costs of the importing countries' downstream industries, due to the increased prices of raw materials. According to Corden (1966), ERP is defined as a percentage increase of the value added per unit on economic activities as a result of the tariff structure application. The impact of the export tax imposition on raw materials (e_i) by exporting countries against the decreased ERP in importing countries is formulated by Murray and Walter (1975) as follows:

$$g = \frac{t_j - \sum_{i=1}^{n} a_i t_i - \sum_{i=1}^{n} a_i e_i \left(1 + t_i\right)}{1 - \sum_{i=1}^{n} a_i} \tag{7.1}$$

The above equation indicates that the higher the export tax tariff on the input, the lower the ERP on downstream products in importing countries.

A number of previous researches related to the impact of the policy on the cocoa beans export tax against processed cocoa exports were implemented several times, such as the research by Suryana et al. that analyzes the impact of the export tax imposition on cocoa beans against the volume of processed cocoa exports by using the gravity model with panel data. Research outcomes indicate that the export tax policy has a significant impact on the increase of cocoa butter export volume; yet, it does not significantly impact the increased export volume of cocoa powder. Further, Gumay (2014) performs a research on the impact of the cocoa beans export tax enforcement on the competitiveness of Indonesian processed cocoa products by using the method of the *ordinary least squares and data time series.* Research outcomes signify that the policy of the cocoa beans export tax significantly affects the increased *competitiveness of the Indonesian processed cocoa products in the international market.*

Method

The empirical model used to estimate the demand function in Indonesian and Malaysian exports follows the "imperfect substitutes" model established by Goldstein and Khan that is also used by Athanasouglu and Bardaka in estimating the export demand of manufacture products in Greece. The function of the export demand is as follows:

$$X^d = x\left(PX_g, PX_c, Y^f\right), f_1 < 0, f_2 > 0, f_3 > 0 \tag{7.2}$$

where X^d= quantity of domestic products exported to international markets, PX_g= price of domestic products, PX_c= price of competitor products in the international market, Y^f= real foreign revenue.

Further, the long-term model of the Indonesian processed cocoa exports determinant used in this research is as follows:

$$\begin{aligned} \ln\text{XIND}_t = {} & \beta_0 + \beta_1 \ln\text{DPB}_t + \beta_2 \text{PXC}_t \\ & + \beta_3 \ln\text{WMP}_t + \beta_4 \text{BK}_t + \varepsilon_t \end{aligned} \tag{7.3}$$

where $\beta_1 < 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$.

Description:

lnXIND = Natural logarithm of export volume of processed cocoa products in Indonesia in month-t (ton)

- lnDPB = Natural logarithm of the Indonesian cocoa beans price in month-t (Rp/kg)

PXC = Average export price of processed cocoa in five competitor countries of Indonesia in month-t (US$/kg)

lnWMP = Natural logarithm of the volume of processed cocoa imports in the world in month-t (ton)
BK = Dummy application of export tax of Indonesia cocoa beans, value 1 if imposed with the export tax tariff in the related month, value 0 if in the related month the export tax tariff is not implemented
ε_t = error term in month-t

The price of domestic cocoa beans is used as an independent variable on the model of Indonesian processed cocoa exports as a proxy of the Indonesian processed cocoa price. The Indonesian processed cocoa industry uses most of the domestic cocoa beans as raw material (80%). In this model, domestic beans prices are expected to have a negative relationship against the value of the Indonesian processed cocoa exports. The lower the price of domestic cocoa beans, the lower the production costs of processed cocoa so that the Indonesian processed cocoa price is expected to be lower in the international market. The lower domestic sales price will encourage the increased demands for Indonesian processed cocoa in the world.

The average processed cocoa prices in five competitor countries of Indonesia are used as an independent variable that is expected to be positively related to the Indonesian processed cocoa exports. The five competing countries selected are the United States, the Netherlands, Germany, Malaysia, and France. The high average price of processed cocoa exports in competitor countries reflect the high price of processed cocoa in the world, which will encourage the Indonesian cocoa processing industries to increase the export of its products.

The volume of processed cocoa imports in the world is used as a proxy of foreign real revenues. The greater the foreign real revenue, the higher the consumption of processed cocoa. The high consumption of processed cocoa in the world will increase export demands of the Indonesian processed cocoa products.

To identify the long-term relationship between the Indonesian processed cocoa exports and the price of domestic cocoa beans, the average price of competitor processed cocoa, the import volume of the world's processed cocoa, and the export tax policy on the Indonesian cocoa beans, the following Autoregressive Distributed Lag (ARDL) equation is established:

$$\begin{aligned}\Delta \ln \mathrm{XIND}_t = {} & \alpha + \beta_0 + \beta_1 \ln \mathrm{XIND}_{t-1} + \beta_2 \ln \mathrm{DPB}_{t-1} \\ & + \beta_3 \mathrm{PXC}_{t-1} + \beta_4 \ln \mathrm{WMP}_t + \beta_5 \mathrm{BK}_{t-1} \\ & + \sum_{i=1}^{p} \beta_{6i} \Delta \ln \mathrm{XIND}_{t-\mathrm{i}} + \sum_{j=1}^{q} \beta_{7j} \Delta \ln \mathrm{DPB}_{t-j} \\ & + \sum_{k=1}^{q} \beta_{8k} \Delta \mathrm{PXC}_{t-k} + \sum_{m=1}^{q} \beta_{9m} \Delta \ln \mathrm{WMP}_{t-m} \\ & + \sum_{n=1}^{q} \beta_{10n} \Delta \mathrm{BK}_{t-n} + \epsilon_t \end{aligned} \tag{7.4}$$

Coefficients β_1, β_2, β_3, β_4,and β_5 illustrate the coefficient of a long-term relationship.

Further, the error correction model (ECM) equation used in this research is as follows:

$$\begin{aligned}\Delta \ln \mathrm{XIND}_t = {} & \alpha + \sum_{i=1}^{p} \theta_{1i} \Delta \ln \mathrm{XIND}_{t-i} + \sum_{j=1}^{q} \varphi_{1j} \Delta \ln \mathrm{DPB}_{t-j} \\ & + \sum_{j=1}^{q} \varphi_{2j} \Delta \mathrm{PXC}_{t-j} + \sum_{j=1}^{q} \varphi_{3j} \Delta \ln \mathrm{WMP}_{t-j} \\ & + \sum_{j=1}^{q} \varphi_{3j} \Delta \mathrm{BK}_{t-j} + \gamma \mathrm{ECT}_{t-1} + \epsilon_t \end{aligned} \tag{7.5}$$

where θ and φ are the short-term coefficients and γ is the speed of adjustment.

This research also establishes the determinant model of the Malaysian processed cocoa exports. Unlike the model of the Indonesian processed cocoa exports, the Malaysian model of processed cocoa exports also refers to the export demand function established by Goldstein and Khan. Nevertheless, the proxy used for the variable of domestic processed cocoa prices is different from the proxy used in the model of the Indonesian processed cocoa exports. Differences in the proxy used are attributable to differences in the characteristics of raw materials used in the cocoa processing industries of Indonesia and Malaysia.

Unlike Indonesia that expends most of the domestic cocoa beans as raw material, Malaysia utilizes most of the imported cocoa beans as raw material for the processed cocoa. The determinant model of Malaysian processed cocoa exports is as follows:

$$\ln XMAS_t = \gamma_0 + \gamma_1 \ln WPB_t + \gamma_2 PXC_t + \gamma_3 \ln WMP_t + \gamma_4 BK_t + \varepsilon_t \quad (7.6)$$

where $\gamma_1 < 0$, $\gamma_2 > 0$, $\gamma_3 > 0$, $\gamma_4 < 0$.

Description:

lnXMAS = Natural logarithm of export volume of processed cocoa products in Malaysia in month-t (ton)
lnWPB = Natural logarithm of the international cocoa beans prices in month-t (US$/ton)
PXC = Average export price of processed cocoa in five competitor countries of Malaysia in month-t (US$/kg)
lnWMP = Natural logarithm of import volume of processed cocoa in the world in month-t (ton)
BK = Dummy application of Indonesian export tax of cocoa beans by Indonesia, value 1 if in the related month the export tax tariff is imposed, value 0 if in the related month the export tax tariff is not imposed
ε_t = error term in month-t

The international cocoa beans prices are applied as independent variables of Malaysia's processed cocoa export model. The Malaysian processed cocoa industries exploit most of the imported cocoa beans as raw material (99%). In this model, the international beans prices are expected to have a negative relationship against the value of the Malaysian processed cocoa export. The lower the price of international cocoa beans, the lower the production costs of processed cocoa so that the price of the Malaysian processed cocoa is lower. The lower selling price of the Malaysian processed cocoa will encourage demands for Malaysian processed cocoa in the world.

In the variable of average processed cocoa prices from Malaysia's competitor countries in this model are the United States, the Netherlands, Germany, Indonesia, and France. This variable is expected to have a positive relationship with the processed cocoa exports from Malaysia. The higher average export price of processed cocoa in competitor countries reflects the higher processed cocoa prices in the world that could encourage the Malaysian processed cocoa industries to increase exports.

The proxy of real foreign revenues employed in the model of the Malaysian processed cocoa exports, namely the import value of the world processed cocoa. Consumption of the world processed cocoa will increase in line with increased export demands for Malaysian processed cocoa products.

To indicate the long-term relationship between Malaysian processed cocoa exports and the international cocoa beans prices, the average price of processed cocoa competitors, the import volume of the world processed cocoa, and the export tax policy on the Indonesian cocoa beans, the following ARDL equation is established:

$$\begin{aligned}\Delta \ln \mathrm{XMAS}_t = {} & \alpha + \beta_0 + \beta_1 \ln \mathrm{XMAS}_{t-1} + \beta_2 \ln \mathrm{WPB}_{t-1} \\ & + \beta_3 \mathrm{PXC}_{t-1} + \beta_4 \ln \mathrm{WMP}_t + \beta_5 \mathrm{BK}_{t-1} \\ & + \sum_{i=1}^{p} \beta_{6i} \Delta \ln \mathrm{XMAS}_{t-i} + \sum_{j=1}^{q} \beta_{7j} \Delta \ln \mathrm{WPB}_{t-j} \\ & + \sum_{k=1}^{q} \beta_{8k} \Delta \mathrm{PXC}_{t-k} + \sum_{m=1}^{q} \beta_{9m} \Delta \ln \mathrm{WMP}_{t-m} \\ & + \sum_{n=1}^{q} \beta_{10n} \Delta \mathrm{BK}_{t-n} + \epsilon_t \end{aligned} \tag{7.7}$$

Coefficients β_1, β_2, β_3, β_4,and β_5 illustrate the coefficient of the long-term relationship.

The ECM equation for the determinant model of the Malaysian processed cocoa export is as follows:

$$\begin{aligned}\Delta \ln \mathrm{XMAS}_t = {} & \alpha + \sum_{i=1}^{p} \theta_{1i} \Delta \ln \mathrm{XMAS}_{t-i} + \sum_{j=1}^{q} \varphi_{1j} \Delta \ln \mathrm{WPB}_{t-j} \\ & + \sum_{j=1}^{q} \varphi_{2j} \Delta \mathrm{PXC}_{t-j} + \sum_{j=1}^{q} \varphi_{3j} \Delta \ln \mathrm{WMP}_{t-j} \\ & + \sum_{j=1}^{q} \varphi_{3j} \Delta \mathrm{BK}_{t-j} + \gamma \mathrm{ECT}_{t-1} + \epsilon_t \end{aligned} \tag{7.8}$$

where θ and φ are the short-term coefficients and γ is the speed of adjustment.

This research applies secondary data in the form of monthly data from 2006 to 2015. The export volume of processed cocoa products is the addition of the export volume of cocoa paste products (HS. 1803), cocoa butter (HS. 1804), and cocoa powder (HS. 1805). Data of the processed cocoa export volume, average price of competitor countries processed cocoa, and import volume of the world processed cocoa are sourced from trademap.org. Data of domestic cocoa beans prices are sourced from bappebti.go.id, while international cocoa beans prices are obtained from icco.org. Data on the export tax of the Indonesian cocoa beans are obtained from kemendag.go.id. The estimation method in this research uses the ECM by using the ARDL method developed by Pesaran et al. (2001). According to Nkoro and Uko (2016), the ARDL co-integration techniques can be used to determine the long-term relationship between series and different levels of integration. Nkoro and Uko (2016) add that the ARDL model can produce ECM so that the short-term dynamics and long-term relationships can be identified on a single model. Data processing in this research is conducted by using Eviews 9 software.

Outcomes and Analysis

Research Outcomes

Estimation Outcome Model of the Indonesian Processed Cocoa Exports

The initial step in performing the estimation based on the ARDL model is by conducting a stationary test to ensure that data used are not stationary at the second difference level. In this research, the stationary test employs the Augmented Dickey Fuller method. Test outcomes of stationary data denote that at the first difference level all variables are stationary.

Furthermore, the optimum lag determination is conducted to be used in the equation. The optimum lag determination applies the Schawrz information criterion (SIC). The outcomes of SIC imply that the optimal lag for the dependent variable is 2. Then the optimum lag for the independent DPB variable is 0, PXC is 1, WMP is 0, and BK is 1.

Estimation outcomes with the best model for the Indonesian processed cocoa exports are shown in Table 7.1.

The next phase is to perform the diagnostic test and stability test to prevent misinterpretation. The diagnostic test of serial correlation of the Lagrange multiplier (LM) test indicates that the *p*-value is 0.2103 and the heteroskedasticity test indicates that the *p*-value is 0.1486. The outcomes signify that the ARDL model in this research does not contain serial correlation and heteroskedasticity. The next test is the stability test using the cumulative sum (CUSUM) test. The outcome of the CUSUM test suggests that all parameters of the ARDL model are stable.

After performing the diagnostic test and stability test, further phase is conducting the Bound Testing Co-integration to observe whether there is a co-integration relationship between the variables. The Bound Testing Co-integration outcomes are shown in Table 7.2.

The above outcomes of the Bound Testing Co-integration imply that there is a co-integration relationship between the variables of the domestic cocoa beans prices, the average price of processed cocoa of the competitor countries of Indonesia, the import volume of the world processed cocoa, and the dummy application of export tax on the Indonesian cocoa

Table 7.1 Estimation outcomes with the best model for the Indonesian processed cocoa exports

Variable	Coefficient	Prob.
LN_XIND(−1)	0.434425	0.0000
LN_XIND(−2)	0.329083	0.0001
LN_DPB	−0.018190	0.8190
PXC	0.254758	0.1131
PXC(−1)	−0.347288	0.0224
LN_WMP	0.369232	0.0389
BK	0.034949	0.5746
BK(−1)	0.163398	0.0118
C	−1.773776	0.3458
R-squared	0.852855	
Adjusted *R*-squared	0.842055	
F-statistic	78.97074	
Prob(*F*-statistic)	0.000000	

Table 7.2 Outcomes of the Bound Testing Co-integration

Test statistic	Value	*k*
F-statistic	4.061106	4
Critical value bounds		
Significance	I(0) bound	I(1) bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

beans with the variable volume of the Indonesian processed cocoa exports. This can be observed from the F-statistic value that is greater compared to 5% critical values.

The next phase is to estimate the ECM equation and co-integration equation, with the following outcomes in Tables 7.3 and 7.4.

Estimation Outcomes of the Malaysian Processed Cocoa Export Model

The determinant estimation phase of the Malaysian processed cocoa exports is similar to the determinant estimation phase of the Indonesian processed cocoa exports. The first phase is performing a stationary test at

Table 7.3 Estimation outcomes of the ECM equation

Variable	Coefficient	Prob.
D(LN_XIND(−1))	−0.329083	0.0001
D(LN_DPB)	−0.018190	0.8190
D(PXC)	0.254758	0.1131
D(LN_WMP)	0.369232	0.0389**
D(BK)	0.034949	0.5746
CointEq(−1)	−0.236492	0.0001*

*Significant at level 1%, **Significant at level 5%

Table 7.4 Estimation outcomes of the co-integration equation

Variable	Coefficient	Prob.
LN_DPB	−0.076918	0.8211
PXC	−0.391263	0.0970***
LN_WMP	1.561287	0.0187**
BK	0.838704	0.0036*
C	−7.500364	0.3240

*Significant at level 1%, **Significant at level 5%, ***Significant at level 10%

the level degree, with data of the stationary test outcomes showing that all variables are not stationary at the level degree except the variable of the Malaysian import value of cocoa beans. Therefore, the stationary test is continued to the first difference level. Data of the stationary test outcomes denote that at the first difference level all variables are already stationary. Further, an optimum lag determination is performed that will be used for the equation. The determination of the optimum lag utilizes the SIC. The outcomes of SIC indicate that the optimal lag for the dependent variable is 1. Then the optimum lag for the DPB independent variable is 0, PXC is 0, WMP is 0, and BK is 0.

Estimation outcomes with the best model for the Indonesian processed cocoa exports are shown in Table 7.5.

The next step is to perform a diagnostic test and stability test to prevent misinterpretation. The diagnostic test on the serial correlation of the LM test indicates that the *p*-value is 0.5113 and the heteroskedasticity test indicates that the *p*-value is 0.1574. These outcomes indicate that the ARDL model in this research does not contain serial correlation and heteroskedasticity. The subsequent test is the stability test by using the CUSUM test. The outcomes of the CUSUM test indicate that all parameters in the ARDL model are stable.

Table 7.5 Estimation outcomes for the best model of Malaysian processed cocoa exports

Variable	Coefficient	Prob.
LN_XMAS(−1)	0.488575	0.0000
LN_WPB	−0.130302	0.2217
PXC	0.087323	0.1034
LN_WMP	0.077997	0.4028
BK	−0.013418	0.6914
C	4.835475	0.0033
R-squared	0.417014	
Adjusted *R*-squared	0.391218	
F-statistic	16.16596	
Prob(*F*-statistic)	0.000000	

Table 7.6 Outcomes of the Bound Testing Co-integration

Test statistic	Value	*k*
F-statistic	7.460052	4
Critical value bounds		
Significance	I(0) bound	I(1) bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Further, the Bound Testing Co-integration is conducted to observe whether there is a co-integration relationship between the variables. The Bound Testing Co-integration outcomes are shown in Table 7.6.

From the above Bound Testing Co-integration outcomes it can be observed that there is a co-integration relationship between the variables of the domestic cocoa beans prices, the average price of processed cocoa of the competitor countries of Malaysia, the import volume of the world processed cocoa, and the dummy application of export tax on the Indonesian cocoa beans with the variables of the export volume of Malaysian processed cocoa. This can be observed from the F-statistic value that is greater compared to the four critical values.

The next phase is to estimate the ECM equation and co-integration equation. Estimation outcomes of the ECM equation are shown in Tables 7.7 and 7.8.

Table 7.7 Estimation outcomes of the ECM equation

Variable	Coefficient	Prob.
D(LN_WPB)	−0.130302	0.2217
D(PXC)	0.087323	0.1034
D(LN_WMP)	0.077997	0.4028
D(BK)	−0.013418	0.6914
CointEq(−1)	−0.511425	0.0000*

*Significant at level 1%

Table 7.8 Estimation outcomes of the co-integration equation

Variable	Coefficient	Prob.
LN_WPB	−0.254782	0.2104
PXC	0.170744	0.0870***
LN_WMP	0.152509	0.4048
BK	−0.026237	0.6909
C	9.454903	0.0005

***Significant at level 10%

Discussion

Export of the Indonesian Processed Cocoa

Estimation outcomes of the determinant model of the Indonesian processed cocoa exports as presented in Table 7.4 indicate that in the long term, variables of export tax on cocoa beans, the import volume of the world processed cocoa, and the average of processed cocoa prices of the competitor countries of Indonesia significantly affect the export volume of the Indonesian processed cocoa. The graph on the export volume development of the Indonesian processed cocoa is displayed in Fig. 7.1.

The policy on the imposition of export tax on cocoa beans in the long term will significantly affect the export volume increase of the Indonesian processed cocoa. The increased export volume of the Indonesian processed cocoa that is affected by the increased export tax on the Indonesian cocoa beans already conforms to the hypothesis presented in this research. The policy of the imposition of export tax on cocoa beans leads to a decreased cocoa beans export of Indonesia. The declined export of the Indonesian cocoa beans will cause an abundance of domestic cocoa beans raw materials that encourages investments in the national cocoa

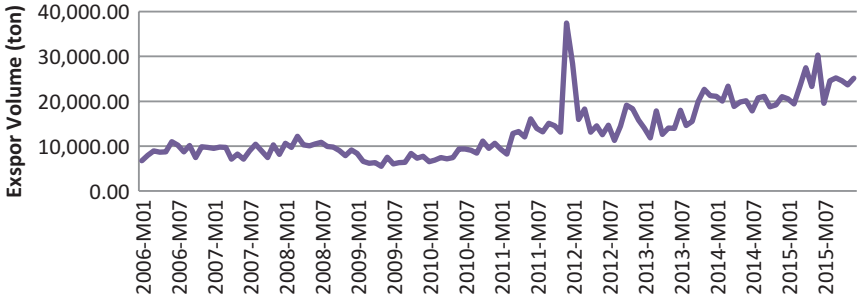

Fig. 7.1 Development of processed cocoa exports of Indonesia. Source: Authors, from trademap

processing industries. The increasing number of the Indonesian cocoa processing industries leads to increased production of processed cocoa that may affect the increase of the Indonesian processed cocoa export value. On the word of Piermartini (2004), domestic processing industries will benefit from the imposition of export tax on the input of the decreased raw material prices so that it may increase competitiveness and expansion of the international market share.

Variables of domestic cocoa beans prices in the long term do not have significant effects on the export volume of the Indonesian processed cocoa. This is assumed because the trend of the domestic cocoa prices is affected by the trends of international cocoa beans prices. As stated by Bappebti (2014), domestic prices of cocoa beans are strongly affected by international prices. Accordingly, when international cocoa beans prices decrease, it will lead to a decreased price of the domestic cocoa beans, and thereby impacting a decreased price of processed cocoa, internationally and in Indonesia.

The average price of processed cocoa in five competitor countries in the long term will have a negative and significant effect. This condition does not conform to the hypothesis presented in this research. The decline of the processed cocoa average price in five competitor countries precisely and significantly boosts the value of the Indonesian processed cocoa exports. This is allegedly caused by the increased quality of the Indonesian processed cocoa so that the demands for the Indonesian processed cocoa in the world continue to climb although the prices of processed cocoa in

the world fall. The decline in the world processed cocoa beans price is expected to be utilized by the processed cocoa user industry (food and beverage industry) to augment the demand for raw materials. This is purportedly to have boosted the export volume of processed cocoa from Indonesia.

The import volume variables of the world processed cocoa will have a positive and significant impact in the long term. This long-term condition conforms to the hypothesis of this research. The higher the import volume of the world processed cocoa, the higher the export volume of the Indonesian processed cocoa. Increased consumption of processed cocoa that is marked by the increased total value of processed cocoa of the world will encourage the export demand for processed cocoa from Indonesia.

From the estimation outcomes of the above ECM equation, the coefficient value of Error Correction Term (ECT) (-1)/CointEq(−1) is −0.23 and significant. This means that a 23% disequilibrium is occurring between the lnXIND and lnDPB, PXC, lnWMP, while the BK will be re-corrected within one period (one month). The negative coefficient mark signifies that there is a corrective mechanism for the long-term balance.

Processed Cocoa Exports of Malaysia

The determinant model on the estimation outcomes of the Malaysian processed cocoa export in the long term as presented in Table 7.8 suggests that independent variables which significantly affect the Malaysian export volume of processed cocoa are only average variables of the processed cocoa prices in the competitor countries of Malaysia. The dummy variables on the policy of the imposition of export tax on the Indonesian cocoa beans have a negative effect, yet are not significant against the export volume of the Malaysian processed cocoa. Even though the import of cocoa beans from Indonesia will decrease after the imposition of the export tax is applied to the Indonesian cocoa beans, this does not affect the Malaysian export of processed cocoa. The policy of applying the export tax on the Indonesian cocoa beans is expected not to cause an increase in the international cocoa beans prices. As said by Ali and Salim, increased prices on products imposed with the export tax in the world may occur if the export volume of

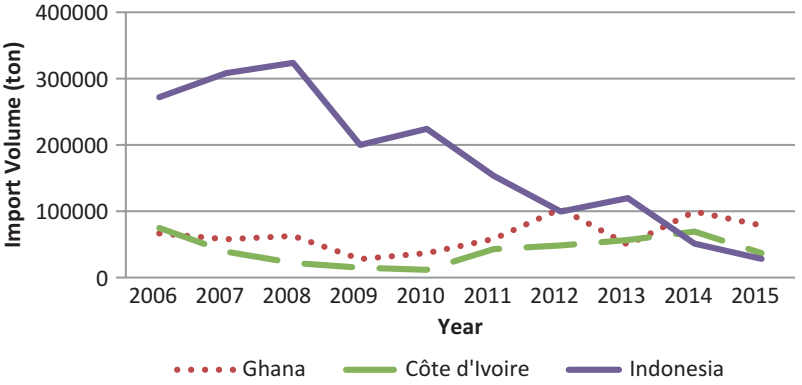

Fig. 7.2 Development of imported cocoa beans volume by Malaysia. Source: Authors, from trademap

the products imposed by the export tax drops and no other country fills the declining export volume with similar products. The decreased supply of the Indonesian cocoa beans is anticipated by Malaysia by transferring the import of cocoa beans to the Ivory Coast and Ghana, so that the supply of cocoa beans as raw materials in the Malaysian processed cocoa industries is still maintained (Fig. 7.2).

Price variables on the international cocoa beans that are applied as a proxy of the domestic processed cocoa price and import volume of processed cocoa in the world do not significantly affect the processed cocoa export of Malaysia. This outcome is different from the research of Hameed and Arshad (2014) where, in the long term, the cocoa butter price of Malaysia will lessen the export volume of Malaysian cocoa butter. The insignificant outcomes are expected because the Malaysian processed cocoa industries succeed in maintaining the stability of the processed cocoa export volume by safeguarding the selling price of their processed cocoa in the world market to remain stable, regardless of the hike in cocoa prices. Additionally, the stable export volume of the Malaysian processed cocoa is supposedly attributable to the high quality of the processed cocoa products. Hameed and Arshad (2014) add that the Malaysian cocoa butter products have a unique characteristic of a high melting point. This character is well suited to be used as a raw material for chocolate products in warm climate countries, resulting in Malaysia being the largest exporter of cocoa butter products in the world.

Variables of processed cocoa average prices in five competitor countries have a positive and significant effect against the export volume of the Malaysian processed cocoa in the long term. The average increase of processed cocoa prices in five competitor countries can be interpreted as the increase of the world export price of processed cocoa exports that may encourage Malaysian processed cocoa industries to export. The increased value of the Malaysian processed cocoa exports that is down to the increased average price of processed cocoa in competitor countries conforms to the hypothesis presented in this research.

From the estimation outcomes of the ECM equation against the model of the Malaysian processed cocoa exports, a coefficient value of ECT(-1)/CointEq(−1) is obtained at −0.51 and significant. This means that a 51% disequilibrium that occurs between lnXMAS and lnWPB, PXC, lnWMP, and BK will be re-corrected in one period (one month). The negative coefficient mark denotes that there will be a correction mechanism on the long-term balance.

Conclusion

Data analyses outcomes imply that the imposition of the export tax on the Indonesian cocoa beans significantly affect the increased value of the Indonesian processed cocoa exports in the long term. In the interim, for Malaysia, the imposition of the export tax on the Indonesian cocoa beans does not significantly affect the decreased value of the Malaysian processed cocoa exports in the long term.

The imposition of the export tax on the Indonesian cocoa beans in the long term will affect the increased value of the Indonesian processed cocoa exports. As the policy on the imposition of the tariff will significantly impact in the long term, it is best to continue the implementation of the policy. The policy on the imposition of the export tax on the Indonesian cocoa beans does not significantly affect the decreased processed cocoa export of Malaysia. Consequently, in order to be able to compete with the Malaysian processed cocoa products in the world market, the Indonesian processed cocoa industries need to continuously improve the quantity and quality of the products.

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8

Importers' Responses to the Anti-dumping Duty of Steel in Indonesia

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Introduction

International trade has novel issues of new protectionism. In line with the decrease in tariffs for imported goods, some World Trade Organization (WTO) member states introduce a new policy that seems to become a protectionist policy for their domestic industry. The protection against "price discrimination" and "pricing strategy" activities—that which importers carry out to gain market power are also known as dumping (Gifford and Kudrle 2009)—is an instance of such policy. After being ratified in 1994 by WTO, the anti-dumping policy has been implemented by many of the member states. In the Anti-dumping Agreement (1994), a practice of international trade could be categorized as dumping if the selling price of the product sold to the country of destination is lower than the market price in the country of origin. If the country of

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destination (the importer) is able to prove that its domestic industry was harmed by the dumping practices, the importer can exercise anti-dumping measures against the goods sold by the exporter. Even so, researchers have different opinion about the anti-dumping policy.

The anti-dumping policy is a form of new protectionism that is widely used to protect domestic producers from "unfair" international trade practice. Bown suggests that the anti-dumping policy is generally issued by developed countries such as the United States, the European Union (EU), Canada, and Australia. However, since the beginning of 2000, the anti-dumping policy was also initiated by developing countries, including Indonesia.

Experts are divided over the effectiveness of anti-dumping policy. Viner (1923) and Marsh (1998) argue that anti-dumping policy is an efficient instrument to protect domestic companies from pricing strategy undertaken by the company abroad. The addition of anti-dumping tariffs is considered able to restore prices of exported goods from the country impacted by anti-dumping duties (ADs) (named country) to the reasonable market price so that domestic products can be competitive in domestic market. At the interim, Prusa (1999) is still not convinced of the effectiveness of the anti-dumping policy considering there are unintentional trade effects that may occur due to the implementation of the anti-dumping policy.

One of the unintentional trade effects that may result from the implementation of the anti-dumping policy is the presence of trade diversion (Bown and Crowley 2007). Domestic consumers who previously traded more efficiently with the named countries, but due to the imposition of anti-dumping tariffs, have lost supplies from the named countries and are forced to switch to other trade partner that is less efficient. For instance, after the United Kingdom imposed anti-dumping duties on New Zealand butter, it switched to Danish butter which was priced higher.

Protection measures that importing countries can opt are actually not only in the form of anti-dumping duties. There are such other options as countervailing, quota restrictions, and safeguards. Nevertheless, anti-dumping is considered a better protectionist policy as Tharakan (1995) argues. He suggests that anti-dumping duties are better than quota restrictions since anti-dumping duties will not increase additional cost

when demand increases, while in quota restrictions the extra cost will be even greater due to the increased consumers' demand. On the other hand, safeguards and countervailing are deemed expensive policies that pose difficulties in the implementation. Anti-dumping is considered easier to do so; it is more often chosen to anticipate "unfair" international trade (Neufeld and CNUCED 2001; Tharakan 1995).

However, anti-dumping is believed to be able of giving effect in the future when the countries accused of dumping take countermeasures. Moreover, anti-dumping tends to drive price increase in domestic market, thus reducing domestic consumers' welfare. As Zarnic and Vandenbussche point out, trade barrier causes domino effect, that is exports re-route by exporting countries, which could eventually lead to implementation of similar protection by the new export destination countries. This situation is hurting the exporting country.

Developing countries have different characteristics with developed countries that have become the subject of research on the impact of anti-dumping. According to www.worldsteel.org data, Indonesia in the year 2015 was in the 14th rank among national steel importers in the world by value of imports which amounted to 11.4 million tons, while the European Union and the United States rank the 1st and 2nd with the value of imports reaching 37.7 million tons and 36.5 million tons, respectively. Indonesia has very low average steel consumption per capita compared to that of developed countries such as the United States and the European Union. Although the trend has increased, Indonesia's consumption in 2007 only touched 37.3 kg per capita before jumping to 58.3 kg per capita in 2016. The figure is far below the United States which in 2007 consumed 400.5 kg per capita and the European Union which took up 448.1 kg per capita until 2016. The consumption trend decreased until the year 2016 when the US consumption stood at 318.4 kg per capita and EU consumption hit 338.7 kg per capita.

With such different characters, anti-dumping policy may potentially have different impacts for Indonesia's context. The authors therefore attempt to undertake research on anti-dumping in such developing countries as Indonesia. As for the types of goods that dominate the dumping investigation in 2014 were metal, especially steel. Indonesia is chosen as

its government has imposed anti-dumping measures on four types of carbon steel products since the period 2010–2013, namely H&I Section, Hot Rolled Coil (HRC), Hot Rolled Plate (HRP), and Cold Rolled Sheet/Coil (CRC).

Literature Review

Conceptualization

Indonesia's steel industry is currently categorized as a strategic manufacturing industry by the Ministry of Industry. Nevertheless, it is one of the industries with weak competitiveness according to the Ministry's criteria. This encourages the government to facilitate the industry to be able to compete with imported products. Along with the increasing number of demands in iron and steel products that are not accompanied by production capacity and production cost efficiency, it is feared that the industry would not be able to compete with imported products to meet domestic needs. This is evident in the deficit of net export of iron and steel products which amounts to 9.5 million tons (USD9.4 million) in the year 2014.

On the other hand, China becomes the world's largest iron and steel manufacturer that is able to generate a total production of 823 million tons (2014) or approximately 49% of the total world production (source: World Steel Organization) and posts a sizeable value of iron and steel net exports accounting for 78 million tons (2014) or USD 33 million (2014). With the slowdown in China's economy, iron and steel products are currently experiencing supply (crude) excess. This excess is further coupled with government policies which no longer give incentives to the construction sector so as to force domestic manufacturers to export its products. According to the World Steel Organization data, in 2015 China exported 112 million tons, with 20–50% cheaper price than that of any other producer (source: Forbes Asia).

Facing such unfavorable situation, the Indonesian steel industry filed an anti-dumping petition to Indonesian Anti-Dumping Committee (KADI) against several steel products from such countries as China,

Taiwan, Korea, Japan, Malaysia, Singapore, Vietnam, and Ukraine in the period of 2008 until 2011. The petition was approved and enacted as Minister of Finance Decree following a lengthy (which could take up to two years) investigation. Nonetheless, despite the anti-dumping ruling, Indonesian steel producers still complain about the flooding imports of steel. This would become an interesting phenomenon if trade diversion occurs amid the anti-dumping policy, which will then be deemed ineffective. The situation would be more alarming as the United States recently confirmed anti-dumping duties on Chinese steel products. A trade diversion from the US anti-dumping measures, if eventually takes place, would make Indonesia's steel market further flooded by imported products.

It is worth noting that the anti-dumping policy in Indonesia mostly impacts steel products if viewed from the imports value side. As many as 78.3% of imports value from products that are subject to AD consist of steel products which vary from HRC, CRC, HRP, to H&I Section. This research will focus on anti-dumping policy in those four products within the period 2008–2015. It is questionable whether the anti-dumping policies are successfully tapping steel imports or causing trade diversion as demonstrated in the preceding studies countries conducted in such developed nations as those of the European Union and the United States.

Trade diversion that may occur as the impact of the anti-dumping policy takes form as the migration of the source of imported goods from the countries that are subject to anti-dumping tariffs to other countries that are not. In numerous studies, the exploring countries that are hit by AD is referred to as "named countries", while other countries that are not impacted by AD are often referred to as "non-named countries". Table 8.1 illustrates that the named countries for HRC products are Korea and Malaysia, while the remaining 43 countries (not hit by AD) are non-named countries. Prior researches managed to identify the presence of trade diversion from named countries to non-named countries due to the anti-dumping policy imposed by the developed countries. The authors intend to find out whether trade diversion also takes place in developing countries such as Indonesia.

Table 8.1 Indonesia's anti-dumping actions against imports of steel products

Product	Anti-dumping petitioners	Anti-dumping investigation initiation date	Anti-dumping enactment date (Finance Minister Decree/PMK)	Named countries and anti-dumping tariffs
HRC	Krakatau Steel	05-11-2008	07-02-2011 23/ PMK.011/2011	Korea: 3.8%Malaysia: 48.4%
HRP	Krakatau Steel	31-03-2010	10-01-2012 150/ PMK.011/2012	China: 10.47%Singapore: 12.33%Ukraine: 12.50%
CRC	Krakatau Steel	24-06-2011	19-03-2013 65/ PMK.011/2013	China: 13.6–43.5% Taiwan: 5.9–20.6% Korea: 10.1–11.0% Japan: 18.6–55.6% Vietnam: 12.3–27.8%
H&I Section	Gunung Garuda	30-06-2009	23-11-2010 195/ PMK.011/2010	China: 6.63–11.93%

Previous Empirical Research

Neufeld and CNUCED (2001) argues that anti-dumping is a good instrument to reduce the negative impact in a free market regime. If this opinion is true, with anti-dumping measures, the competition between the domestic industry and the exporting countries would become neutral again. In reality, however, an anti-dumping action in one country is continuously followed by similar measure in other countries. In a developing country such as India, Ganguli (2008) finds, although still in early phase of investigation, a volume drop of steel imports by up to 50%. It seems that the announcement of dumping investigation already shocks the importers so that they respond by lowering the imports volume. Similar results are also found in the research by Vandenbussche and Zanardi (2010).

As discussed earlier, the study seeks to identify one of the unintentional trade effects from the imposition of anti-dumping policy, that is trade diversion. There are sizeable researches in trade diversion as the result of anti-dumping policy. Subsequent researches on the impact of anti-dumping are conducted by adding more details of categorization of

named countries and non-named countries. Applying this model, Prusa (1996) finds that AD in the United States manages to limit the volume of imports from the named countries, but causes shift of imports to non-named countries. This shift is defined as "trade diversion" in his research. Even though trade diversion occurs so that the total volume of imports does not change much, at least an anti-dumping policy is still able to raise the selling price of imported goods so as to make the domestic industry able to compete.

Other than that of Prusa (1999), another study that identifies "trade diversion" from named countries to non-named countries is conducted by Konings et al. (2001). This research takes European Union as object and finds out that the trade diversion in European Union is not as strong as that found in the United States as discussed in Prusa's study. In this research, the size of the diversion seems to be influenced by the amount of the anti-dumping tariffs. The results of this research are supported by Brenton (2001), who also examines the trade diversion in European Union and identifies a trade diversion from named countries to non-named countries.

Inspired by the results of research by Konings et al. (2001), Mendieta performs similar research in Mexico utilizing the same method. His research reveals that the volume of imports from named countries fall and a diversion of volume to non-named countries like Indonesia takes form. Since the volume of imports has not changed much post imposition of anti-dumping, Mendieta opines that anti-dumping policy is not effective in controlling the volume of imports.

Moreover, Bown and Crowley (2007) perform research to unmask whether a trade diversion occurs from the anti-dumping policy on Japan, while Park Soon-Chan (2009) does similar study for the case of China. Employing ordinary least squares (OLS) and generalized method of moments (GMM) methods, both studies demonstrate that in addition to trade diversion stemming from anti-dumping actions on China and Japan, a trade depression—which is the decrease in exports value of named countries as a whole in the global market—also come off.

The trade depression phenomenon is also captured in the research by Egger and Nelson (2011) and Prusa (2013). Egger and Nelson use panel data and gravity model data for the period of 1948 up to 2001. The

results suggest that anti-dumping measures give a negative effect on the international trade in the world because it significantly lowers the total value of world trade, thereby reducing the people's welfare. Besides revealing trade depression, Prusa (2013) also discovers the fact that the impact of imports value drop is greater at the time of the initial dumping investigation than it is at the time of the anti-dumping policy decision.

Researches on the impact of anti-dumping policy on trade are quite plentiful and broad, yet there has been no consensus on what kind of impact that emerges. Some of the above researches (Prusa 1999; Brenton 2001; Konings et al. 2001) discover that anti-dumping policy is effective in either limiting or reducing imports from the named countries. Nonetheless, it remains dubious whether the imports shift to non-named countries or affect domestic production, provided that the empirical results depend upon which country that imposes anti-dumping policy and which industry that is hit by such policy.

An industry-based research is performed by Lee and Jun (2004) utilizing data of anti-dumping policy in the United States to observe whether trade diversion occurs in the chemical, metal casting, and steel industries. The study stumbles on the presence of trade diversion in the chemical and metal casting industries, but not in the steel industry. Another similar study is also carried out by Durling and Prusa (2006) that applies world trade data of HRC steel products for the period 1996–2001. Trade destruction stemming from the anti-dumping policy is identified but not trade diversion. However, when the data are limited to only the United States, empirical results indicate trade diversion.

From the earlier elaboration, it can be implied that this study attempts to contribute to the literature that discusses the impact of the anti-dumping policy on the importation of HRC, CRC, HRP, and H&I section. The impact of the anti-dumping policy which is observed includes:

1. Trade reduction/restriction of named countries due to AD on steel products in Indonesia
2. Trade diversion from non-named countries due to AD on steel products in Indonesia

Hypothesis

Pursuant to theories and prior empirical researches, the hypothesis proposed in this research is the occurrence of trade reduction/restriction from named countries and the existence of trade diversion to non-named countries because of AD on steel products in Indonesia.

Research Methods

Data Source

The data that will be used in this quantitative research are taken from transactional Notice of Imports (PIB) sourced from the Directorate General (DG) of Customs and Excise, Ministry of Finance. This research will look into the data from the year 2007, which is the year in which dumping investigation on HRC products from Korea and Malaysia started, until the year 2015 or two years after imposition of AD on CRC products from China, Taiwan, Korea, Japan, and Vietnam. The GDP data are obtained from the World Bank.

Based on the available data, this research employs sample of transaction data of steel imports in Indonesia for the period 2007–2015 considering that the anti-dumping policy was issued in that period. Nevertheless, since the amount of data between individuals is not identical, the unbalanced panel is used. The sample countries are listed in Table 8.2.

Empirical Specification

The econometrics model that is utilized is multiple linear regression OLS, referring to the model specifications by Konings et al. (2001) combined with variable control used by Bown and Crowley (2007). In the model by Konings et al. (2001), a variable Number (dummy number of named countries with Number = 1 if the number of named countries for certain HS products at certain times is three or more) is used, but the authors apply variable market share (dummy percentage of the total number of

Table 8.2 Sample countries

Category	Countries
Named country	China, Japan, Republic of Korea, Malaysia, Singapore, Taiwan, Ukraine, Vietnam
Non-named country	Argentina. Australia, Austria, Bahrain, Belgium, Brazil, Bulgaria, Canada, Chile, Czech Republic, Denmark, Ecuador, Finland, France, Georgia, Germany, Hong Kong SAR, India, Italy, Jordan, Kazakhstan, Kyrgyz Republic, Luxembourg, Mexico, the Netherlands, New Zealand, Niger, Norway, Papua New Guinea, Pakistan, Philippines, Poland, Portugal, Puerto Rico, Romania, Russian Federation, Saudi Arabia, Slovak Republic, Slovenia, South Africa, St. Vincent and the Grenadines, Swaziland, Sweden, Thailand, Tunisia, Turkey, the United Kingdom, the United States, Spain, Switzerland, Turkmenistan, United Arab Emirates, Virgin Island, Democratic People's Republic of Korea.

Source: DG of Customs and Excise (2018)

imports from named countries compared to total imports with market share = 1 if percentage of imports from named countries reaches 50% or more). This is because the use of reference of three countries is less consistent. For instance, although there are three countries that impose AD for HRP, those countries only constitute 32% of Indonesian HRP imports.

The variables of exporting country's GDP and productivity of the domestic industry as discussed in the research by Bown and Crowley (2007) are used as independent variables. The GDP variable is utilized as their research takes the United States and Japan as objects that own production network between industries of the two countries. As the researchers do not see clearly the existence of production network between Indonesia and steel exporting countries, the researchers do not use the exporter's GDP variable. On the other hand, the productivity of the steel industry does not become the focus of this research, so that the domestic steel industry's productivity is not used as an independent variable.

$$\ln M_{jit} = \alpha_0 + \beta_1 \ln M_{ijt-1} + \beta_2 \mathrm{AD}_{ijt} + \beta_3 \mathrm{Named}_{it} + \beta_4 \mathrm{Marketshare}_{ijt} + \beta_5 \ln Y_t + \beta_6 \ln e_{ijt} + \beta_7 \ln p_{ijt} + \varepsilon_{ijt}$$

Table 8.3 Variable and data source

Variable	Description	Unit	Source
M_{ijt}	The value of imports of products of HS *i* of group *j* (named, non-named) at time *t*	(m^3)	Notice of Imports (PIB) of the Directorate General of Customs and Excise
M_{ijt-1}	The value of imports of products of HS *i* of group *j* (named, non-named) in a time before *t*	(m^3)	Notice of Import goods (PIB) of the Directorate General of Customs and Excise
AD_{ijt}	AD tariffs for HS product *i* to country *j* at time *t*	(%)	Finance Minister Regulation
$Named_{it}$	Dummy imposition of AD on country for HS *i* at time *t*, 1 = named countries, 0 = non-named countries	1 dan 0	Finance Minister Regulation
$Marketshare_{ijt}$	Dummy percentage of imports from named countries for HS *i* in *t*, 1 = 50% or more, 0 = less than 50%	1 dan 0	Notice of Imports (PIB) of the Directorate General of Customs and Excise
Y_t	GDP of Indonesia at time *t*	(Billion US$)	data.worldbank.org (accessed in May 2018)
e_{ijt}	Exchange rates used against the rupiah transactions	(IDR)	World Development Indicators (2018)
p_{ijt}	The price of goods *i* of country *j* at time *t*	1 dan 0	World Development Indicators (2018)

In the above equation, i represents HS steel product code, j represents country (named or non-named country), t represents period, α_0 represents constant intercept from parameter estimate,β_1 to β_9 represent slope of parameter estimate, while ε_{ijt} represent error term. For more details, Table 8.3 is a description of the variables used in this study.

Methods of Estimation

This research applies OLS with panel data in the estimation. Yet, due to the different number of observations in each country, it is called unbalanced panel. Greene states that by using panel data, there is a flexibility

to model behavior differences between individuals. In addition, by having more unit cross section, data panel can minimize biased results. Due to the use of dummy named/non-named country in this study, the study is approached with fixed-effects model. The fixed-effects model utilizes constants as parameters of the regression (intercept). Assuming there are no statistical problems, the fixed effect can be estimated consistently so that estimation parameters depend on the impact of country/region and year in samples (Hsiao 2004).

Results and Analysis

Description of Statistics

Description of statistics based on the observed data is depicted in Table 8.4 as follows:

Table 8.4 clearly indicates that the smallest imports volume per transaction recorded in the Directorate General of Customs and Excise is only 4.97e−06 m^3, that is, transaction of imports of CRC 7209160010 HS steel type from Japan, dated 26 December 2007. Meanwhile, the largest transaction is 72,789.73 m^3, that is, transaction of imports of HS 7209170010 CRC from Vietnam on 20 March 2013. This is considered large since the transaction is subject to AD.

There are 18 currencies used by the 48 countries which export steel to Indonesia in the period 2007–2015. Interestingly, given the minimum value of exchange rate is Rp1, there are import transactions that

Table 8.4 Statistical description

Variable	Obs	Mean	Std. Dev.	Min	Max
M_{ijt}	292,270	12.11586	414.4966	4.97e−06	72789.73
M_{ijt-1}	292,270	12.1143	414.4964	4.97e−06	72789.73
$BMAD_{ijt}$	292,270	1.637301	5.21436	0	48.4
$Named_{it}$	292,270	0.4499676	0.4974913	0	1
$Marketshare_{ijt}$	292,270	0.2559443	0.4363914	0	1
Y_t	292,270	789.5834	161.1149	460.19	917.87
e_{ijt}	292,270	9532.48	2375.039	1	19870.93
p_{ijt}	292,270	2.55e + 09	1.96e + 11	1,357,248	7.38e + 13

use rupiah, particularly 2308 transactions throughout 2007–2015. The countries that trade in rupiah are Japan, Singapore, China, and Malaysia.

Estimation Results

Based on estimation results of the fixed-effects model, Table 8.5 indicates significant negative AD tariff. This is in accordance with some prior researches carried out in developed countries which suggest that the imposition of AD is able to degrade the value of Indonesia's imports from named countries. Meanwhile, the results of the estimation show that the variable of named country is positive. In contrast to the studies by Konings et al. (2001) and Prusa (1999), this research offers empirical

Table 8.5 Estimation results of fixed-effects model

	Dependent variable:		
	Imports volume Named countries	Imports volume Non-named countries	Imports volume Overall
Imports volume *t–1*	0.367011***	0.3275586***	0.3519417***
	(168.72)	(175.70)	(248.76)
AD tariff	−0.0011387**		−0. 0015913**
	(−2.38)		(−3.38)
Named countries			0.3375687***
			(49.53)
Market share			−0.5029199***
			(−24.62)
GDP of Indonesia	0.0568317***	0.0896702***	0.085483***
	(3.96)	(6.93)	(8.85)
Exchange	0.1186442***	−0.0810305***	−0.0633121***
	(15.58)	(−32.24)	(−26.57)
Product price	−0.5544244***	−0.5654042***	−0.5599774***
	(−168.07)	(−249.90)	(−302.94)
Constant	9.054622***	10.59845***	10.46755***
	(68.11)	(1.55)	(138.37)
N	131,827	161,143	292,970
R Square	0.5041	0.6113	0.5771

**$p < 0.05$, ***$p < 0.01$

evidence of absence of trade diversion amid anti-dumping policy on steel products in Indonesia.

The unproven occurrence of trade diversion might be attributable to the named countries which become the majority exporters of CRC steel (above 50%). Indonesia relies on the supply of CRC steel from China, Taiwan, Korea, Japan, and Vietnam. When AD hits those countries, importers will still purchase the products from those countries, but certainly reduce the volume, considering the higher price. Despite the AD tariffs, the price of steel products from the named countries average only Rp2.1 billion per m^3, while the average price of steel products from non-named countries reaches Rp2.8 billion rupiah per m^3. Most transactions (more than 76%) are still valued below the average price of steel products from non-named countries. This could be the reason for Indonesia to keep taking supplies from the named countries.

Failing to prove the existence of trade diversion, the research identifies the presence of trade depression. Trade depression is one of the unintentional effects from anti-dumping policy as Bown and Crowley (2007) described: imports volume drop is not only experienced by the named countries, but also by the non-named countries. Figure 4.1 depicts that after May 2013 (anti-dumping on CRC was imposed on 19 March 2013), the imports value of steel in Indonesia from both the named and non-named countries experience a declining trend. The negative dummy market share variable signifies that the imports volume from the named countries that constitute the majority of steel exporters to Indonesia is lower when compared to the imports volume from the named countries that are not majority exporters.

The Indonesia's GDP has significantly positive effect on the value of imports as it serves as a proxy of the country's buying power. Since rising purchasing power can be coupled with the growing demand for products from other countries, it is reasonable if the rise of GDP is followed by the increase in steel imports volume.

The currency exchange rate is significantly negative. The negative sign on the exchange rate variable means that the weaker the rupiah, the lower the imports value. The weakened exchange rate reduces the purchasing power or makes transaction value higher than before so that demand for steel imports is also down.

The last control variable in this estimation is the price of the product. Significant negative variable of price means that the higher the price, the lower the volume of imports. Such price change will lower the purchasing power and eventually reduce the capability of importing steels.

Conclusion

The research unveils many interesting findings, one of which is the use of rupiah currency in import transactions, while typically in international trade, the seller's currency or widely used currencies are used. What makes this finding more interesting is rupiah currency is used by such countries as Japan and China which dominate import transactions and make up a huge market share in the total steel imports. Therefore, this research suggests that if the use of rupiah in import transactions could be expanded to other import transactions, Indonesia's economy would reap many benefits, one of which is adding the country's international reserves.

As in the preceding researches, the Indonesia's anti-dumping policy on steel products from the eight named countries are proven to cause reduction in the trade volume from those countries. This finding reinforces the series of empirical results on trade reduction/destruction as the impact of anti-dumping policy. These results indicate that the anti-dumping policy is an effective trade barrier.

The presence or absence of trade diversion as the impact of anti-dumping policy remains interesting topic. Some researches manage to prove it, while others do not. The results of this study support the opinion that the presence of trade diversion stemming from anti-dumping policy cannot be proven. There is no empirical evidence of imports volume increase from non-named countries due to the imposition of AD on imported steel products in Indonesia.

Moreover, other data show a declining trend of volume of imports from non-named countries. This could mean that the anti-dumping policy could cause trade depression in Indonesia. The anti-dumping measures on steel not only succeed in lowering the volume of imports of steel from named countries, but also cause the volume of steel imports from non-named countries to fall. The declining trend of imports volume in

total post-enactment of AD policy on 19 March 2013 goes against the growing trend of demand for steel that the country is experiencing. Further research is required to find out whether the domestic industry is able to fill the demand gap or there are issues of circumvention, that is, turning HS carbon steel into HS boron steel, as has been lately suspected by the US steel industry.

It is necessary to evaluate the implementation of government's AD policies by considering unintentional effects such as trade diversion and trade depression as well as circumvention before continuing or extending the duration of AD policies. Although in this study trade diversion is not proven, the government still needs to look back the AD tariffs, particularly since this research reveals that the selling prices of steel from the named countries are lower than those of the same products from non-named countries.

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9

The Impact of Temporary Tariff Protection (Safeguard) on the Heterogeneity of Productivity of Firms That Are Listed as Taxpayers in Indonesia

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Introduction

The impact of tariff protection on productivity/efficiency at firm level can be deemed ambiguous a priori. The literature in general shows that trade liberalization is believed to increase domestic firm productivity through specialization which is based on comparative advantage. Trade liberalization will encourage firm productivity through reallocation of resources and output from less efficient firms to more efficient one across sectors in the economy causing efficient firms to thrive, while others will exit. Amiti and Konings (2004) point out that decreasing tariffs for imports of input goods can increase productivity through *transfer of knowledge*, variations, and quality effects, while tariffs for final goods will experience stronger import competition so that the company will try to be produce efficiently.

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Similarly, Khandelwal and Topalova (2011) prove the same in India where the decrease tariff of input goods and final goods tariff promote productivity.

Alongside the literature which confirms that trade liberalization can increase the productivity of domestic companies, other literature only indicates the need for trade protection tariff to encourage companies to invest and innovate. Rodrik (1992) explains that there is no reason to believe protection will discourage productivity. Liberalization might hamper productivity growth through reducing domestic purchases and reducing incentives to invest and innovate because of the low rate of return on these investments. This argument is also supported by Miyagiwa and Ohno (1995) who examine the relationship between protection with the speed of a protected domestic company to adopt the technology.

The distinction between permanent and temporary protection as well as forms of protection (tariff vs. quota) is in the speed of adoption of technology. Temporary protection might slow down the adoption process over permanent tariffs, while quotas will delay adoption. As for the adoption response in terms of nature of protection (temporal vs. permanent), it is highly dependent on the credibility of these types of protection and industry perceptions related to the length and duration of protection. The empirical study supporting this argument is conducted by Konings and Vandenbussche (2008) by examining the impact of trade protection through anti-dumping duty on productivity in the European Union (EU) firm. The study concludes that generally protected company productivity has moderate increases. Another thing that is explained from the research is that heterogeneity of initial productivity of the company gives a different impact from that of trade protection policy.

In further review, Rodrik (1992) explains the reasons why tariffs can lead to different result. In terms of liberalization perspective, the impact of tariff is explained through the allocation of efficiency. The mechanism of the tariff transmission process is based on the argument of exploiting economies of scale to obtain a *gain of trade*. Meanwhile, from the perspective of protection, tariff is explained by technical efficiency. The protection of domestic companies will lead to a monopoly on domestic market share. There is a common presumption that the benefit of domestic companies over the monopoly is expected to provide opportunities for

domestic companies to improve the efficiency/productivity through various efforts. This different approach and perspective cause the assumption and transmission of the impact of tariff to be very distinctive.

Regardless of the existing literature debate, the facts in the world today show that the development of *New Protectionism* and non-tariff barriers (NTB) issues among current trade liberalization cannot be ignored. Countries in the world are increasingly prevalent in using temporary trade protection to protect domestic industries. One of the legal steps that countries in the world use to provide protection to domestic industries is through several trade policies which are permitted by World Trade Organization (WTO), such as anti-dumping, safeguard, and countervailing duty. These three instruments become popular as protection instruments among WTO member countries (Table 9.1).

The rise of liberalization and free trade leaves policy makers with no choice but to provide protection to the domestic industry that is concerned or industry that is in the stage of development (infant industry). Based on some of the literature described earlier, the strategy in providing protection to the domestic industry becomes the consideration of economists and policy makers. One that is particularly appealing in the strategy pursued by countries in the trade policy is the expectation of an increase in the efficiency and productivity of protected industries once the barrier of trade restrictions is lifted.

Table 9.1 Trade protection measures by WTO member states from 1995 to 2016

Protection instrument	1995–2010	2011	2012	2013	2014	2015	2016	Total	Average/year
Anti-dumping initiation	3861	165	208	287	236	229	300	5286	240.3
Anti-dumping measure	2524	99	120	161	157	181	163	3405	154.8
Safeguard initiation	218	12	24	18	23	17	11	323	14.7
Safeguard measure	103	11	6	8	11	11	5	155	7.0
Countervailing initiation	254	25	23	33	45	31	34	445	20.2
Countervailing measure	158	9	10	13	11	15	24	240	10.9

Source: Authors, from WTO

Based on new protectionism and trade policy issues and the characteristics of micro data at the company's unique level that can look at the productivity and firms behavior that are rarely captured in the previous study, this study attempts to adopt Konings and Vandenbussche's (2008) approach to examine the effect of temporary tariff protection on productivity. The difference made in this research is the use of safeguard instrument compared to imposing anti-dumping. Selection of safeguard instruments is based on the consideration by Miyagiwa and Ohno (1999) who deem the credibility of safeguard better than anti-dumping import duty which is linked to productivity.

Literature Review

The Concept of Productivity

Productivity is defined as the level of efficiency of an entity, in the form of companies, organizations, industry, or an entire economy that converts inputs (capital, labor, and raw materials) into output/goods. Productivity does not indicate how much we produce output, but rather look at how efficiently we use its resources to produce goods output. Productivity will grow along with the increase in the generated output relative to the utilized input goods. This causes the available input items to be more utilized/produced more efficiently.

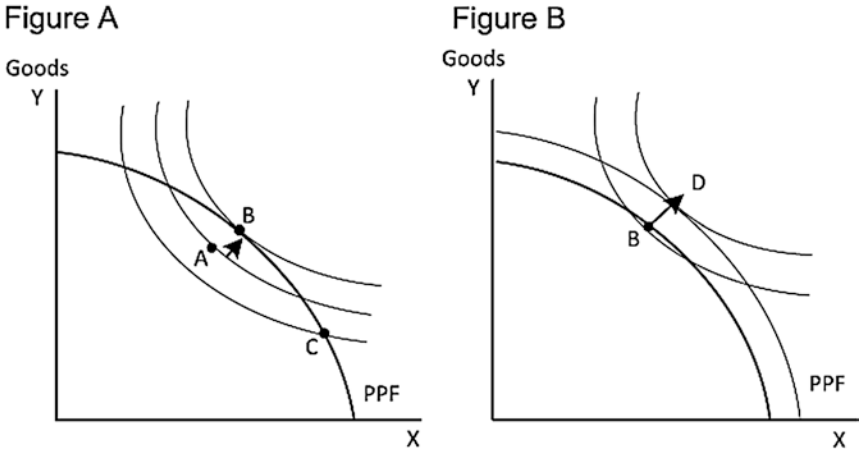
Productivity at the Firm Level

There are three ways a firm can improve its productivity efficiency, they are:

- Increase in ***technical efficiency***. Increased output can be achieved with the same input level by using existing technologies/resources more efficiently. Such an increase in technical efficiency leads to a movement toward production possibility frontier (PPF) (movement of point A to point B in Fig. A).
- ***Technological progress*** and ***organizational change***. When firms adopt or develop technology or restructure it, firms can increase out-

put beyond the required input. Technological change changes the firm's maximum ability to produce larger outputs with fewer inputs. This is represented by Fig. B by shifting the outward shift of the PPF curve from point B to point D.

- ***Return of scale***. As the company grows, the cost per unit generated also reduces. Technology has caused the average cost to subside as the volume generated increases. Market size can increase production utilization and even encourage companies to benefit from technology that has lower cost of production units.



Measurement of Productivity Level

Measurement of productivity level is the ratio of the measurement of total output to the measurement of total inputs used in producing goods and services. One of the methods of measuring productivity that is commonly applied is total factor productivity (TFP). With a complete estimation of productivity, this analysis can effectively provide a thorough understanding of the productivity characteristics/performance of an industry. The development of estimation method of TFP in econometrics becomes a fundamental issue (Mollisi and Rovigatti 2017). In estimating TFP by using ordinary least squares (OLS), the researcher is concerned about the potential correlation relationship between input level and

unobservable firm-specific productivity shock that produces biased estimation results. When expected to gain positive productivity shocks, a firm will respond by mounting its output level and increasing demand for inputs. This will unfortunately turn out to be negative shock and vice versa. The positive correlation between the observable input levels and the unobservable productivity shocks is a source of bias in OLS when estimating the TFP. Various methods have been proposed to tackle such simultaneity issue. One approach in the measurement of production function estimation which introduces consistent two-step estimation procedure aiming to address endogeneity problem is the Levinsohn-Petrin method that uses materials as the proxy intermediate input.

Instrument of Domestic Industry Protection

The instrument protection which is commonly and often used by countries to protect their domestic industry can take form as instrument tariff (import duty) and non-tariff. Such procedural and technical characteristics of non-tariff instruments are less favorable among researchers and economists since the impact and implications of non-tariff barriers are difficult to be measured from the economic side. The tariff policy is made to carry out three functions: first, as industrial development instrument; second, as trade instrument, the import tariff is used as bargaining position against partner countries when negotiating trade cooperation; and lastly as fiscal instrument, tariff is used for the purpose of increasing state revenues (Fig. 9.1).

Safeguard Measures

Agreement on safeguard is a provision in the WTO that can be used by member states as an instrument that provides protection for domestic industries that suffer losses from significant import surge in a relatively short time. The objective of the safeguard instrument is to offer an opportunity for the affected industry to make structural adjustments and improve performance. Safeguard policy mechanism must also meet the following requirements:

1. A significant increase in imports (absolute increase) and an increase in the share of imports due to the shrinking market (relative increase)

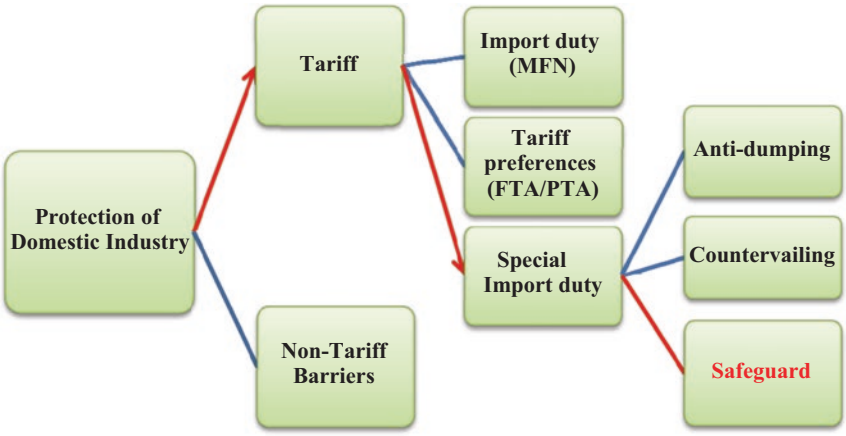


Fig. 9.1 Types of domestic industry protection instrument

2. The existence of a surge in imports as a result of unforeseen development and the impact of fulfillment of obligations under the WTO agreement
3. Serious loss or threat of serious harm to domestic industries that produce similar or directly competitive goods
4. A causality relationship that links the loss or the threat of loss with imports upsurge

Safeguard measures cannot be enforced for more than four years, but may be extended to eight years if the competent authority deems necessary, and there is a clarity that the domestic industry is adjusting. The competent authority appointed by the Indonesian government in conducting the investigation and related inquiry request for imposition of safeguard measures is Indonesian Trade Security Committee (KPPI). KPPI is an independent government agency and is under the coordination of the Ministry of Trade.

Previous Empirical Research

Empirical studies in safeguard and productivity in particular are quite limited. More specific research pertaining to temporary protection through safeguard measure instrument is conducted by Liebman, Benjamin H. and Kara M. Reynolds (2013) for the case of investment in research and development (R&D). The study applies panel data at firm

level in the United States for the period 1975–2005. The empirical study demonstrates that safeguard instruments as temporary trade protection have a positive impact on investment spending in R&D. Investment in R&D is a proxy of firm's behavior in technological adoption.

Using Miyagiwa and Ohno's (1999) arguments over temporary protection linked to investment and technological innovation, the study is consistent with the theoretical literature which argues that safeguard tariffs encourage investment in R&D. If the instrument protection is credible, tariff protection will raise investment above the free trade level and will lower it until protection ends. On the other hand, employing the same theoretical model, the restrictive quantitative protection (quota) of non-binding safeguard instrument results in investment falling below the free trade level. This stems from the quota instrument which makes the return rate of investment lower than the free trade condition.

Konings and Vandenbussche (2008) examine the impact of trade protection through anti-dumping duty on productivity. The study concludes that in general protected company productivity experiences moderate increase. Moreover, the study reveals that the heterogeneity of initial productivity of the firm gives a different impact from the trade policy in question. The study signifies that the impact of tariffs can be different due to the heterogeneity of the initial productivity of each firm.

The study conducted by Rachmawati and Indrasari (2017) examines safeguard policies relative to the profitability level of protected industries. This study supports the theoretical literature which states that protection will lead market structure to change into a monopoly which is then utilized by domestic companies to get margin benefit (producer surplus/profit). The level of profitability is measured through price cost margin (PCM). Based on the results of the study, a significant positive relationship between the instrument protection safeguard and the PCM of the protected industry is found.

Research Methods

Theoretical Framework

The objective of safeguard measures is to provide temporary protection for domestic industry from imports surge so as to enable opportunities

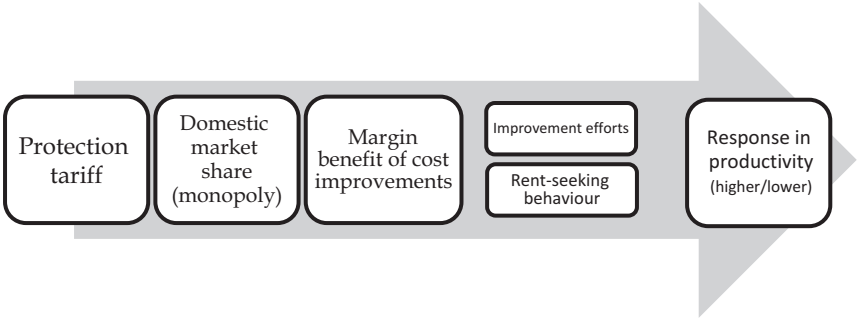


Fig. 9.2 Variable transmission mechanism

for domestic industry to make structural adjustments and improve performance. The following is the transmission mechanism from the imposition of safeguard toward improving the productivity of the company.

Based on the framework in Fig. 9.2, temporary protection can give monopoly power for domestic industries which receive protection. This situation can be responded by the company by lifting the price of goods and expanding market share in the country due to reduced competition from imports. Domestic producers/firms can therefore gain profit margin (producer surplus). One of the required critical assumptions made by the company to make the temporary protection successful in increasing productivity is by utilizing the benefits to invest/adopt technology as well as to exercise structural adjustment and performance improvement. Without this assumption, the temporary protection tariff can actually reduce productivity because the company feels in a "comfort zone" in the absence of import competition which led to counterproductive (negative) effect.

Hypothesis

This study will examine the impact of safeguard policy on the productivity of the firms which are protected in accordance with the purpose of the safeguard. The influence of firm heterogeneity in the form of "distance to frontier" on the implementation of safeguard will also be examined. The general hypothesis of this research becomes the following:

1. There is a positive and significant relationship between the safeguard policy and the productivity of the protected firm.
2. There is a different relationship between the safeguard policy and the firm productivity based on the heterogeneity of each firm.

Specification of Empirical Method

This study aims at observing the impact of temporary safeguard on the efficiency and productivity of protected companies in Indonesia. The dependent variable used as a proxy of level productivity is the TFP. To measure the impact of a policy, the commonly used estimation is the difference in differences (DiD) method. The main equation model to be tested is adopted from the study conducted by Vandenbussche and Konings (2008) with slight modifications since their research involves multi-countries within the EU region. Furthermore, their research applies Olley-Pakes' method in calculating the TFP estimation to correct the simultaneous relationship of input options and firm exit, while this study estimates TFP by employing Levinsohn-Petrin method. Their study also investigates instrument of temporary trade protection by using anti-dumping measure, while this study will use safeguard measure.

The Research Model

$$\begin{aligned}\mathrm{Ln\_TFP}_{it} = {} & \alpha_i + \alpha_1 \mathrm{Safeguard}^{*}\mathrm{Distance} + \alpha_2 \mathrm{Safeguard} \\ & + \alpha_3 \mathrm{Distance} + \alpha_4 \mathrm{Location} + \alpha_5 \mathrm{age} + \alpha_6 \mathrm{pma} + \varepsilon it\end{aligned}$$

where

$\mathrm{Ln\_TFP}_{it}$ = Total factor productivity of firm (i) at time (t) in natural logarithmic form

Distance = Value ratio of a firm in determining the position of productivity level of companies in one industry group

Safeguard = Dummy variable for *treatment group*

Location = Binary variable for firm's location
Age = Firm's age in years
pma = Binary variable for foreign/domestic firm
εit = Error term

To obtain information related to heterogeneity, as has been alleged that the impact of the policy may vary on firms based on each initial productivity differences, it is necessary to calculate the estimation by adding new variables which is the heterogeneity of firms in the treatment group. This heterogeneity variable is obtained by estimating *Distance to the frontier* which is the ratio used to measure the TFP of each firm compared to the productivity of the frontier companies in each industry sector in a given year in the sample. The basic reference year for this calculation uses the TFP value in 2009. Frontier company is a company with the highest level of productivity in each industrial sector which is grouped in KLU 4-digit code.

The calculation of *Distance to the frontier* is obtained using:

$$\text{DISTANCE}_{ijt} : \frac{\text{TFP}_{it}}{MAX_j \text{TFP}_{i,2009}}$$

where

DISTANCE_{ijt} = The firm productivity ratio (*i*) in the industry sector (*j*) in the year (*t*)
TFP_{it} = The firm productivity value (*i*) in the year (*t*) in exponential form
$\text{MAX}_j\text{TFP}_{i,2009}$ = The productivity value of frontier company (highest) for industry sector (*j*) in reference to the year 2009.

Estimation calculation of Distance produces a positive value ratio between 0 and 1 (for base year 2009) where the value of 1 shows the productivity position of the frontier company, that is, the most efficient company, while the company that has value close to 0 is the *laggard* company, namely companies that have low productivity.

Independent variables used as control variable in the calculation of TFP are Location, Age, and company investment status (Foreign/Domestic). This follows the model applied by Margono and Sharma (2006). Location and company status variables are binary so that a location will be equal to 1 if the location is on Java island and is worth 0 if it is outside Java. This is necessary because the economic development of Indonesia is concentrated on Java island thereby requiring different treatment. The company investment status (pma) will be equal to 1 for companies that are influenced by foreign investment and 0 for domestic companies. This argument is based on the theory that suggests that foreign investment offers technology transfer either in capital (FDI) or in human resources (transfer of knowledge). The age variable has a unit year, and this information is obtained from the company tax return filed to the tax authority (Directorate General of Tax/DJP). Control variable Age describes the relationship of productivity through the argument of *learning process and experience*. Companies tend to gain cumulative knowledge about technical efficiency and productivity through the production process from time to time.

The Scope of Research

This study will use the enforcement of safeguard in the period 2010–2012 when there are eight cases of safeguard imposition in Indonesia. The safeguard cases that become the subject of research are shown in Table 9.2.

Table 9.2 The subject of research

No	Product	Investigation	Enactment date
1	Rebar tie wire	19 January 2010	04 June 2010
2	Zinc wire	21 January 2010	16 July 2010
3	Steel wire rope	30 April 2010	27 August 2010
4	Synthetic fiber tarp other than awning and sunshade	22 March 2011	12 July 2011
5	Gabion	22 August 2011	09 August 2012
6	Steel wire rope	05 February 2010	09 June 2010
7	Cotton woven fabric	25 June 2010	12 March 2010
8	Cotton yarn (not sewing thread)	25 June 2010	10 January 2011

Source: KPPI, Ministry of Trade. Processed

Data

The research collects micro data at the firm level from the annual tax return (SPT) filed to Directorate General of Taxation (DGT). The unique characteristics of micro data at the firm level allows the authors to observe the productivity and behavior of each firm which is rarely captured in previous research. Due to the self-assessment nature of tax system, it is possible that the data obtained are under-reporting, only comprising data from firms which compliantly and regularly file their tax return. This further prevents achieving a balanced panel from the data observation (unbalanced panel with gaps).

To get the counterfactual data, the observed company is the one that has similar characteristics to those that receive safeguard protection. These characteristics are captured in the same industry by using the category of processing industry with main class (2 digits) Business Classification (KLU). The observations cover textile industry (KLU 13), apparel industry (KLU 14), basic metal industry (KLU 24), and fabricated metal products, except machinery and equipment (KLU 25). This study follows several adjustment steps aimed at clearing data from nonsense and noise, missing values, improper reporting, and other things required in preparing ready-made data sets.

Estimation Method

This study employs the DiD method with the fixed-effect (FE) model in estimating the effectiveness effect of safeguard protection tariff policy. However, the various number of observation in each country constitutes unbalanced panel data observation. Because of the use of regional dummy, the research applies fixed-effect model. The fixed-effect model utilizes constants as regression parameters (intercept). Assuming there is no statistical problem, the fixed effect model can be estimated consistently so that the estimation parameter depends on the impact at the firm level and the year period in the sample.

Results and Analysis

Statistics Description

The financial statements data extracted from annual tax return (SPT) from DGT manage to observe 8348 companies. Based on the data, which has complete information on value of capital, materials, labor, and sales (output) as well as information pertaining to control variables such as location, capital status (foreign/domestic), and age, the observations are reduced to 2712 companies. Eventually, the data observation cannot be conducted in a balanced panel (unbalanced panel with gaps). Table 9.3 depicts the list of companies based on filing period (year).

As many companies do not file complete SPT periodically, which reflects taxpayer compliance, this research is unable to obtain the required information related to the value of capital, material, labor, sales (output), and other information in control variables such as age, location, and investment status. The distribution of observation companies by location is illustrated in Tables 9.4 and 9.5 (Fig. 9.3).

Total Factor Productivity Estimation (TFP)

The use of the OLS estimates in principle seeks to obtain unobserved productivity through the residual value of the production function. A possible problem arising from a simple OLS TFP estimate is the potential correlation between the input level and the unobserved firm-specific productivity shock within the estimation parameters of the production function. This condition has been suggested by Marschak and Andrews

Table 9.3 The Distribution of observations by SPT filing period (years)

Filing period (year)	Number of company	Number of observation
2	1038	2076
3	767	2301
4	522	2088
5	384	1920
6	1	6

Table 9.4 Distribution of the observed companies

Province	Number of companies					Total	Investment status	Safeguard
	Textile	Apparel industry	Basic metal	Fabricated metal products	Others			
Bali	2	146	2	6	1	157	4	0
Banten	68	61	33	132	15	309	48	28
DI Yogyakarta	17	18	1	7	3	46	7	5
DKI Jakarta	66	234	60	150	46	556	106	30
West Java	260	215	37	185	31	728	112	134
Central Java	124	96	24	44	8	296	31	56
East Java	47	64	49	137	17	314	18	24
Kalimantan	1	16	3	12		32	1	1
Riau & Riau Islands	2	27	15	37	36	117	51	6
Bangka Belitung Islands	–	–	6	–	–	6	0	0
Nusa Tenggara	1	1	–	3	–	5	0	0
Sulawesi	4	11	2	6	–	23	0	1
North Sumatera	2	11	15	36	2	66	0	5
Sumatera (others)	2	7	–	5	1	15	0	1
Papua	–	10	–	–	–	10	0	0
Lampung	2	2	–	6	–	10	0	0
Nanggroe Aceh Darussalam	–	20	–	1	–	21	0	0
Others	–	–	–	1	–	1	0	0
Total						2712	378	291

Source: DJP, processed

Table 9.5 Comparison of results from the three methods of TFP estimation

	(1)	(2)	(3)
Variables	OLS	OLS_year control	TFP_levpet
lglabor	0.452***	0.448***	0.0406***
	(0.0103)	(0.0103)	(0.00587)
lgkapital	0.458***	0.450***	0.0798*
	(0.00657)	(0.00656)	(0.0456)
lgmaterial			0.532**
			(0.211)
Constant	5.051***	5.103***	
	(0.0520)	(0.0542)	
Observations	7936	7936	7539
R-squared	0.645	0.650	
Year FE		Yes	

Standard errors in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

(1944) and makes the production function parameter of OLS estimation results to be biased, and eventually a biased productivity (TFP) will be generated. The second method in this research is to use OLS method by controlling time variable. One reason to control time variable is the unbalanced data set characteristics with different time periods. To address this problem, a step that can be performed is to estimate the production function by creating a dummy variable of time (year dummies).

Several literature designate common weaknesses in estimation using OLS methods, including simultaneity and selection problems that bring about biased estimation. The problem of simultaneity arises because of the contemporary correlation between Xit and Ɛit. This in practice is indicated by the firm's flexibility to manage the use of input variables (both capital and labor) in response to shock (productivity). The firm's response to the use of inputs to productivity raises endogenous issues. Selection problems emerge if the firm's observation does not take into account its entry and exit, which is likely to occur frequently in the balanced panel data.

One alternative that is used to resolve this problem is using semi-parametric estimation method. This method utilizes intermediate input as a proxy in estimating unobserved productivity shocks. The third measurement productivity in this study applies semi-parametric

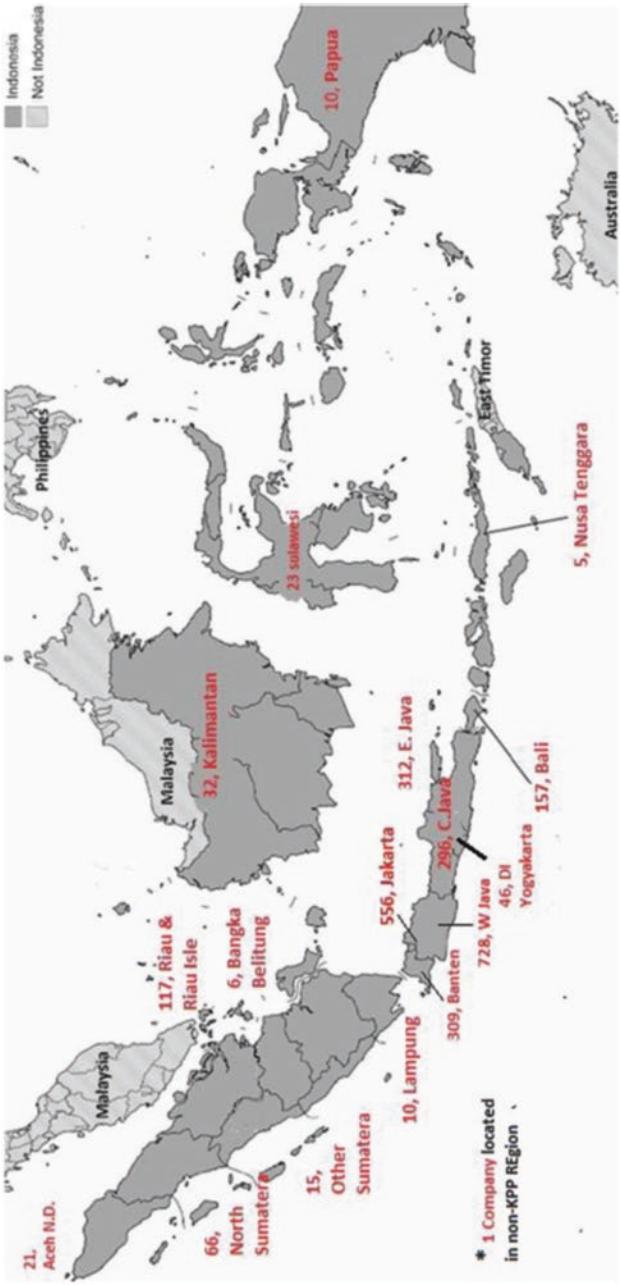


Fig. 9.3 Distribution of observation company by location

Table 9.6 Summary of results of the three methods of TFP estimation

	(1)	(2)	(3)	(4)	(5)
Variables	*N*	Mean	SD	Min	Max
lgTFP_OLS	7936	−7.32e−11	0.618	−6.786	4.328
lgTFP_OLS_controlling time variable	7936	1.38e−10	0.613	−6.748	4.291
lgTFP_levpet3	7539	3.929	0.393	−0.0703	6.642

estimation algorithm method with Levinsohn and Petrin approach (2003). This method uses material variables as TFP proxy. This proxy controls correlation error stemming from the input by eliminating variations that may occur in the estimation of production function.

The productivity estimation results derive from three methods: productivity measurement using OLS method, OLS method by controlling time variable, and semi-parametric estimation method with Levinsohn and Petrin approach (2003).

Each method has its own characteristics with the formed assumptions. With the required advantages, disadvantages, and assumptions, then in examining the relationship between TFP and safeguard policy, in this study we will use the estimation result of TFP calculation with semi-parametric method of Levinsohn and Petrin. Further details related to the advantages and disadvantages between TFP estimation through OLS method and Levinsohn and Petrin semi-parametric method are discussed in Levinsohn and Petrin (2003) studies (Table 9.6).

Firm Heterogeneity

The study investigates whether the firm heterogeneity of initial productivity might have a different effect from that of the safeguard policy through the consideration of *distance to the frontier* information. This variable is calculated to categorize the level of productivity of a firm within one industry sector (four-digit KLU) with a base from the year 2009. The recapitulation of distance to the frontier calculation for each industry can be seen in Table 9.8.

With the *distance to the frontier* information, the study resumes to see the effect of the heterogeneity of the company to changes in the

productivity of companies which receive protection safeguard. To determine the impact of safeguard policies on firm heterogeneity, in the estimation, it is necessary to make the safeguard variables interact with distance variables as described in the model.

The estimation results of safeguard impact with heterogeneity consideration using pooled least squares (PLS), fixed effect (FE), and random effect (RE) are shown in Table 9.7.

To calculate the impact of safeguard and heterogeneity, the model is derived from the safeguard so that the formula becomes: $\frac{\Delta Ln\,\mathrm{TFP}}{\Delta \mathrm{Safeguard}} = (\alpha_1 \times \mathrm{Distance}) + \alpha_2$.

Safeguard parameter coefficients (α_2) and (α_1) and the value of the variable distance are the main focus of this study. These three elements are the essence of DiD estimates to provide counterfactual information between treatment groups, with other similar companies not receiving protection (Table 9.8).

Table 9.7 Safeguard impact estimation results with consideration of heterogeneity

	(1)	(2)	(3)
Variables	OLS	FE	RE
Safeguard*distance	0.211***	−0.128***	−0.0733*
	(0.0541)	(0.0402)	(0.0389)
Safeguard	−0.0699**	0.0873***	0.0623***
	(0.0318)	(0.0239)	(0.0229)
Distance	1.499***	2.154***	1.900***
	(0.0140)	(0.0183)	(0.0149)
Location	0.0360***		0.0233**
	(0.00681)		(0.0116)
Age	0.00307***	−0.00445***	0.00136***
	(0.000235)	(0.00107)	(0.000378)
pma	0.0394***		−0.0170
	(0.00740)		(0.0125)
Constant	3.057***	2.849***	2.883***
	(0.00894)	(0.0156)	(0.0129)
Observations	7525	7525	7525
R-squared	0.677	0.744	
Number of idwp		2566	2566

Standard errors in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table 9.8 Recapitulation of distance to the frontier for each industry

Industry	Firms	Average	Std. Dev.	Min	Max
13—Textile	580	0.52275217	0.192444494	0.020334437	1.2054695
14—Clothes	880	0.46838693	0.191959278	0.031801105	1.5431938
24—Basic metal	228	0.40612981	0.191896955	0.056128648	1.1261319
25—Fabricated metal goods, except machinery	738	0.44188768	0.181625356	0.029796859	1.0460601
26—Others	143	0.65700593	0.273554576	0.082068387	1.6775624

KLU 4-Digit (Sub-industry)	Obs	Average	Std. Dev.	Min	Max
1311	274	0.522837	0.249311	0	1.087015
1312	518	0.497778	0.194721	0	1.050136
1313	236	0.459602	0.204613	0	1.097519
1391	191	0.573026	0.270311	0	1.174207
1392	209	0.486587	0.208256	0	1.111423
1393	40	0.682304	0.221532	0.117722	1.127109
1394	47	0.705616	0.178847	0.345055	1.064529
1399	249	0.58596	0.289323	0	1.265993
1411	2416	0.461315.	0.22971	0	1.672699
1412	395	0.360293	0.268446	0	1.67037
1413	23	0.713756	0.37267	0	1.151324
1430	70	0.682502	0.218412	0	1.016077
2410	495	0.375239	0.204912	0	1
2420	185	0.443071	0.276491	0	1.183297
2431	79	0.425993	0.243977	0	1.10966
2432	35	0.555072	0.28826	0	1.089158
2511	583	0.435997	0.227994	0	1.616957
2512	115	0.49804	0.232598	0	1.528796
2513	5	0.978711	0.059513	0.887137	1.045139
2591	150	0.562328	0.232142	0	1.036157
2592	571	0.329563	0.190516	0	1.163076
2593	194	0.490209	0.188369	0	1.069182
2594	96	0.606534	0.23051	0	1.049497
2595	170	0.533735	0.227963	0	1
2599	515	0.487784	0.209336	0	1.284366
2611	119	0.51047	0.361866	0	1.39912
2612	107	0.634003	0.322974	0	1.326023
2621	17	0.46488	0.375014	0	1
2631	7	0.804708	0.261055	0.473317	1.027538
2639	31	0.535928	0.307336	0	1.13703
2641	16	1.213747	0.467946	0.041158	1.767452
2642	10	0.896023	0.218981	0.53784	1.11343

(*continued*)

Table 9.8 (continued)

KLU 4-Digit (Sub-industry)	Obs	Average	Std. Dev.	Min	Max
2649	64	0.523972	0.227689	0.099542	1.049097
2651	52	0.761859	0.310063	0	1.292101
2652	18	0.782022	0.221615	0	1
2660	12	0.82985	0.147844	0.546141	1
2680	74	0.521181	0.274709	0	1.068971
Grand Total	8391				

Based on the argument described earlier, the parameter coefficients of the heterogeneity variable show a negative and significant effect to the productivity. This support the notion that the further the company's initial productivity from frontier companies in its sector, the stronger the positive impact of safeguard. Conversely, the closer the company's initial productivity to frontier in its sector, the weaker the effect of safeguard to increase productivity. At certain level, it might even lessen productivity of frontier companies if they get safeguard protection.

The FE estimation results also omit the location variable and the ownership status variable (pma) used as control variables. Both variables are omitted for reasons of collinearity. This is probably because both variables are binary of exact value/no variation for each firm (observation) so that the firm's character is estimated in the FE method and is reflected in the constant/intercept variable (α_i).

Robustness Check

This empirical study also conduct an exercise to find out to which extent the consistency of the main variable coefficients when modified regression specifications are done through either addition or subtraction of regressor variables. The fundamental reason for the need for such robustness check is to provide warrant for fundamental changes in the analysis undertaken in this study. The main concept of this robustness check is to give certainty whether the effects are consistently estimated and remain statistically significant in the robustness testing model. To know the impact of this safeguard, robustness check is carried out through the

reduction of heterogeneity variable. The test is conducted to see if the impact of safeguard imposition remains robust with positive and significant results on the productivity of the protected company. Empirical studies have shown that heterogeneity variables create different effects on productivity so that to test the consistency of this safeguard effect, the distance variable is eliminated. The results of an estimated robustness check are presented in Table 9.9.

Table 9.9 Robustness check of safeguard impact

	(1)	(2)
Variables	Without	With hetero
Safeguard*distance		–0.128***
		(0.0402)
Safeguard	**0.0324***	**0.0873*****
	(0.0167)	**(0.0239)**
Distance		2.154***
		(0.0183)
o.location	–	–
Age	0.0180***	–0.00445***
	(0.00206)	(0.00107)
o.pma	–	–
Constant	3.685***	2.849***
	(0.0271)	(0.0156)
Observations	7525	7525
R-squared	0.019	0.744
Number of idwp	2566	2566
Firms FE		Yes

Standard errors in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Conclusions

Empirically there is significant evidence to conclude that the enactment of safeguard affects the productivity of the company. This study also confirms previous findings where Konings and Vandenbussche (2008) suggest that the effect of firm heterogeneity from the temporary protection on frontier companies is actually a reduced productivity and an increased productivity for *laggard* firms. This is proven by the value of the parameter coefficient of safeguard which is positive (0.0873), while the coefficient value of the interaction parameter safeguard with distance (Heterogeneity) shows negative value (−0.128). Consequently, the ability to observe the overall impact of safeguard on firms that receive protection from the safeguard policy is highly dependent upon the relative level of initial productivity of each firm. By using the base year of 2009, the threshold value of distance/initial productivity of firms to receive positive impact from safeguard is $0.0873 + (-0.128 \times \text{Distance}) > 0$. The distance/initial productivity of the firm in 2009 must be less than 0.682.

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10

Import Tariffs and Productivity of Manufacturing Firms in Indonesia

Bayu Sulistiantoro and Fithra Faisal Hastiadi

Introduction

In recent years, Indonesia has issued several regulations governing import tariffs. Since 2006, there are at least 50 regulations with 27 of them setting the most favored nation (MFN) tariffs and 23 others fixing preferential tariffs on partner countries that have trade agreements with Indonesia. In general, the government's consideration to change import tariffs regulation is to improve industrial competitiveness, protect the consumers, and reduce international trade barriers. In contrast to the preferential tariffs in which changes are generally upward, the changes in MFN tariffs can be downward or upward depending on the policy adopted by the government.

The role of import tariffs for domestic industries is also supported by the academic literature which commonly states that import tariffs as one of trade liberalization can affect the productivity of domestic firms. Theoretically, trade liberalization would open the access of

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domestic firms to foreign markets which could lead to productivity gains for firms as they increase sales, expand production scale, and lower cost curves (Krugman 1979). The argument is then complemented by Melitz (2003) by including the competition effect of trade liberalization due to firm heterogeneity. In the model, it is said that the benefits of trade liberalization tend to be accepted only by firms with higher productivity. Expanding access to overseas markets makes the demand for resources gradually grow. This leads to an upsurge in price factors that will reduce profits of the low productivity firms, so some of those firms would decide to exit from the industry and to then reallocate their resources to other firms with higher productivity. The combination of low productivity firms' exit and reallocation of resources to higher productivity firms has increased industry productivity (Bernard et al. 2007).

The firm's decision to exit from the market is problematic as there may be barrier or subsidy from another party that keeps the low productivity firms in the market (Rodrik 1988). Such condition inhibits the benefits from trade liberalization and can even lead to decreased average productivity of the industry. Stokey (1991), Young (1991), and Lucas (1993) develop an endogenous growth model that indirectly argues that trade liberalization in developing countries will reduce the demand for high-end products produced domestically, limiting the learning process of firms and productivity growth (Fernandes 2007).

Besides the competitive effects of trade liberalization, there is another theory which suggests that productivity gains can occur because trade liberalization opens access to more varied and higher quality of intermediate inputs and technologies which will improve the technical efficiency of firms (Ethier 1982; Markusen 1989; Rivera-Batiz and Romer 1991). However, Corden (1971) as cited in Amiti and Konings (2007) argues that a cheaper material input cost because of trade liberalization can actually enhance an effective protection that can reduce import competition and thereby having a low productivity impact. In this case, a lower cost of material input can diminish the firm's incentives to seek more efficient production techniques.

Empirically there are many studies that discuss how trade liberalization affects the productivity of the firm. Initially, existing empirical studies focus solely on the competitive effects of liberalization using various proxies such as import penetration, protection changes, dummy variables of the year of liberalization, nominal rates, and trade orientation (Tybout et al. 1991; Harrison 1994; Tybout and Westbrook 1995; Balakrishnan et al. 2000; Pavcnik 2002). Yet, recently the interests could be expanded by looking at the impact of intermediate input due to trade liberalization. In order to compare how competitive effects and the effects of intermediate input can affect productivity, the proxies used focus on the tariffs, whereas output tariffs become the proxy of competitive effects and input tariffs become the proxy of the input effect.

Based on empirical studies, there are at least four different findings. First, both input and output tariffs have a negative impact on firm productivity with input tariffs having greater impact than the output tariffs (Amiti and Konings 2007; Topalova and Khandelwal 2011). Thus, access to more varied and higher quality of the intermediate input through reduction of input tariffs is more important than the pro-competitive effects of reduced output tariffs. Second, both input and output tariffs have a negative impact on firm productivity, but the output tariffs have greater impact than input tariffs (Yu 2015). The result mainly derives from the 0% special tariffs on intermediate input imported by the processing firm of which importation is half of the total importation made by the research object, in this case the People's Republic of China. Furthermore, the reduction in input tariffs does not have an impact on firms that are fully involved in processing trade but still has an impact on firms that, in addition to processing trade, are involved in non-processing trade. Third, input tariffs have a negative impact on productivity, while output tariffs have a positive impact (Hu and Liu 2014). The positive impact of the output tariffs differs from the results of other research because domestic monopoly firms experience negative productivity shock when they are forced to reduce production in line with escalating import competition. Although Hu and Liu (2014) utilize the same country and period with those of the research by Yu (2015), the object of the research is different. Yu (2015) uses the trading firms data which are a combination of data sets from the National Bureau of Statistics (NBS) of China

and China General Administration of Customs, while the research of Hu and Liu (2014) uses manufacturing firm data from NBS of China. Fourth, the output tariffs do not have an impact on firm productivity as input tariffs have a negative impact on firm productivity (Ahn et al. 2016). In contrast to previous empirical studies that analyze firm-level productivity in one country, Ahn et al. (2016) undertake research on the impact of changes in output and input tariffs on industry-level productivity for 18 countries.

The output and input tariffs on recent empirical studies are generally measured only using the MFN tariffs basis (Amiti and Konings 2007; Topalova and Khandelwal 2011; Hu and Liu 2014; Yu 2015). It is later criticized by Ahn et al. (2016) who suggest that, under current conditions where the use of preferential tariffs has been spreading out worldwide, making measurements of output tariffs and input tariffs using only MFN tariffs will give misleading results. They propose to use effective tariffs which are the weighted average of MFN tariffs and preferential tariffs.

In the current context of Indonesia, the measurement of output tariffs and input tariffs using effective tariffs is deemed quite accurate considering that until 2015 there have been seven free trade agreements that are effective in Indonesia in accordance with the Regulation of the Minister of Finance No. 205/PMK.04/2015 on the Procedure for Imposition of Import Duty Tariff in the Framework of International Agreement. The seven free trade agreements include Association of Southeast Asian Nations (ASEAN) Trade in Goods Agreement (ATIGA), ASEAN-China Free Trade Area (ACFTA), ASEAN-Korea Free Trade Area (AKFTA), Indonesia-Japan Economic Partnership Agreement (IJEPA), ASEAN-India Free Trade Area (AIFTA), ASEAN-Australia-New Zealand Free Trade Area (AANZFTA), and Indonesia-Pakistan Preferential Trade Agreement (IPPTA). Based on 2014 data, the imports value using preferential tariffs covers about 29.05% of the total value of Indonesian imports. If we look at the variation of tariffs change from year to year, there is a difference of variation between MFN tariffs and effective tariffs as depicted in Fig. 10.1.

The different variations in import tariffs as shown in Fig. 10.1 encourage this research to re-investigate the impact of import tariffs which already consider the preferential tariffs on firm productivity. This study will try to complement the study by Ahn et al. (2016) which only employs

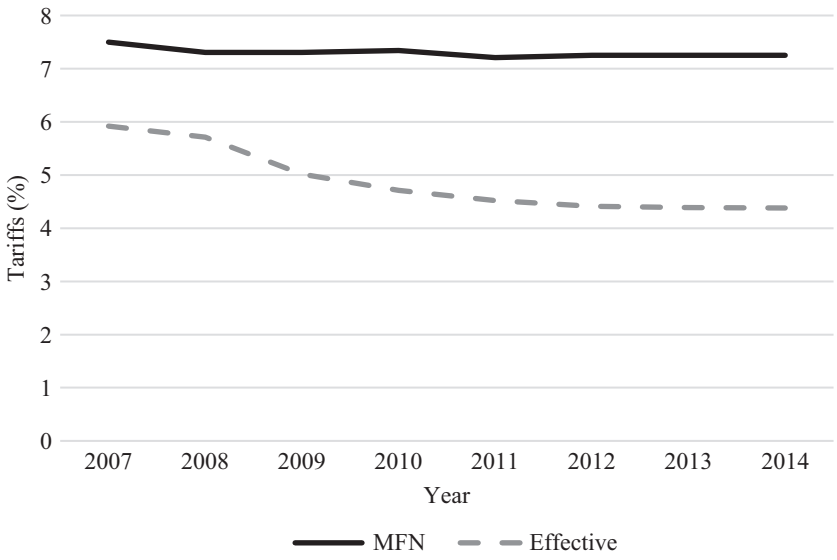

Fig. 10.1 Variation of MFN tariffs and effective tariffs. Source: Authors, from Fiscal Policy Agency and Directorate General of Customs and Excise Finance Ministry

six-digit Harmonized System (HS) and two-digit International Standard Industrial Classification of All Economic Activities (ISIC) by applying ten-digit HS and five-digit Classification of Indonesian Business Field Standard (KBLI). Amiti and Konings (2007) highlight the importance of having data with high level of disaggregation in research related to import tariffs on firm productivity since there are large variations in tariffs along the production chains and among industries. If the research utilizes a high level of aggregation data, some important variations will be lost. In the effective tariff measurement—one of which element is the weighted average of product-level imports, the use of high disaggregation data is important because it can produce a different average rate when compared to aggregated data. In addition, Ahn et al. (2016) assume the utilization rate of preferential tariffs is 100%. The utilization rate of preferential tariffs indicates the degree to which extent the eligible dutiable imports would prefer to enter under preferential rather than under MFN tariffs (Plummer et al. 2010). In the case of Indonesia, not all importers apply

preferential tariffs despite importing from the partner countries of free trade agreements. This argument is supported by Sitepu and Nurhidayat (2015) who find that the utilization rate of preferential tariffs in Indonesia spans from 6.05% to 35.98%. Thus, to measure the weighted average of product level in this study, real data on the importation of products which are subject to MFN tariffs and preferential tariffs will be used.

Analytical Framework

Output Tariffs and Productivity of the Firm

In the monopolistically competitive model of trade which is tied to firm heterogeneity in terms of productivity differences developed by Melitz and Ottaviano (2008) and Melitz and Trefler (2012), it is explained that growing firms in a market will increase competition. Nevertheless, tariff changes generally occur after negotiations in the fora that produce tariff reduction schedules so that a tariff reduction in one country can be followed by a tariff reduction in other country based on an agreed schedule. It opens the access for domestic firm to enter the foreign market. Therefore, there will be a combination between increased competition as a result of increasing competitors entering the market and increasing market size due to increased demand.

When there is a combination of increased competition and increased market size, the demand curve will shift to the lower left in the firm perspective with lower output coming from the intersection between the old and new demand curves. In this case, the impact of increased competition is more dominant. Though, in the firm perspective, with higher output from the intersection between the old and new demand curves, the demand curve will shift to the upper right. In such case, the impact of increasing market size is more dominant. The combination of increasing competition and increasing market size will have an aggregate increase in productivity because market share will be reallocated from low productivity firms with high marginal cost to high productivity firms with low marginal cost.

Input Tariffs and Firm Productivity

Ethier (1982) argues that most international trade is not in the final product but in the intermediate input. He states that in each internal economies of scale of production of each variation of intermediate input, there will be external economies in the final stage of goods. Tariff reductions will further expand the variety of intermediate input that will benefit the firm that uses them. This is because the firm has a choice of more intermediate input to be used in the production process so that the production cost can be reduced. The decrease in production costs will increase the productivity of the firm.

Hypothesis

Based on the theory and previous empirical research, the hypotheses proposed in this study are:

1. The output tariffs whether measured using MFN tariffs or effective tariffs have different effect on firm productivity.
2. The input tariffs whether measured using MFN tariffs or effective tariffs have a negative impact on firm productivity.

Method

Measurement of Productivity

The firm's productivity will be measured using the total factor productivity (TFP). It is assumed that Cobb-Douglas production function is applied:

$$Y_{it} = A_{it} K_{it}^{\beta_k} L_{it}^{\beta_l} \tag{10.1}$$

where Y is the firm output, K and L are inputs consisting of capital and labor, and A is a Hicksian neutral efficiency firm level. The logarithm of the equation produces the following linear production functions:

$$y_{it} = \beta_k k_{it} + \beta_l l_{it} + \omega_{it} + \varepsilon_{it} \tag{10.2}$$

where lower case letters denote natural logarithms for each variable. The natural logarithm of A is $\omega_{it} + \varepsilon_{it}$, where ω_{it} is a predictable variable of the firm when deciding the use of input, whereas ε_{it} is a variable that the firm has no information. ω_{it} in this case is considered firm-level productivity, whereas ε_{it} is a component i.i.d which represents an unexpected deviation from the mean because of the measurement error or other external circumstances.

Therefore, the productivity can be calculated as follows:

$$\hat{\omega}_{it} = y_{it} - \hat{\beta}_k k_{it} - \hat{\beta}_l l_{it} \tag{10.3}$$

Equation (10.2) can be estimated using ordinary least squares (OLS) when the input used in a production function is exogenous. In other words, the input is determined independently of the firm's efficiency level. Unfortunately, according to Marschak and Andrews (1944), inputs on the production function are not independently determined but also depend on the characteristics of the firm including its efficiency (van Beveren 2012). Accordingly, there will be a matter of simultaneity if the equation is still estimated using OLS. To solve that problem, Eq. (10.2) will be estimated using Levinsohn and Petrin method (2003) by means of intermediate input as a proxy of unobserved productivity. In this case, the intermediate input is a function of capital and productivity, $m_{it} = m_t(k_{it}, \omega_{it})$. With the monotonic conditions assumed to be met and intermediate inputs are strictly increasing in ω_{it}, the function can be reversed so that the unobserved productivity can be expressed as an observable function following $\omega_{it} = s_t(k_{it}, m_{it})$. With that expression, Eq. (10.2) can be rewritten as follows:

$$y_{it} = \beta_k k_{it} + \beta_l l_{it} + s_t\left(k_{it}, m_{it}\right) + \varepsilon_{it} \tag{10.4}$$

The coefficient of input variable l can be obtained in the first stage of estimation, while the coefficients of k can be obtained in the second stage of estimation using the generalized method of moments (GMM).

Measurement of Output Tariffs

The output tariffs are obtained by averaging the ten-digit HS rates for every five-digit KBLI code as performed by Amiti and Konings (2007). In contrast to previous empirical studies using MFN tariffs as the basis for tariff measurements, this study adopts what Ahn et al. (2016) conduct by including MFN tariffs and preferential tariffs as a basis for tariff measurement. Their method is formulated as follows:

$$\tau_{pt} = \sum_{c}^{N_t^{\text{MFN}}} \omega_{pc}\text{MFN}_{pt} + \sum_{c}^{N_t^{\text{Pref}}} \omega_{pc}\text{PREF}_{pct} + \sum_{c}^{N_t^{\text{nonMFN}}} \omega_{pc}\text{nonMFN}_{pt} \quad (10.5)$$

where τ_{pt} is an effective tariffs rate on product p in year t. MFN_{pt} is MFN tariffs for the product from World Trade Organization (WTO) member countries in year t. nonMFN_{pt} is tariffs for the product from non-WTO member country in year t. PREF_{pct} is preferential tariffs of product p from the partner country c in year t. ω_{pc} is the weighted average for the product level which is the import share of country c on the total import of the product p. Nevertheless, since Indonesia only recognizes MFN tariffs and preferential tariffs, in this study the non-MFN tariffs are excluded from the equation. In addition, with the condition that the utilization rate of preferential tariffs in Indonesia does not reach 100%, there is a different calculation of weighted average of product level in this research from that done by Ahn et al. (2016). By using the real data of imported goods subject to MFN or preferential tariffs, the effective tariff measurement in this research becomes:

$$\begin{aligned}\text{effective tariffs rate}_{pt} = {} & \omega_{p1}\text{MFN}_{pt} + \omega_{p2}\text{ATIGA}_{pt} \\ & + \omega_{p3}\text{ACFTA}_{pt} + \omega_{p4}\text{AKFTA}_{pt} \\ & + \omega_{p5}\text{IJEPA}_{pt} + \omega_{p6}\text{AIFTA}_{pt} \\ & + \omega_{p7}\text{AANZFTA}_{pt} + \omega_{p8}\text{IPPTA}_{pt}\end{aligned} \quad (10.6)$$

where $\text{effective tariffs rate}_{pt}$ is an effective tariffs rate on product p in year t. ω_p is the weighted average for the product level, where import value of the product p is subject to the MFN tariffs or the preferential tariffs

divided by the total value of the imported product p. MFN_{pt} is MFN tariffs for product p in year t. $ATIGA_{pt}$ is ATIGA tariffs for product p in year t. $ACFTA_{pt}$ is ACFTA tariffs for product p in year t. $AKFTA_{pt}$ is AKFTA tariffs for product p in year t. $IJEPA_{pt}$ is IJEPA tariffs for product p in year t. $AIFTA_{pt}$ is AIFTA tariffs for product p in year t. $AANZFTA_{pt}$ is AANZFTA tariffs for product p in year t. $IPPTA_{pt}$ is IPPTA tariffs for product p in year t.

The weighted average for this study utilizes 2014 as the base year which is considered constant throughout the year of the study. This is done to avoid endogenous issues (Ahn et al. 2016). The year 2014 is selected as the base year since in that year the import data for all preferential tariffs are available.

Measurement of Input Tariffs

Input tariffs which are the average tariffs on intermediate input of an industry are constructed using a formula by Amiti and Konings (2007) as follows:

$$\text{input tariffs}_{kt} = \sum_{j} w_{jk}^{2014} \, x \, \text{output tariffs}_{jt} \tag{10.7}$$

where input tariffs_{kt} is the input tariff for sector k in year t, w_{jk}^{2014} is the cost share of the product from sector j that is used for production in sector k based on data of 2014, and output tariffs_{jt} is the output tariff of sector j in year t.

Empirical Specifications

This study will focus on examining how the import tariffs that consist of output and input tariffs impact the productivity of manufacturing firms in Indonesia. To estimate the impact, the equation will be the following:

$$\begin{aligned}\text{productivity}_{ijt} = {} & \alpha + \beta_1 \text{output tariffs}_{j,t-1} + \beta_2 \text{input tariffs}_{j,t-1} \\ & + \beta_3 \text{market concentration}_{jt} + \beta_4 \text{foreign ownership}_{ijt} \\ & + \beta_5 \text{firm size}_{ijt} + \delta \text{year}_t + \gamma \text{industry}_j + \varepsilon_{ijt}\end{aligned} \tag{10.8}$$

where:

$\text{productivity}_{ijt}$: productivity of firm i in sector j at year t;
$\text{output tariffs}_{j,t-1}$: the output tariffs for sector j at year $t-1$;
$\text{input tariffs}_{j,t-1}$: the input tariffs for sector j at year $t-1$;
$\text{market concentration}_{jt}$: market concentration in sector j at year t;
$\text{foreign ownership}_{ijt}$: foreign ownership of firm i in sector j at year t;
firm size_{ijt}: size of the firm i in sector j at year t;
year_t: year fixed effect
industry_j: industry fixed effect

Equation (10.8) will be estimated using OLS with year and industry fixed effect.

The dependent variable in this research is firm productivity measured by employing TFP logarithm of Levinsohn and Petrin method. The method is applied to overcome the simultaneous problems that occur in the firm's production function. The first independent variable, which is the main variable in this study, is the output tariffs. This study will use a one-year lag in determining output tariffs because some changes of import tariffs regulation conducted in Indonesia take place in mid to end of year and productivity is considered not changing immediately after the change of regulation (Topalova and Khandelwal 2011). Additionally, one-year lag is also used to mitigate the endogenous issues (Ahn et al. 2016). This variable is predicted to be positively correlated if the reduction of the output tariffs only leads to increased import competition accompanied by barriers for less productive firms to exit from the market, but it will be negative if the decline in the output tariffs leads to the reallocation of resources from less productive firms to more productive firms. In addition to effective tariffs, this study will also use the MFN tariffs to measure output tariffs as common researchers do to see if the difference in measurement can cause different impacts.

The second independent variable, which is also the main variable in this study, is input tariffs. Similar to output tariffs, one-year lag will be used to determine the input tariffs. This variable of input tariffs is predicted to be negatively correlated because the decrease of input tariffs will increase access to more varied and higher quality of inputs and provide a learning effect of the technology attached to the input. This is consistent with the findings of the majority of researchers (Amiti and Konings 2007; Topalova and Khandelwal 2011; Hu and Liu 2014; Ahn et al. 2016). Besides measured using effective tariffs, in this study the input tariffs will also be measured using the MFN tariffs.

The third independent variable is the level of market concentration measured using the Herfindahl-Hirschman Index (HHI). This index was developed by Albert O. Hirschman and Orris C. Herfindahl and is calculated by summing the squares of the market shares as follows:

$$\mathrm{HHI} = \sum_{i=1}^{n} \left(S_i \right)^2 \tag{10.9}$$

where HHI is the Herfindahl-Hirschman Index, S_i is the market share of firm *i*, and there are *n* firms in industry. If market share is expressed as a percentage, HHI can range from zero for a very competitive market to 10,000 for a monopoly market. If HHI is declared in decimal, HHI will span between zero and one. If the index is less than 1000 (0.1 in decimal), it will be categorized as unconcentrated industry, and if it is more than 1800 (0.18 in decimal), it will be categorized as highly concentrated industry (Laine 1995). The market concentration level in this study is used to control the markup. Firms that are in a concentrated market tend to have the ability to charge a higher markup than firms that are in a competitive market, making it possible for firms to increase their profits through increased markup compared to increased productivity. Hence, the market concentration level also captures how the competitive level of a market can drive productivity. This variable of market concentration level is predicted to be negatively correlated.

The fourth independent variable is the foreign ownership dummy variable that is used to control the firm's characteristics. This variable will be assessed as one if the firm status is a foreign investment and zero if else. Foreign-owned firms tend to have better technology and greater investment compared to domestic-owned firms.

The fifth independent variable is firm size. Proxies that can be used in measuring the scale of the firm include the amount of labor and sales. The use of labor as a proxy of firm size when linked to productivity is likely to be biased because it is more labor intensive than capital intensive. Therefore, in this study the size of the firm will be measured using the logarithm of the sale. Similar to foreign ownership variables, these firm size variables are also used to control the firm's characteristics. Firms with larger sizes tend to have higher productivity compared to smaller firms among them because larger firms have larger economies of scale compared to smaller size firms. Firm size variables are predicted to be positively correlated.

The sixth and seventh independent variables are year and industry fixed effect. The purpose of using year fixed effect is to control the shock during the study period that can affect the productivity of the firms in all industrial sectors such as the existence of other government policies and economic conditions in each study period. The purpose of the industry fixed effect is to control the industry-specific heterogeneity that can affect productivity but is not observed.

Data

Data Source

The data used in this study come from several sources. Productivity, market concentration, foreign ownership, and firm size will be processed from the secondary data of the Manufacturing Industry Annual Survey organized by the Statistics Indonesia with the data obtained from the Institute for Economic and Social Research of the Universitas Indonesia. Firms covered in the survey are large and medium-sized industrial firms, that is,

firms with a workforce of 20 or more. The tariff data which are the main variable of this research are obtained from the Fiscal Policy Agency consisting of MFN tariffs and preferential tariffs that are applicable in Indonesia in accordance with the Regulation of the Minister of Finance No. 205/PMK.04/2015. Construction of output tariffs are based on ten-digit HS for every five digits of KBLI code, and construction of input tariffs are based on ten-digit Indonesian Standard Commodity Classification (KBKI) for every five digits of KBLI used to compile input tariffs using the correspondence book of KBKI with KKI 1998/1999, KBLI 2009, and HS 2012 published by Statistics Indonesia. Raw material data consisting of ten digits of KBKI for every five digits of KBLI are obtained from the Indonesian Raw Material Manufacturing Industry Statistics Book 2014. The import data using MFN tariffs and preferential tariffs required to prepare the weighted average of product level are obtained from the Directorate General of Customs and Excise. The period of data used in this research is 2007–2014. Year 2007 is chosen as the beginning of the study period since the table of correlation classification of import tariffs to Indonesian Customs Tariff Book 2012 (BTKI 2012), which becomes the basis of classification in this study, is only available from Indonesian Customs Tariff Book 2007 (BTBMI 2007). Year 2014 is chosen as the end of the study period because the data of the annual survey of manufacturing industry firm organized by the Statistics Indonesia are only available until 2014.

Firm Data

The firm's samples that are available from the Manufacturing Industry Firm's Annual Survey cover from 27,998 firms in 2007 to 24,529 firms in 2014. Yet, some of the existing data still contain noise due to unreported data as well as misreporting data. Therefore, before conducting the analysis, we must perform cleaning data process as follows:

1. The industrial code used in this study utilizes KBLI 2009 as the basic code so that the 2007–2010 data which still apply KBLI 2005 will be converted to KBLI 2009 with reference to the table of conformity of KBLI 2009-KBLI 2005. After the code of industry is entirely converted to KBLI 2009, if there remain firms that change industrial code during the period of the study, those firms will be excluded from the sample.

2. Firms of which data have negative values are excluded from the sample.
3. For firms that have blank data in a given year but have available data in the prior year and the year after, interpolation is applied to fill those blank data.
4. The growth of each firm data in this study that is less than 1 percentile and/or more than 99 percentiles is considered unrealistic, so it needs to be excluded from the research sample.

Monetary data will be deflated by some price deflators as follows:

1. The value added will be deflated by the wholesale price index by the industry sector.
2. The intermediate input will be deflated by the general index of the wholesale price index for the manufacturing sector.
3. Land will be deflated with a gross domestic product (GDP) deflator.
4. Building will be deflated by the wholesale price index of building materials by the type of construction for residential buildings and non-residential buildings.
5. Machinery and others will be deflated by the wholesale price index of imported industrial machinery.
6. Vehicles will be deflated by the wholesale price index of imported transport equipment.

Tariff Data

Some adjustments made to tariff data are as follows:

1. Import tariffs are based on BTKI 2012 so that the import tariff data using BTBMI 2007 base in the period 2007–2011 needs to be converted first to BTKI 2012 base by using the correlation table between BTBMI 2007 and BTKI 2012.
2. The tariffs that are used in this research are ad valorem tariffs, while specific tariffs are excluded from the sample.
3. Average tariffs are used for HS code having more than one tariff as found in IJEPA.

4. Some categories of industry do not have the equivalent of HS in the correspondence book of KBKI with KKI 1998/1999, KBLI 2009, and HS 2012. This makes the average output tariffs for the category of industry unconstructed, so firms that fall into that industry category will be removed from the sample.
5. There are numerous categories of industry that are not listed in the ten-digit code of KBKI for its raw materials. Their statements only include explanation of other raw materials in the description of the raw materials used. This makes the input tariffs for the category of industry cannot be constructed so that the firms belonging to that industry category will be taken out from the sample.

Result and Discussion

Statistics Description

Statistical descriptions based on observed data can be found in Table 10.1. There are 8802 firms in 244 categories of industry that meet the process of cleaning firm and tariff data. Since the amount of data among firms is not the same, the data used are unbalanced data panel with a total of 36,401 observations in the eight-year sample period (2007–2014).

From Table 10.1 it can be seen that the average firm productivity is 9.346 where the highest productivity average is in the electrical equipment industry category (27), whereas the lowest productivity average is in the tobacco processing industry category (12). In the manufacturing industry, the average output tariffs are higher than input tariffs where, if measured by MFN tariffs, the average output tariffs are 8.272% and the average input tariffs are 5.459%. Meanwhile, if measured using effective tariffs, the average output tariffs are 5.561% and the average input tariffs are 3.614%. This means that the average input tariffs are lower than the output tariffs for the same industry category with the exception of the category of paper and paper product industry (17), printing and reproduction industry (18), products of coal and petroleum refineries industry (19), computer, electronic, and optical goods industry (26),

Table 10.1 Statistics description

Variable	Obs	Max	Min	Mean	Std. Dev.
Firm	36,401	8802	1		
Year	36,401	2014	2007		
Industry category	36,401	244	1		
Firm productivity	36,401	16.46	4.295	9.346	1.371
Output tariffs MFN based	36,401	40	0	8.272	4.024
Input tariffs MFN based	36,401	18.96	0	5.459	2.633
Output tariffs effective based	36,401	40	0	5.561	3.474
Input tariffs effective based	36,401	19.43	0	3.614	2.507
Market concentration	36,401	0.997	0.00440	0.0777	0.117
Foreign ownership	36,401	1	0	0.0470	0.212
Firm size	36,401	22.88	5.938	13.63	2.019

electrical equipment industry (27), as well as machinery and equipment industry (28). Table 10.1 also signifies that the average effective tariff measurement results in lower tariffs when compared to those measurements applying the MFN tariffs only.

The highest average output tariffs are in the category of tobacco processing industry (12) and the lowest one is in the product of coal and petroleum refinery industry (19). The highest average input tariffs are in the category of printing and reproduction media industry (18) and the lowest one is in wood, wood and cork goods (excluding furniture), wicker goods from bamboo, and rattan industry (16). Table 10.1 designates that the average effective tariff measurement results in lower tariffs when compared to MFN tariffs only. Detailed data related to output tariffs and input tariffs, whether measured using the effective tariffs or MFN tariffs, can be observed in the appendix of this research.

The average market concentration in the research sample is 0.0777. This means that in general the market in Indonesia is competitive because the average value is still below 0.1. The average foreign ownership status of 0.0470 indicates that foreign-owned firms in the observations are 4.7% of the total existing firms. The remaining 95.3% of firms have domestic investment or non-facility status. The average firm size using the logarithm of sales is 13.63 where the industry with the largest economies of scale is basic metal industry (24), while the industry with the lowest economic scale is tobacco processing industry (12).

Estimation Results

The estimation results using OLS with year and industry fixed effect can be seen in Table 10.2. The table illustrates one of the main variables of this study, that is, the output tariffs whether measured using the effective tariffs or MFN tariffs have an insignificant estimation result. This finding is similar to the results obtained by Ahn et al. (2016). This signifies that changes in the output tariffs have different impact on each industry sector. Some industries may be negatively impacted by tariffs such as the majority of empirical research findings, but other industries may be positively affected such as the findings of Hu and Liu (2014) so that the estimation results are insignificant.

In the next research variable, the estimation results show that input tariffs are negatively correlated and significant to firm productivity. This indicates that the reduction of input tariffs will increase the productivity of the firm. The first identification in which input tariffs are

Table 10.2 Estimation results

	Dependent variable: log TFP	
Variables	Model (1)	Model (2)
Output tariffs effective based $_{t-1}$	−0.00530	
	(0.00527)	
Input tariffs effective based $_{t-1}$	−0.0180**	
	(0.00755)	
Output tariffs MFN based $_{t-1}$		−0.00651
		(0.00603)
Input tariffs MFN based $_{t-1}$		−0.0273***
		(0.00958)
Market concentration	−0.142***	−0.142***
	(0.0518)	(0.0518)
Foreign ownership	0.116***	0.116***
	(0.0369)	(0.0369)
Firm size	0.487***	0.487***
	(0.00526)	(0.00526)
Constant	2.471***	2.576***
	(0.212)	(0.215)
Observation	28.178	28.178
R-squared	0.775	0.775

Robust standard errors in parentheses
***$p < 0.01$; **$p < 0.05$

measured using the effective tariffs indicates that the significance level is 5%, while on second identification where input tariffs are measured using MFN tariffs, the significance level is 1%. This finding is similar to the majority of similar empirical studies such as those of Amiti and Konings (2007), Topalova and Khandelwal (2011), as well as Ahn et al. (2016). These findings on the main variables of this study mean that the increase in firm productivity is more attributable to the cheaper and qualified input factors due to the decrease in input tariffs. Furthermore, the findings in the first and second variables also answer the question that the use of effective tariffs and MFN tariffs in measuring the output tariffs and input tariffs yields similar results in correlation.

In the market concentration variables, the estimation results indicate that market concentration is negatively correlated and significant at the 1% level of firm productivity. This indicates that firms in highly concentrated industries have lower productivity when compared to firms located in industries with high levels of competition. This is because firms in highly concentrated industries have the ability to charge higher markup than firms that are in a competitive market, allowing firms to prefer using markup versus productivity to increase their profits. This finding is similar to the results obtained by Amiti and Konings (2007).

Foreign ownership variables demonstrate that foreign ownership is positively correlated and significant at 1% level. This specifies that foreign-owned firms tend to have higher productivity than domestic-owned firms. This may be due to the better technology used by firms owned by foreign nationals when compared to firms that are only owned by domestic owners. These results are similar to those findings obtained by Amiti and Konings (2007) and Yu (2015).

The firm size variables reveal that firm size is positively correlated and significant at 1% level. Thus, it indicates that large firms tend to have higher productivity compared to smaller firms. This is possible because larger firms tend to have larger economies of scale, more differentiated products, and have funds for research and development. These results are similar to the results obtained by Yu (2015).

Conclusion

This research intends to find out the extent of impact of import tariffs, which consist of output tariffs and input tariffs, on firm productivity particularly after the inclusion of preferential tariffs in measurement. The estimation results reveal that the output tariffs do not have a significant impact on the firm productivity, while the input tariffs have a negative impact on the firm productivity. Therefore, a decrease in input tariffs will increase the firm productivity. These findings signify that the increase in firm productivity is not attributable to competition factors stemming from lower output tariffs, but is down to cheaper and higher quality input factors deriving from lower input tariffs. Similar results are also produced if both tariffs are measured using the MFN tariffs. These results have implications for the policies that governments can make to help the domestic industry. One of such policies is trying to reduce the input tariffs for the industry provided that the current tariff rates at the moment are still possible to be lowered.

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