The impact of RTAs on trade in Indonesia

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Abstract

This study focuses on the question whether signing regional trade agreements (RTAs) may serve as a solution to increase the level of bilateral trade between the signatories, specifically applied to the case of Indonesia's trade with forty-two other countries. The framework of this study uses gravity models of bilateral trade. The Poisson pseudo-maximum likelihood econometric technique is utilized to run the analysis. Five different types of trade relations, i.e., AFTA, ASEAN Plus, PSA, WTO member and no RTA, are included to reflect the scope of trade relations Indonesia developed in 1989-2019. Further, the analysis is disaggregated by nine product groups to reveal the more thorough information about the specifics of bilateral trade of Indonesia. This study estimates that the most balanced and beneficial form of integration for Indonesia was the partnerships set forth in the form of partial scope agreements (PSA).It also retained balanced trade with the WTO member countries. The recommendation is to define the comparative advantages that would turn around and lead to the gains from trade within the ASEAN Plus and AFTA partnerships. The PSAs seem to be a better fit for the trade objectives of Indonesia, therefore expanding the list of PSA partnerships would benefit this country's trade. The product level analysis of trade supports our findings that were generated on the aggregate level.

JEL classifications: F13; F15; F43; F68; N15.

Keywords: Regional Trade Agreements (RTA); International Trade; AFTA; ASEAN Plus; Indonesia; Gravity Models of Trade.

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1. Introduction

The literature on international trade suggests benefits of regional trade agreements (RTAs) for signatories. The motivation for this paper is to answer the question whether all regional trade agreements, which operate as one of the driving forces in the process of trade creation, are equally beneficial to both partners. We study the impact of RTAs on the change in dynamics of trade between Indonesia and its intra-ASEAN and non-ASEAN partners, which include forty-two countries.

The motivation for this analysis is driven by the review of data on trade between Indonesia and its partners for 1989-2019 and assessment that the former experienced a significant decline in net exports after signing some of the RTAs (IMF, 2019). Therefore, a natural question was to evaluate the effect of all trade agreements signed by Indonesia and estimate which of those produced a negative effect on this country's balance of trade.

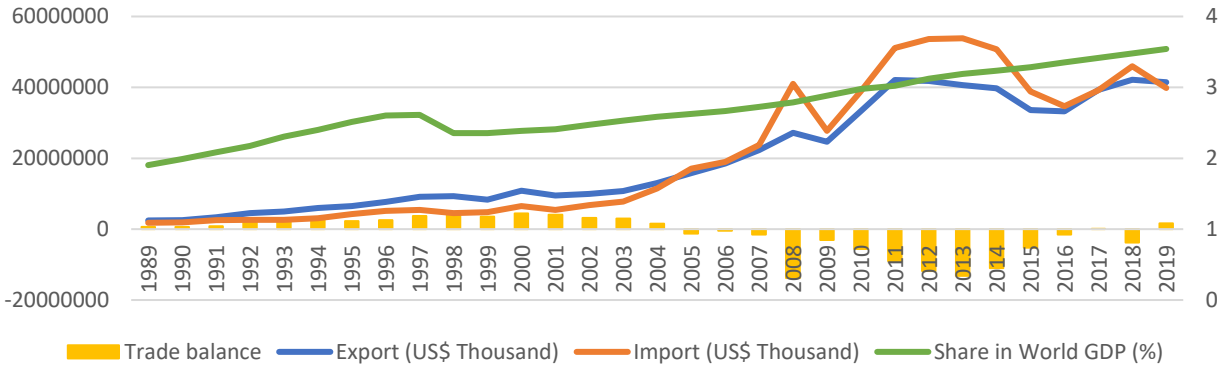
The growing importance of Indonesia in global trade and the long-term scope of this analysis capturing the period of 1989-2019 suggests to start this study with relating the effects of globalization on the domestic developments in this country. Thus, the economy of Indonesia, a Southeast Asian country, with population of over 270 million people, is the fourth most populous country in the world followed after China, India and the United States (WB, 2019). This country, upon the declaration of its independence in 1945, started implementing its institutions and developing its economic system. These domestic changes overlapped and, to some extent, were the result of global developments, including the emergence of trade liberalization efforts set forth by the delegates representing forty-four nations at the 1944 Bretton Woods conference in New Hampshire, USA (U.S. Department of State, 1944). The founding concepts in support of trade liberalization reached a pivotal moment in 1947, when the U.S. and twenty-two other nations

agreed upon taking the path of reduction of barriers to trade. This founded the first multilateral free trade agreement known as the General Agreement on Tariffs and Trade (GATT), which became the prototype of a more-inclusive and complex institution known as the World Trade Organization (WTO) established during the Uruguay Round of GATT in 1995.

These global changes also resulted in turns in specific regions. Indonesia, after the declaration of its independence in 1945, continued to build its national economy and infrastructure. The first opportunities for accelerated economic and cultural integration in the region of Southeast Asia were put forth by the Bangkok Declaration on August of 1967. The Association of Southeast Asian Nations (ASEAN) was launched by the leaders of five countries, including Indonesia, who signed this declaration in Thailand. The 1980s were characterized by a significant economic slowdown in Indonesia. Its balance sheet and government revenues were affected by lower export revenues, due to a fall in the world price of oil. In 1983-1995, the reduction of trade barriers and shift of export composition to non-oil and gas products was seen as a solution to increase economic activity in this country (Soesastro and Basri, 2005). The ASEAN became the basis for a more profound step in the regional economic integration, which came in the form of the ASEAN free trade area (AFTA), a trade block with ten active members, including Indonesia, which entered into force in January 1992. This promoted the free flow of goods and services within the region (Yang and Martinez-Zarzoso, 2014). For Indonesia, the AFTA entered into force a year later in 1993. Overall, these trade liberalization policies and expansion of trade to also capture developing countries accelerated the economic growth of Indonesia until the recession of 1997. In the period of 1989-1992, Indonesia, in aggregate terms, ran a trade surplus with its future AFTA partners. Systematically, it reported a trade deficit only with Malaysia (1989-1993). During the same period, there were sporadic instances of trade

deficits with Myanmar (1989), Vietnam (1990) and Thailand (1991). This positive dynamic in trade continued until 2004. As an aggregate estimate of all trade flows with its AFTA partners, Indonesia reported trade deficit since 2005 onward. This negative trend in trade with the AFTA partners was reversed only in 2019 (*Figure 1*). The trade surplus of 2019 was achieved mainly due to a significant reduction of imports from Philippines and Singapore, and an increase of exports to Brunei, Cambodia and Vietnam.

*Figure 1. Trade balance of Indonesia and its AFTA partners (in thousand USD) and share of AFTA in World GDP (%)**



**Right vertical axis reflects the share of AFTA in World GDP (%)*

As a member of AFTA, Indonesia developed trade agreements in the ASEAN Plus format with a number of countries. Thus, those agreements offered more beneficial terms of trade to the People's Republic of China in 2005, the year of their FTA entering into force. In two years, the trade surplus with China reversed and Indonesia has reported a growing trade deficit with this country from 2007 onward. The similar negative impact of FTAs on trade dynamics of Indonesia is seen in the case of Australia and other countries. This paper uses the case of Indonesia to challenge the widely used assumption by many countries that views RTAs as the direct solution to achieving higher domestic economic growth through the acceleration of net exports.

Generally, according to the WTO, during various periods Indonesia (as a part of the ASEAN free trade zone) launched FTAs with seven countries, including China, Japan, Australia, New Zealand, India, Republic of Korea, Hong Kong (China) and Chile (Table A1). This is also known as ASEAN Plus format of trade agreements. According to the Asia Regional Integration Center, Indonesia has been actively expanding the policies of trade openness in recent years. Thus, in contrast to the currently in-effect fifteen FTAs, it is in the varying stages of implementation of a large number of new FTAs classified as follows: 17 being at the stage of consultation and study, 6 being at the stage of negotiations, and 3 being signed but not yet in effect.

From the technical perspective, a gravity model of trade from 1989 to 2019 (the World Bank's last data on bilateral trade) is constructed to analyze the changes in trade dynamics between Indonesia and its partners. We follow the changes in trade patterns between Indonesia and its forty-two partner countries. The Poisson pseudo-maximum likelihood technique is used as the econometric strategy to conduct data analysis.

This analysis contributes to the existing literature on international trade particularly in terms of shedding light on those specific situations when RTAs may reverse the expected gains from trade for individual countries. This paper is organized as follows. A brief summary of the existing literature is provided in Section 2. The discussion of the data, their features and sources are compiled in Section 3. Section 4 describes the method and econometric strategy used in this paper. The results of the analysis are covered in Section 5. Section 6 provides our view on possible policy implications and concludes the study.

2. Literature Review

Volumes of studies are dedicated to the discussion on the benefits of trade liberalization and high economic dependence in East Asia, which is achieved through the domestic structural reforms and rising economic cooperation regionally and in the global scene. The expansion of three main contributors to the open economy - foreign trade, direct investment and financial flows - created natural grounds for highly integrated economic zone in this region (Kawai, 2005). The literature suggests various models for further regional integration. Thus, Cui et al. (2019) discuss the possibilities and advantages of the trilateral FTA among China, Japan and South Korea. They define the comparative advantages of agricultural sector in Japan and South Korea and consumption potential of those products in China. They believe that these strategies would resolve the issues of rural employment and contribute to environmental protection in the region.

Along with the benefits of high integration and trade liberalization, the research also defines some areas for improvement in the East Asia region. Thus, Kawai (2003) defines the advantages of the region-wide FTA and advocates for the exchange rate policy coordination in the region.

Other studies focus on specific countries of the region. The issue whether the gains from trade are distributed fairly has been one of the important topics. Thus, Halil and Tugce (2022) ask the direct question whether South Korea really benefited from FTAs. Their analysis constructs a gravity model of trade and derives that the exports of metals to the partner countries increased significantly. They also estimate the acceleration of imports specifically applied to minerals, chemicals and machinery.

The studies analyzing the benefits of trade in Indonesia focus on various aspects that would lead to macroeconomic improvements. Thus, Amiti and Konings (2007) consider two

policy changes on imports - a reduction of tariffs on final goods vs. a contraction of tariffs on intermediate inputs. They assess 12% gains in productivity if the tariffs are reduced on intermediate inputs by 10 percentage points. This study concludes that reducing the tariffs on imported inputs is more advantageous than lowering output tariffs. Another study by Qurbani et al. (2021), considers the leadership role of Indonesia in the ASEAN and estimates the improved role of justice on the minerals sector. The authors believe that the implementation of legal reforms and further elevation of the role of justice in Indonesia would not only benefit the minerals sector and economy of this country but also spill over into other partner countries and elevate the potential of their extractive industries.

In terms of the modeling strategy applied to the large datasets associated with international trade, the literature suggests that the working horse for such analysis is to construct gravity models of trade and then use the Poisson pseudo-maximum likelihood technique as the econometric strategy. We find numerous studies that follow this strategy (Greaney and Kiyota, 2020; Jagdambe and Kannan, 2020; Halil and Tugce, 2022; Sedrakyan, 2022).

3. Data

Independent variables

A gravity model of trade is constructed to conduct data analysis. In its general formulation, a gravity model requires to control for a number of factors, such as importer-specific and exporter- specific determinants, which would reflect the levels of demand for and supply of products available for trade. It also requires the factors, which will control for the ease of access to market of importing country. Thus, for the basic variables to construct the gravity model for this analysis, we include the GDPs of and distance between trade partners. This analysis includes Real GDP in 2015 prices, which is retrieved from the World Development

Indicators (WDI) of the World Bank database. The straight-line distance between two countries in kilometers is used, which is calculated based on their center latitudes and longitudes. The size of potential demand is controlled by including the population of trade partners as another independent determinant, which is collected from the Population estimates and projections dataset of the World Bank, which in turn is linked to the UN World Population Prospects annual dataset.

The fluctuations in exchange rates are another characteristic that contributes to the ease of market access and may change the direction of trade flow. This analysis uses the rate of 1 unit of foreign exchange to Indonesian Rupiah (IDR). We do not link the exchange rate to the U.S. Dollar (USD), since the United States and several countries, which pegged their domestic exchange to USD, namely Oman, Saudi Arabia, and United Arab Emirates, are included in this analysis. Our strategy allows us to capture the fluctuations of their domestic currency to IDR.

The level of internet penetration loosens the physical barriers and reduces associated trade costs between buyers and manufacturers located in different countries. In order for the internet to link parties of the transaction, both countries need to have certain level of digitalization. Here, we create a ratio, $Digital_{it}$, between the share of internet users in total population of a partner country and the same determinant calculated for Indonesia. This ratio explains four different groups of countries. Thus, the ratio of $Digital_{it} \geq 1$, reflects those countries, where the % of internet users was higher or equal than in Indonesia; of $0 < Digital_{it} < 1$ reflects those countries where the share of internet users was lower than in Indonesia. The $Digital_{it} = 0$, for the periods after 1993 reflects those countries, which had 0% digitalization in corresponding years. The $Digital_{it} = 0$ for 1989-1993, since in Indonesia some level of digitalization was first reported in 1994.

This analysis includes binary variables which control for several common characteristics which are believed to facilitate trade, such as language, border (contiguity), and colonial history. More than 700 languages and local dialects are spoken in Indonesia. For the purpose of current analysis, the knowledge of Malay, as Bahasa Indonesia (Indonesian) is considered a modification of it, English and Dutch is controlled. The binary variable which controls for common history takes 1 for the countries colonized by Portugal and/or the Netherlands and 0 otherwise. According to the World Population Review, Indonesia is made up of over seventeen thousand islands; therefore, it shares land border with only three countries, of which Malaysia is included in this analysis. Thus, the binary variable defining adjacency of trade partners takes 1 in case of Malaysia and 0 otherwise. Usually, the cost of transportation is considered to be higher for landlocked and island countries, and the literature recommends using binary variables to control for those characteristics. Indonesia and all other countries included in the current analysis have a coastline; therefore, we do not control for being a landlocked country. Indonesia is an island nation. Therefore, 1 is assigned if both Indonesia and trade partner are island nations and 0 otherwise.

RTA variables

This analysis uses a set of RTA denoting dummy variables to obtain the answer, whether Indonesia benefited from RTAs, specifically applied to net-exports, which is one of the primary drivers of a country's economic growth. *Table 1* below provides the summary of countries included in the analysis and the type of RTA, or possibly not having one, they use for trade with Indonesia. Thus, the first variable ($(RTA_{1t}$) controls the intra-ASEAN trade and is equal 1 if both countries in the period t are members of the ASEAN free trade area (AFTA) and 0 otherwise.

There are total of ten countries, including Indonesia, which comprise the AFTA zone. The second variable (RTA_{2t}) controls for the agreement in the ASEAN Plus format, where 1 is assigned only to those countries which cooperate with Indonesia in the context of being an external trade partner with the countries that comprise the ASEAN free trade area - that list includes: Australia, New Zealand, China, Hong Kong (China), India, Japan, and South Korea.

Table 1. Countries included in the analysis and types of their RTAs with Indonesia

Australia**	France****	Mexico***	Poland****	Switzerland****
Bangladesh***	Germany****	Myanmar*	Russia****	Tanzania***
Belgium****	Hong Kong (China)**	Netherlands****	Saudi Arabia****	Thailand*
Brazil***	India**	New Zealand**	Singapore*	Turkey****
Brunei Darussalam*	Italy****	Nigeria***	South Africa	United Arab Emirates****
Cambodia*	Japan**	Oman****	South Korea**	United Kingdom****
Canada****	Kenya****	Pakistan***	Spain****	United States****
China**	Lao People's Democratic Republic*	Philippines*	Sri Lanka***	Vietnam*
Egypt***	Malaysia*			

Note: *ASEAN free trade area (AFTA) (RTA_{1t}); **ASEAN Plus (RTA_{2t}); ***PSA (Partial Scope Agreement) (RTA_{3t}); ****None of the outlined RTAs (RTA_{4t}).
Source: *World Trade Organization*

The third variable (RTA_{3t}) controls for the countries which have Partial Scope Agreements (PSA) with Indonesia. It takes 1 if both Indonesia and given country have a PSA in effect and 0 otherwise. Indonesia and Pakistan have a bilateral PSA in effect since September, 2013. Another plurilateral PSA, known as the Global System of Trade Preferences among Developing Countries (GSTP), entered into force in April, 1989 and intended to promote trade between developing countries. The fourth variable (RTA_{4t}) controls for the trade partners which do not

have FTAs and other regional trade agreements with Indonesia. The list of countries compiled under each of the outlined RTAs is provided in Table A2. Since, the membership to WTO also has an impact on trade, a binary variable assigning 1 if both trade partners in the period t belong to it and 0 otherwise is also included.

Overall, having the trade partners grouped under the four RTA types described above allows us to determine if the international trade of Indonesia experienced one of the following changes as a result of an RTA of interest: trade creation, diversion or, possibly, contraction. There are three possible scenarios. Thus, the positive coefficients associated with all RTAs would signal the case of trade creation. The combination of negative and positive coefficients associated with RTAs would signal trade contraction in the areas where RTAs take a negative coefficient and diversion of those trade flows to the RTA types which take a positive coefficient. Here, the absolute values of coefficients are also important. Thus, if the negative coefficient is greater than the positive one in absolute terms, then there was some level of trade diversion but the higher negative value also signals some level of trade contraction. In contrast, if the associated positive coefficient is greater than the negative one in absolute terms, it means a combination of two effects took place - trade diversion and, in general, trade creation. The negative coefficients simultaneously derived relative to all RTAs would signal trade contraction.

Dependent variables

The data (including the disaggregated data by product types) on bilateral trade flow between Indonesia and its trade partners were obtained from the World Integrated Trade Solution (WITS), one of the flagship databases produced by the World Bank. The data on bilateral trade includes forty-two countries. Although, according to the same source, Indonesia exports to 215 countries and imports products and services from 225 countries, we chose the top forty countries

Table 1. Descriptive statistics and data sources

Variables	Description	Mean	Std. Dev.	Min	Max	Source
Imp_{ijt}	Imports to Indonesia (thousand USD)	1,789.97	4,239.04	0	45,537.82	WITS, World Bank
Exp_{ijt}	Exports from Indonesia (thousand USD)	2,146.75	4,204.13	0	33,714.7	WITS, World Bank
GDP_{it}	Real GDP trade partner in 2015 prices (million USD)	1,613,542	3,243,556	0	19,974,530	UNCTAD
GDP_{jt}	Real GDP Indonesia 2015 prices (thousand USD)	554,022	228,839	251,688	1,049,319	UNCTAD
$Dist_{ij}$	Direct distance (km)	7,426	4,381	599	17,730	Google Maps
Pop_{it}	Population size (thousand)	114,864	252,868	252	1,407,745	UNCTAD
Pop_{jt}	Population size Indonesia (thousand)	224,030	27,426	178,209	270,626	UNCTAD
Er_{ijt}	Exchange rate of local currency to IDR (in thousands)	1,172.35	40,059.86	.0002	1,444,127	UNCTAD
$Digit_{ijt}$	Ratio of computer users	30	227	0	4,589	ITU World Telecommunication/ ICT Indicators & WB
$Island_i$	Island country	0.2	0.4	0	1	World Population Review
$Cont_{ij}$	Contiguity-Common border with Indonesia	0.02	.2	0	1	The World Factbook, CIA
$Comlang_i$	Malay, Dutch and English	1.12	0.9	0	2	World Population Review
$Comhist_i$	Common colonizers (Portugal and/or Netherlands)	0.2	0.4	0	1	WorldAtlas.com
Remoteness	Estimate of $\sum_i \frac{dis_{ij}}{GDP_i/GDP_W}$	0.2	0.6	0	4.2	Google Maps/ UNCTAD
RTA_{1t}	AFTA/Both ASEAN	0.2	0.4	0	1	WTO
RTA_{2t}	ASEAN Plus format	0.05	0.2	0	1	WTO
RTA_{3t}	PSA/Both in partial scope agreement	0.3	0.5	0	1	WTO
RTA_{4t}	Non-ASEAN	0.8	0.4	0	1	WTO
WTO_t	Both in WTO	0.8	0.4	0	1	WTO

in terms of their contributed share to Indonesia's trade which for the duration of our analysis was about 95 percent and added the data on two remaining countries of the ASEAN free trade area, Lao People's Democratic Republic and Brunei Darussalam, since it represented the main reference point for constructing the RTA variables used in this analysis.

4. Methodology

The Poisson pseudo-maximum likelihood (PPML) econometric technique is used to conduct data analysis. This method is described in Santos-Silva and Tenreyro (2006), and the recommendations outlined in that paper are closely followed in this research. Several considerations went into the choice of the econometric technique used in this analysis. First, a method that allowed us to keep the dependent variable equal to 0 as valid cases was essential, specifically for the analysis conducted by product groups. Second, a method that is consistent in the presence of heteroscedasticity, an issue frequently arising in data analysis reflecting international trade, was needed. Third, a method that works efficiently with large datasets covering long duration of the study, was required. The PPML method is known as the data analysis technique that solves for all abovementioned concerns.

In addition, we follow the literature on international trade which suggests the necessity of controlling for the multilateral resistance terms (MRT) (Anderson and van Wincoop, 2003). Overall, a large number of studies uses importer and exporter-fixed effects to control for MRTs. In our case, where Indonesia is one of the countries in each analyzed country pair, controlling for a country-fixed effect would produce a constant-dummy for Indonesia and automatically drop it by the statistical software. Therefore, to keep the analysis consistent, instead of creating importer and exporter fixed effects, we use another MRTs controlling technique, which is also specified by Head (2003). It suggests introducing a determinant of remoteness. This variable is estimated

according to the equation of $Rem_i = \sum_i \frac{dis_{ij}}{GDP_i/GDP_W}$ and can be interpreted as the country's spatially weighted GDP from its trading partners. The statistical software uses a two-step approach to estimate it. First, it estimates the contribution of GDP of a trade partner in the world GDP and then incorporates that estimate as the denominator in the formula described above. To avoid reverse causality, all macroeconomic control variables are included in the analysis with the lag of one year.

As described above, the model uses the Santos-Silva and Tenreyro (2006) approach, where the gravity equation is modeled in the level-log format. Here, the dependent variable is supposed to be in level - not logarithmic - form, while the independent variables are transformed into the natural logarithms. Thus, the model is described by the following equation [1]:

$$Dep_{ijt} = \alpha_0 + \alpha_1 lnGDP_{it-1} + \alpha_2 lnGDP_{jt-1} + \alpha_3 lnDist_{ij} + \alpha_4 lnPop_{it-1} + \alpha_5 lnPop_{jt-1} + \alpha_6 lnExch_{t-1} + \alpha_7 lnDigital_{t-1} + \alpha_7 RTA_{1t} + \alpha_8 RTA_{2t} + \alpha_9 RTA_{3t} + \alpha_{10} RTA_{4t} + \alpha_{11} WTO_{it} + \alpha_{12} Rem_{it-1} + \alpha_{13} A_i + \varepsilon_{it} \quad [1]$$

where:

Dep_{ijt}- stands for dependent variables - a) volume of exports from Indonesia (j) to partner economy (i) at time (t); b) volume of imports from partner economy (i) to Indonesia (j) at time (t); c) volume of exports of a type of product from Indonesia (j) to partner economy (i) at time (t); and d) volume of imports of a type of product from partner economy (i) to Indonesia (j) at time (t),

Rem_{it} - remoteness,

A_i - vector of binary variables, i.e., $Island_i$, $Cont_i$, $Comlang_i$,

The set of FTA denoting dummy variables with t corresponding with the period of integration includes:

RTA_{1t} - both countries are AFTA member economies

RTA_{2t} - partner trades within ASEAN Plus format

RTA_{3t} - both countries are PSA member economies

RTA_{4t} - partner does not operate within the ASEAN related trade agreements

WTO_t - both are WTO member countries

ε_{it} - cluster robust error (clustered on country pairs).

The description and sources of the variables included in the model are provided in *Table 1*.

The choice of regressors is also impacted by the outcomes of the variance inflation factor (VIF) test, which was applied to the random effects regressions of the described model, to avoid the issue of multicollinearity.

The postestimation is conducted by using the heteroscedasticity-robust RESET test. The reported $p - value > 0$ suggests that the specifications of the gravity model are properly defined. This determination is based upon the significance of an additional regressor constructed as $(xb)^2$ with b representing the vector of estimated values.

5. Results

The results of the analysis are divided into two main sections. First, the review of the results associated with the effects of RTAs on the change in total exports and imports of Indonesia over 1989-2019 is provided. Then, a selective list of product groups is analyzed for the same time horizon to gain a more thorough understanding of the impact that the RTAs had on trade associated with each of those categories and the corresponding results are provided (*Tables A2* and *A3*).

Thus, this section covers the effects of RTAs on total exports and imports. The RTAs had a significant impact on ***total exports*** of Indonesia (*Table A2*). According to the analysis, being a member of the ASEAN free trade area (RTA_{1t}) was not a significant factor for exports from

Indonesia. The exports to the countries which traded with Indonesia within the ASEAN Plus format (RTA_{2t}) were lower and that specific format of trade agreement was a significant factor leading to the contraction of exports. It was estimated that trading with an ASEAN Plus partner reduced the flow of exports on average by 0.273 million dollars, if all other explanatory variables are held constant. Exports significantly rose to countries which had partial scope agreements (RTA_{3t}) with Indonesia. On average, exports to these countries were higher by .364 million dollars. Not having an effective RTA in place was also a factor significantly reducing exports of Indonesia, lowering it on average by 0.452 million dollars (RTA_{4t}). Also, Indonesia benefited from being a member of WTO, as trading with the other members of this organization had a positive effect on its exports. On average, the exports with the WTO members were higher by 0.198 million dollars. Thus, the RTAs signed in the ASEAN Plus format significantly lowered exports and resulted in the diversion of trade away from these countries to the destinations which traded with Indonesia within the PSAs or as members of WTO.

In terms of the impact of RTAs on ***total imports*** to Indonesia, the analysis determined that the trade partners significantly benefited from the large market of Indonesia (*Table A3*). Thus, the AFTA was a significant driver of a large share of imports received from these countries in Indonesia. On average, the imports from these countries were higher by .702 million dollars, if all other explanatory variables are held constant. The similar significantly positive effect was estimated for the imports from countries which traded with Indonesia in the format of the ASEAN Plus agreements. Here, the imports with the ASEAN Plus partners increased on average by 0.352 million dollars. Although, the coefficients associated with the levels of imports from PSA and WTO countries were positive, these agreements were not determined as significant factors in generating imports. The analysis estimated that not having a form of

regional trade agreement negatively impacted imports to Indonesia and that decline reached, on average, 0.065 million dollars.

There were other factors that had a significant effect on trade of Indonesia. Thus, the exports were positively impacted by the population size of this country and the level of digitalization. The positive relation between the population size and level of exports can be interpreted as the product of rising population that, in turn, generates higher levels of labor force and output growth, which may lead to an increase in exports. The level of digitalization is one of the factors that has been gaining importance in the international trade literature in recent years. This paper reaffirms the significance of digitalization for acceleration of trade and estimates an increased level of exports directed to the countries with higher levels of digitalization than that in Indonesia. The Indonesian exports are negatively impacted by two following determinants - its GDP and appreciation of IDR relative to foreign exchange rate. The negative relation between GDP and exports may be driven by a number of factors, which may include domestic laws causing certain constraints for exports, domestic consumption behavior with higher propensity to consume locally manufactured goods and services, etc. The reduction in exports due to appreciation of IDR (Indonesian Rupiah), which increases the prices of domestic products relative to foreign ones, is supported by the macroeconomics literature.

Next, the factors that positively impact imports to Indonesia include the population of the importing country and remoteness. The positive relation between the population size and imports can be explained by higher labor force in those economies which through the production of higher output would accelerate the levels of imports, including, to Indonesia. Remoteness is explained as country's spatially weighted GDP from its trading partners, and it can rise either

due to a higher distance or a smaller aggregate output of the importing country or combination of movements in both.

This section discusses the effects of RTAs on trade for selected categories of products, which include fuel, minerals, animals, plastic or rubber, textiles and clothing, wood, metals, machines and electronics, and vegetables. The product groups replicate the information retrieved from the World Integrated Trade Solution (WITS) database of the World Bank. In terms of exports, seven of all nine groups of products used in the analysis support the outcomes that have already been assessed for total exports from Indonesia. Thus, the AFTA (RTA_{1t}) had a strong negative impact on the exports from Indonesia, which declined for the following product groups: minerals, animals, plastic or rubber, textile and clothing, wood, metals, and vegetables. The ASEAN Plus format (RTA_{2t}), in general, had a strong negative impact on the same product groups adjusted for the two following categories: machines and electronics (added) and animals (deducted). Overall, some evidence of trade diversion to countries which traded within the PSAs with Indonesia (RTA_{3t}) is determined, but that reflects a limited number of products and specifically applies to minerals, textile and clothing, wood, and vegetables. In all cases of trade diversion, the coefficients are not high enough to suggest that these volumes of exports would fully mitigate their decline related to operations within the RTA_{1t} and RTA_{2t}. This also means that there is some evidence of contraction in exports of those product groups. The analysis estimates trade contraction associated with exports of metals, plastic or rubber, and machines and electronics, since all four coefficients of corresponding RTAs are negative or insignificantly positive for PSAs.

Despite the outcomes suggesting that the effective RTAs do not support export creation in Indonesia, the observation on exports with the WTO members softens this outlook. The

analysis suggests that Indonesia diverts the exports of some of those products to the WTO member countries and those product groups include minerals, plastic or rubber, textiles and clothing, machines and electronics, and vegetables. Due to low coefficients, the trade diversion to the WTO member countries does not fully cover the losses of exports occurred as a result of RTA_{1t} and RTA_{2t} effects.

Since fuel is the largest export product for Indonesia with the share of 20% in 2019, this analysis determines that Indonesia does not fully utilize the potential of the AFTA and ASEAN Plus markets relative to this product, since there is no significant effect of RTA_{1t} or RTA_{2t} on exports of fuel products. However, the significant negative effects of PSAs on exports of this product suggest the need for a more thorough revision of the terms of trade concerning this product group. Our analysis of fuel imports suggests significant contractions of this product from the AFTA and ASEAN Plus countries, which can be viewed as substitution of those imports with domestic production. The observations of the results associated with imports suggest that most likely the contraction of exports in the metals product group can be due to the accelerated imports from the trade partners which operate within the ASEAN Plus (RTA_{2t}) and PSA (RTA_{3t}) agreements with Indonesia.

6. Conclusions and policy implications

Here, the summary of the gains from trade associated with each group of RTAs discussed earlier in this analysis is provided. Indonesia did not seem to fully benefit from the potential that operating as a member of the ASEAN free trade zone may offer. Thus, our analysis did not estimate a significant effect impacting the exports from Indonesia to these countries and, even more, this insignificant coefficient was negative, which implies that the negative effect is not systematic and Indonesia has the potential to turn around the situation. Meantime, the other

countries of the AFTA utilized the potential of the Indonesian market much better and that impacted the rise in their imports. Thus, in light of these findings, Indonesia will be better off if it reevaluates its comparative advantages over the AFTA partners and fully utilizes the potential that this free trade area offers to its members, specifically applied to expanding its exports to these partner countries.

Next, our analysis suggests that the trade with the ASEAN Plus partners had the largest area for improvement, since the exports to these countries were directly and negatively affected by the terms of these agreements. This simultaneously occurring significant trend reflected in a contraction of exports and a much sharper rise in imports would profoundly affect the balance of trade, if no new steps are undertaken to improve the terms of trade and discussed disbalances. Indonesia successfully utilized the potential of PSAs and being a member of the WTO, since the exports to these countries were positively impacted by these agreements and grew significantly. In contrast, although the coefficients associated with imports from the countries which have PSAs and operate as WTO members with Indonesia have positive signs, they are not significantly driven by these two agreements. This suggests that Indonesia did not fully benefit from the diversified products and services that these countries could potentially offer. Therefore, as another strategy, Indonesia may consider better utilizing the diverse potential of the imports from these countries and still retain the orderly balance of trade related to PSA and WTO partners.

Lastly, this analysis suggests that not having regional trade agreements was not beneficial for Indonesia. The exports of Indonesia to these countries had a significant decline. The same negative, yet insignificant, effect was determined in terms of imports to Indonesia from countries which operate without implementation of any of the regional trade agreements discussed above.

Therefore, another strategy to enhance the trade balance of Indonesia is to recommend signing a higher number of partial scope agreements (PSA) directly with new potential partners. The analysis disaggregated by nine product groups provided observations in line with the discussion on the aggregate exports and imports outlined above.

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Appendices

Table A1. Indonesia Regional Trade Agreements

Agreement name/type	Trade partner	Date of entry into force for Indonesia
Global System of Trade Preferences among Developing Countries (GSTP)	Algeria; Argentina; Bangladesh; Benin; Bolivia, Plurinational State of; Brazil; Cameroon; Chile; Colombia; Cuba; Ecuador; Egypt; Ghana; Guinea; Guyana; India; Indonesia; Iran; Iraq; Korea, Democratic People's Republic of; Korea, Republic of; Libya; Malaysia; Mexico; Morocco; Mozambique; Myanmar; Nicaragua; Nigeria; Pakistan; Peru; Philippines; Singapore; Sri Lanka; Sudan; Tanzania; Thailand; Trinidad and Tobago; Tunisia; Venezuela, Bolivarian Republic of; Viet Nam; Zimbabwe	04.19.1989
ASEAN Free Trade Area	Brunei Darussalam; Cambodia; Indonesia; Lao People's Democratic Republic; Malaysia; Myanmar; Philippines; Singapore; Thailand; Vietnam	01.01.1993
ASEAN-People's Republic of China/FTA	Countries of ASEAN + China	01.01.2005*
Japan – Indonesia/FTA	Japan - Indonesia	07.01.2008
ASEAN-Japan/FTA	Countries of ASEAN + Japan	03.01.2010
ASEAN-India/FTA	Countries of ASEAN + India	10.01.2010*
ASEAN - Australia - New Zealand/FTA	Countries of ASEAN + Australia + New Zealand	01.10.2012
ASEAN-Republic of Korea/Comprehensive economic partnership agreement	Countries of ASEAN + Republic of Korea	01.01.2010*
Indonesia-Pakistan/ Partial Scope Agreement (PSA)	Indonesia + Pakistan	09.01.2013
ASEAN-Hong Kong (China)/ FTA	ASEAN + Hong Kong (China)	07.04.2020
Indonesia-Chile/FTA	Indonesia + Chile	08.10.2019
Indonesia – Australia/FTA	Indonesia - Australia	07.05.2020
EFTA-Indonesia	Iceland; Liechtenstein; Norway; Switzerland; Indonesia	11.01.2021

*Launched FTA applied to trade in goods first.
Source: *World Trade Organization*

Table A2. Results on total exports and exports by product types

Variables	Total exports	Exports by product types								
		Fuel	Minerals	Animals	Plastic/Rubber	Textile	Wood	Metals	Machines	Vegetables
$lnDist_{ij}$	0.510 (1.164)	27.617 (15.829)	-1.447 (.863)	8.324*** (1.138)	-1.014 (1.180)	2.040* (.830)	-1.225 (.898)	9.471*** (1.265)	3.290*** (.957)	-7.220*** (1.631)
$lnGDP_{ij}$	.508 (.717)	1.029* (.509)	-.221*** (.063)	1.729* (.840)	.042 (.045)	.072 (.047)	.239 (.461)	1.310* (.657)	.002 (.081)	.090 (.406)
$lnGDP_{ji}$	-1.844*** (.532)	-4.367*** (.493)	-4.885** (1.667)	.358 (1.298)	-3.448*** (.950)	-2.373** (.847)	-.353 (.717)	-4.696** (1.582)	-4.831*** (.615)	-.398 (.896)
$lnPop_i$	.786 (.856)	3.926* (1.744)	.107 (1.058)	.121 (2.161)	-.049 (.410)	-.429 (.3169)	.7392 (.427)	.002 (.915)	-.536 (.308)	1.706* (.707)
$lnPop_j$	11.225*** (2.750)	17.752*** (2.422)	21.266** (7.563)	-1.099 (6.159)	18.846*** (4.065)	12.512*** (3.009)	4.006 (3.664)	22.065 (6.217)	25.294*** (2.389)	7.655* (3.511)
$lnExch_{ij}$	-.542*** (.132)	-.926*** (.181)	-.701 (.394)	-.199 (.270)	-.753** (.267)	-.547*** (.094)	-.403* (.183)	-.855* (.336)	-.678*** (.134)	-.185 (.106)
$lnDig_{ij}$	.041** (.014)	.040* (.017)	.101** (.039)	.040* (.021)	.072* (.034)	.040* (.0168)	.046** (.017)	.035 (.034)	.163*** (.022)	.084* (.038)
$Island_i$	2.806 (2.524)	46.419* (20.524)	-1.989* (.831)	8.039* (4.073)	1.172 (1.124)	2.111 (1.664)	-.377 (.610)	12.644*** (3.150)	4.252 (2.228)	-3.720* (1.875)
$Cont_i$	2.851 (3.301)	48.353* (19.193)	-4.566 (2.720)	19.428*** (2.740)	-4.911* (2.092)	-.537 (2.851)	-1.361 (2.314)	21.004*** (3.713)	5.467* (2.621)	-11.963*** (3.704)
$Comhist_i$	.743 (1.115)	-30.017 (15.747)	.081 (1.994)	-13.447*** (2.715)	4.616** (1.542)	3.882 (2.348)	.187 (.856)	-10.008*** (2.794)	-1.399 (1.635)	-1.214 (1.420)
$Comlang_i$	.514 (.793)	-4.268*** (1.176)	-1.520** (.548)	.810 (1.644)	-.921 (.542)	-.552 (.613)	.219 (.510)	.727 (1.693)	-.088 (.867)	.444 (1.039)
$Remot_i$	.325 (.859)	.025 (.941)	4.706*** (.594)	-1.563* (.756)	-.308 (.191)	-.750 (.433)	.982 (.964)	.566 (1.479)	.382* (.162)	.155 (.736)
RTA_1	-.186 (.317)	.189 (.663)	-2.957*** (.386)	-.735** (.272)	-2.740*** (.495)	-2.268*** (.552)	-1.576** (.539)	-.791*** (.263)	.225 (.169)	-1.668*** (.455)
RTA_2	-.273** (.103)	-.091 (.128)	-1.940*** (.139)	-.126 (.176)	-1.322*** (.073)	-.773*** (.147)	-1.878** (.141)	-1.923*** (.188)	-.282*** (.076)	-1.087*** (.070)
RTA_3	.364*** (.129)	-.629* (.253)	2.258* (1.126)	.454 (.514)	.029 (.158)	.557*** (.115)	.207** (.084)	-.691** (.289)	.132 (.239)	.354*** (.082)
RTA_4	-.452*** (.092)	-.531** (.188)	-2.755*** (.159)	.261* (.130)	-2.193*** (.151)	-1.467*** (.139)	-1.861*** (.075)	-2.381*** (.130)	-.573*** (.135)	-1.362*** (.208)
WTO	.198*** (.054)	.1310 (.091)	.875*** (.169)	.119 (.155)	.525*** (.080)	.198* (.100)	.087 (.101)	.280 (.150)	.750*** (.110)	.344* (.145)
$Const$	-119.027*** (25.467)	-216.64*** (30.390)	-175.103** (60.230)	-10.863 (54.761)	-165.572*** (35.531)	- 105.364*** (25.100)	-37.077 (30.498)	-218.697*** (56.923)	-231.311*** (21.034)	-76.706** (29.844)
N groups	42	42	42	42	42	42	42	42	42	42
N observations	1,302	1,302	1,302	1,302	1,302	1,302	1,302	1,302	1,302	1,302
Pseudo log-likelihood	-134111431	-72761267	-21807462	-5164958	-15052649	-18336598	-12051128	-23588101	-12365110	-33699171
RESET p-val.	.0057	0.9489	0.263	0.000	0.587	0.210	0.000	0.544	0.014	0.043

*Note: clustered robust standard errors in parenthesis; *, ** and *** indicate significance at 0.05, 0.01 and 0.001, respectively.*

Table A3. Results on total imports and imports by product types

Variables	Total imports	Imports by product types								
		Fuel	Minerals	Animals	Plastic/Rubber	Textile	Wood	Metals	Machines	Vegetables
$lnDist_{ij}$	-1.404* (.717)	3.305 (1.850)	-3.466** (1.276)	-2.507 (1.699)	-5.460*** (1.239)	1.470 (1.400)	-.541 (.983)	.192 (1.075)	-.920 (1.063)	-7.462 (17.084)
$lnGDP_{ij}$	.044 (.166)	1.717* (.709)	-.106*** (.019)	.362 (.638)	-.203*** (.057)	1.263 (.662)	-.008 (.023)	.105 (.524)	.072 (.466)	.007 (.013)
$lnGDP_{ji}$	.515 (.800)	-6.055*** (1.066)	2.860*** (.554)	-2.560 (1.856)	.716 (1.186)	2.586*** (.647)	.836 (.723)	1.569* (.616)	1.045 (1.083)	.864 (.664)
$lnPop_i$	1.732** (.635)	3.126*** (.752)	3.203* (1.304)	-1.907 (1.280)	2.646*** (.808)	-1.834 (1.788)	.655 (.652)	1.134 (.923)	2.966** (1.043)	-1.762 (1.122)
$lnPop_j$	3.486 (3.428)	19.693*** (5.170)	-7.625*** (2.123)	20.061* (8.475)	5.459 (6.190)	-5.756* (2.680)	2.217 (2.920)	-1.057 (2.596)	1.935 (5.320)	3.390 (2.658)
$lnExch_{ij}$	-.334* (.147)	-.652*** (.183)	.025 (.068)	-.829* (.396)	-.442 (.366)	-.107 (.073)	-.125 (.100)	-.103 (.137)	.630* (.276)	-.189 (.134)
$lnDig_{ij}$	-.002 (.014)	-.105* (.052)	.012 (.032)	.070* (.032)	.013 (.022)	-.001 (.025)	.039** (.015)	-.001 (.022)	.012 (.019)	.009 (.022)
$Island_i$	1.127 (2.213)	12.213* (5.063)	-2.016* (1.029)	1.141 (2.908)	-2.849** (1.141)	-3.183 (2.417)	.824 (.922)	.695 (1.601)	4.699 (2.984)	1.185 (5.312)
$Cont_i$	-1.478 (1.676)	10.507* (4.277)	-6.126** (2.333)	-15.769 (9.299)	-9.629*** (2.571)	-1.876 (7.750)	-3.646 (2.649)	-.253 (2.629)	-.683 (2.971)	-26.136 (40.589)
$Comhist_i$	-.348 (.957)	-5.701** (2.063)	-1.230 (1.180)	9.188 (5.296)	1.721 (1.075)	1.208 (3.342)	.9520 (1.276)	-.695 (1.127)	.825 (1.116)	12.574 (10.392)
$Comlang_i$	.661 (.582)	2.799 (1.456)	2.639 (1.515)	-1.854 (2.253)	1.278 (.880)	-.505 (1.620)	.437 (.790)	.8328 (.906)	2.062 (1.086)	-1.630 (1.057)
$Remot_i$	1.535* (.732)	-4.285* (1.788)	.706 (.530)	-.731 (.423)	2.214** (.805)	.669 (.851)	1.128** (.437)	1.547 (.995)	2.293** (.892)	-.540 (.323)
RTA_1	.702* (.362)	-1.475*** (.393)	-2.167*** (.503)	1.530** (.596)	-.103 (.643)	.733 (.420)	.219 (.602)	.439 (.475)	.158 (.589)	-2.839*** (.314)
RTA_2	.352*** (.068)	-.789*** (.199)	-2.243*** (.112)	.977*** (.109)	-.431*** (.098)	-.257 (.166)	-.088 (.080)	.244** (.083)	.316*** (.084)	-2.430*** (.107)
RTA_3	.241 (.330)	.352* (.169)	1.519*** (.193)	.205 (208)	-1.259*** (.178)	-.593 (.351)	3.091*** (.144)	1.762*** (.174)	-1.177*** (.227)	.760** (.240)
RTA_4	-.065 (.139)	-1.796*** (.147)	-2.712*** (.169)	.607*** (.086)	-.740*** (.182)	-.244 (.265)	-.415* (.199)	-.224 (.234)	-.410* (.177)	-2.803*** (.132)
WTO	.165 (.092)	.259 (.238)	.502* (.244)	.448*** (.136)	-.032 (.155)	.054 (.137)	.151 (.149)	.198 (.139)	.265 (.146)	.442* (.197)
$Const$	-56.549 (29.429)	-203.93*** (41.753)	41.410* (18.070)	-176.023** (67.871)	-75.462 (53.218)	52.429*** (16.795)	-33.869 (25.764)	-9.418 (24.012)	-51.713 (47.511)	-9.844 (37.754)
N groups	42	42	42	42	42	42	42	42	42	42
N observations	1,302	1,302	1,302	1,302	1,302	1,302	1,302	1,302	1,302	1,302
Pseudo log-likelihood	-175512532	-76659811	-4029784	-3718889	-8829344	-12589141	-5338385	-25372341	-51980590	-17518972
RESET p-val.	0.0003	0.5764	0.8262	0.9148	0.0001	0.3708	0.8341	.1678	0.0790	0.0004

*Note: clustered robust standard errors in parenthesis; *, ** and *** indicate significance at 0.05, 0.01 and 0.001, respectively.*