

## IMPACTS OF IMPORT TARIFFS AND NONTARIFF MEASURES ON INDONESIA'S TRADE PERFORMANCES OF ENVIRONMENTAL GOODS: A GRAVITY MODEL

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### Abstract

*In 2011 leaders of Asia-Pacific Economic Cooperation (APEC) members pledged to reduce tariffs and nontariff barriers on goods and services related to environmental goods, known as APEC Environmental Goods List. In 2012 it was agreed that the member countries will reduce import tariff for the environmental goods to be maximum of 5% by 2015. The commitment is controversial since it is agreed as APEC commitment and hence nonbinding. However, since the tariffs are applied under Most Favored Nation principle, by definition the tariffs apply to all countries. This article aims at analyzing impacts of import tariffs and nontariff barriers for the environmental goods on Indonesia's trade performances. In this study, the environmental goods include APEC Environmental Goods List and WTO Environmental Goods Core. The gravity model is used to explain variations in Indonesia's exports and imports of 54 environmental goods to 18 trading partners. Data included in the analysis were obtained from secondary sources and were analyzed using fixed effect panel data regression. The results show that import tariffs do not affect import, while they affect export negatively. The nontariff measures affect positively to both import and export performances. Other variables, namely the gross domestic product and distance are significant and have influence as predicted by theory.*

**JEL Classification:** F10, F13, F14

**Keywords:** APEC Environmental Goods List, Gravity model, Import tariffs, Nontariff barriers, Trade performance, WTO Environmental Goods Core List

### 1. BACKGROUND/OBJECTIVES AND GOALS

When global economic cooperation under WTO regime stalled, many countries looked at regional economic integration, i.e. cooperation between countries within a geographical area to decrease and/or abolish tariff and nontariff barriers for free trade of goods, services, and factors of production (Hill et al., 2012). In general, regional economic integration aims at strengthening country's economic position in international trade.

One of regional economic cooperation in which Indonesia takes part is Asia-Pacific Economic Cooperation (APEC), i.e. international cooperation in Asia-Pacific region whose aim is to support economic growth and prosperity in the region. Until 2016, APEC members are 21 economies (not countries). A unique feature of APEC is that it is non-binding, meaning that its decision is built on consensus and is based on voluntary principle. However, APEC's decisions usually get attentions since economic potentials of the region. As documented by APEC Policy Support Unit (APEC-PSU, 2016), economic growth in APEC region in 2015 was 2.7% and expected to be 2.8% in 2017-2018. Therefore, Indonesia should monitor closely APEC decisions, including agreements in international trade, and use it to formulate Indonesia's policy especially in international trade.

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APEC forum have discussed several initiatives to decrease trade barriers, either tariffs or nontariff barriers related to environmental goods and services. Elimination of trade barriers will reduce costs along supply chain and boost international trade in environmental goods and services (Vossenaar, 2016). The aim is to support sustainable economic development, achieve green growth, and tackle climate change. The initiative was realized by negotiating APEC List of Environmental Goods (APEC EGs) started in 2011. Amid current APEC crisis of identity (Dang, 2017), tariff reduction in environmental goods ahead of WTO negotiation is one of APEC successes (Dang, 2017; Vossenaar, 2016).

APEC EGs consist of 54 goods as declared in by 21 APEC leaders in Vladivostok, Russia. The 54 product categories represent 54 different HS (Harmonized System) subheadings. A complete list of APEC EGs could be accessed at Annex C APEC Economic Leaders' Declaration 2012 (APEC Secretariat, 2012). Table 1 offers summary of environmental categories in the APEC EGs. Including in the environmental protection category is solid and hazardous waste, waste-water management and air pollution control.

Table 1 Environmental categories in APEC EGs

<b>Categories of main environmental protection</b>	<b>Number of subheadings</b>
Renewable energy	15
Environmental monitoring, analysis and assessment equipment	17
Environmental protection	21
Environmentally preferable products (multi-layered bamboo flooring panels)	1
<b>Total</b>	<b>54</b>

Source: Sugathan (2013), Vossenaar (2013)

Negotiations on APEC EGs were done with commitment that products included in APEC EG list would have import tariff maximum 5% in 2015. Agreement in APEC Forum does not influence rights, position, and negotiation in World Trade Organization (WTO) since it is applied under APEC principles of non-binding, voluntary, consensus and taking into account economic condition of each member. Under these APEC's principles, agreement regarding APEC EGs will be legally non-binding. However, the agreement will be applied based on Most Favored Nation (MFN) principle (United Nations, 1978). Using import tariff based on MFN principle caused that bilateral or regional trade agreements could be effectively implemented globally. Therefore, it means that reduced import tariffs for APEC EGs can be used for international trade not only between APEC members but also between APEC members with other countries.

APEC leaders agreed to reduce import tariff for the APEC EGs to maximum 5% at the end of 2015. However, until February 2016 several APEC members including Indonesia, Vietnam, China-Taipei, Russia, Papua New Guinea and Thailand had not fully reduced their import tariffs according to the APEC agreement (APEC PSU, 2016). As for Indonesia, until November 2015 there were 13 out of 54 APEC EGs with import tariff more than 15% which represented 7 products under HS 6 digits. In the meantime, Indonesia decided to reduce tariff gradually up to 2021, as stipulated in Minister of Finance Regulation Number 134/PMK.010/2016 as the Fifth Amendment of Minister of Finance Regulation Number 213/PMK.011/2011 on Good Classification and Import Tariff.

In addition to APEC EGs, there are other classifications of EGs, including WTO Environmental Goods Core List which were submitted by WTO members' in accordance to the Doha round negotiations (Sugathan, 2013). There are 26 HS 6 digit in WTO EGs, which can be grouped into: (1) solid and hazardous waste management, (2) air pollution control, (3) wastewater management and water treatment, noise and

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vibration abatement, (4) environmental remediation and clean-up, (5) cleaner and renewable energy, (6) energy efficiency, (7) environmental monitoring analysis and assessment, (8) resource efficiency, and (9) environmentally preferable products.

Import tariff reduction and/or tariff assignation are government interventions which may alter trade performance. Furthermore, change in trade performance will affect macro economy as well as the micro economy, especially sectoral economy where the international trade occurred. Indonesia's export and import of environmental goods for 18 trading partners are small as shown in Figure 1, i.e. 2.3% of total import value and 1.06% of total export value in 2000 to 2015. However, small value of import and export in the period of observation may change in the future since APEC list of environmental goods could be used by non APEC member countries/economies. Moreover, WTO EGs Core List would cater larger number of countries. Therefore, this research aims to inquire about impact of import tariff and nontariff barriers on Indonesia's trade performances.

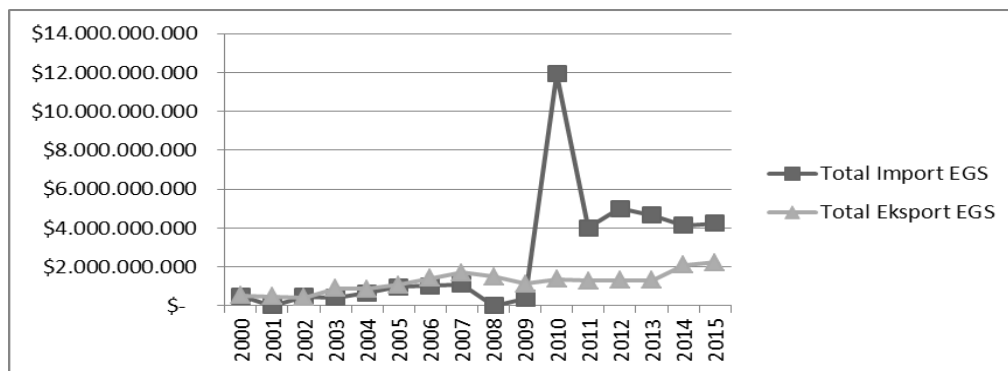


Figure 1 Indonesia's export and import of environmental goods to 18 countries  
Source: WITS (processed by authors)

Previous studies investigated about EGs in case of Indonesia include PKKPI (2014) and Salam and Nugroho (2016). This study differs from previous study in two ways. First, it includes WTO EGs Core List in addition to APEC EGs. Second, it includes nontariff barriers in addition to import tariff as independent variable.

## 2. METHODS

### 2.1 Model

Studies on international trade generally use computable general equilibrium (CGE) or gravity model (Piermartini and Teh, 2005). CGE is widely used to simulate liberalization or regional integration scenarios by altering some exogenous economic indicators. CGE is capable to capture effects of trade policy on macro economy and social welfare. However, simulating effects of altering import tariff for merely 54 products is a challenge for CGE since it is suitable for simulating macro-economic shock.

As for gravity model, it was first developed by Tinbergen (1962) to inquire bilateral trade flows affected by gross national product and distance between countries. The gravity model can be categorized as an ex-post analysis method (Bacchetta et al., 2015). It is called as gravity model since it resembles Newton's gravity model in which interaction between two objects depends on their mass and inversely related to distance between them. In the basic form, the gravity model stipulates that trade volume is function of the size of trading partners and the distance separating them (Ranjan and Tobias, 2007).

Gravity model used in this study is based on model developed by Center for International Trade Cooperation Policy, Ministry of Trade of Indonesia (PKKPI, 2014) with adding NTM variable. The empirical model for impact of import tariff and NTM to import performance is shown equation (1) while for export performance is specified equation (2) as follow:

$$\ln M_{jt} = \alpha + \beta_1 \ln GDP_t + \beta_2 \ln DIS_j + \beta_3 \text{TAR}_{it} + \beta_4 \text{NTM}_t + \varepsilon_{jt}, \quad (1)$$

$$\ln X_{jt} = \alpha + \beta_5 \ln GDP_{jt} + \beta_6 \ln DIS_j + \beta_7 \text{TAR}_{jt} + \beta_8 \text{NTM}_{jt} + \varepsilon_{jt}, \quad (2)$$

where

$\ln M_{jt}$  = log of import value of Indonesia's EG products with partner country j in period t,

$\ln X_{jt}$  = log of export value of Indonesia's EG products with partner country j in period t,

$\ln GDP_t$  = Indonesia's GDP constant value at period t,

$\ln GDP_{jt}$  = partner country j's GDP constant value at period t,

$\ln DIS_j$  = log distance between Indonesia and partner country j,

$\text{TAR}_{it}$  = average import tariff of APEC EG products at period t,

$\text{NTM}_t$  = number of NTM applied by Indonesia for EG products at period t,

$\text{NTM}_{jt}$  = number of NTM applied by partner country j for EG products at period t.

## **2.2 Data**

This article uses secondary data gathered through data providers such as Trade Map, World Trade Integration Solution (WITS), CEPII distance database, World Development Indicator Database of the World Bank, and BPS of Indonesia. The analysis covers period of 2000 to 2015. However, trade data in WITS missing for period of 2002-2008. Furthermore, due to data difficulty, among 27 countries participated with Indonesia's international trade related to the EGs, only 18 countries are further included in the analysis, i.e. Australia (AUS), Brunei Darussalam (BRN), Canada (CAN), Chile (CHL), China (CHN), Costa Rica (CRI), Hong Kong (HKG), Japan (JPN), Mexico (MEX), Malaysia (MYS), New Zealand (NZL), Peru (PER), Philippine (PHL), Singapore (SGP), Thailand (THA), Turkey (TUR), United States of America (USA), and Vietnam (VNM).

Analysis of trade performance was carried out in terms of total trade, and not in terms of each 54 product categories. Alternative approach, i.e. analysis per 6-digit HS number (e.g. PKKPI, 2014; Salam and Nugroho, 2016) could only use general variables and do not allow to use NTM variable. In my research, nontariff barriers measures (NTM) variable represents number of NTM applied for EGs trade by importer countries. Due to data unavailability, only NTM category A (sanitary and phytosanitary measures) and category B (technical barriers to trade) are used in the analysis. This study does not use alternative approach to measure NTM, such as difference between Overall Tariff Restrictiveness Index (OTRI) and Tariff Trade Restrictiveness Index (TTRI) (Hoekman and Nicita, 2011) due to data incompleteness.

## **2.3 Data Analysis**

Panel data analysis was used to analyses the data. To choose regression approach, i.e. whether panel least square, fixed effect model, or random effect model, Chow test and Hausman test were used (Gujarati, 2003). Test results indicate that the most appropriate model is fixed effect for import model and random effect for export model. Further tests for autocorrelation, multicollinearity, and heteroscedasticity were done to fulfill basic econometric assumptions (Nachrowi and Usman, 2006). The test results indicate that for model 1 there exists of autocorrelation and heteroscedasticity, but no existence of multicollinearity. To curb the problems, Model 1 is amended to split NTM to NTMA and NTMB in which NTMB is first differenced to curb autocorrelation problem (D1NTMB). In addition, to curb heteroscedasticity problem, Model 1 is regressed using the period weight (Gujarati, 2003).

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**3. RESULTS**

Indonesia's environmental goods are mainly imported from China, Japan, and USA; while exported mostly to Singapore, USA, and Japan. These countries represent the largest trading partners, while other trading partners contribute negligible values. As for Indonesia's NTM, majority is in terms of TBT (i.e. NTMB) rather than SPS (i.e. NTMA) and it can be observed that number of NTM is increasing. For example, in 2002 to 2007 it is only 5, increase to 79 in 2010 and 2011, and then above 90s in 2012-2015. Similar pattern could also be observed in number of NTM among 18 of Indonesia's trading counterparts, i.e. more NTMB rather than NTMA. For example, 13 countries have zero NTMAs and most NTMs are observed in USA (104 NTMAs), Vietnam (44 NTMAs), and Australia (41 NTMAs). In contrast, USA, Canada, China, Singapore and Japan have 546, 231, 214, 130, and 121 NTMBs, respectively.

**3.1 Gravity Model for Import and Export Performance**

Table 2 shows that Model 1 and Model 2 are both significant at 1%. Model 1 can explain about 41.46% of variations in import performance; while Model 2 explains about 55% of variations in export performance. In Model 1, variables of logarithm of distance, number of non-tariff barrier A (i.e. STS) and first difference of number of non-tariff barrier B (i.e. TBT) are significant at 1% level. It means that Indonesia's import performance regarding environmental goods is influenced by distance between Indonesia and the trading partners and also affected by number of nontariff barriers implemented by Indonesia.

In Model 2, almost all of independent variables are significant at 1%, except number of nontariff barriers in terms of sanitary and phytosanitary measures (SPS). It means that Indonesia's export of environmental goods is influenced by GDP size of trading partners, distance between Indonesia and the trading partners, average custom tariff, and number of nontariff barriers in terms of technical barrier to trade (TBT). Almost all of independent variables in Model 2 have coefficient signs which are consistent with theory, except for NTMB which is contrary to expectation.

In Model 2, import tariff affects negatively on Indonesia's exports of environmental goods. On average, when trading partners increase average custom tariff by 1% it reduces Indonesia environmental goods by 25.86%. Impact of import tariff policy of Indonesia's trading partners is important to determine Indonesia's export performance of environmental goods. Conversely, Indonesia's import tariff does not influence import performance.

Table 2 Estimation of gravity models for import and export performances

Variable	Model 1		Model 2	
	Dependent variable: ln Import	Dependent variable: ln export	Coefficient	Standard Error
$\alpha$	-29.9245	35.6989	19.4079***	1.6176
ln GDP	1.4417	0.9980	0.0459***	0.0459
ln DIS	-0.8089***	0.2119	-1.4039***	0.1322
TAR	-0.1092	0.1970	-0.2389***	0.0398
NTMA	0.3808***	0.0912	0.0075	0.0079
D1NTMB	0.0143***	0.0032	--	--
NTMB	--	--	0.0095***	0.0016
Observation	185		254	
R-squared	0.4750		0.5606	
Adjusted R-squared	0.4146		0.5512	
F statistic	7.8586		63.2855	
Prob. (F-statistic)	0.0000		0.0000	

\*\*\* = significance at 1%

### 3.2 Discussion

As presented previously, GDP growth variable significantly affects Indonesia's export performance. This result is well documented in literature, e.g. in case of Indonesia-Yemen trade (Sabaruddin, 2016), Indonesia's crude palm oil (CPO) trade (Ridwanulloh, 2018), Indonesia's trades with China and India (Bary, 2010), and Indonesia's textile export to 13 countries (Maryono, 2012). In addition, distance which resembles transportation costs affects Indonesia's export and import performance negatively, as documented in numerous previous studies, e.g. Effendi (2014), Maryono (2012), Ridwanulloh (2018), Wahyudi and Anggita (2015), and Yuniarti (2007),.

Two main independent variables are also significant, namely import tariff and nontariff barriers. Trade partners' import tariff is negatively affects Indonesia's export of APEC environmental goods. This result is in accordance with literature, e.g. Effendi (2014). This result support argument that import tariff is not important to inhibit import (PKKPI, 2014; Salam and Nugroho, 2016), yet trading partners' import tariff influences negatively on Indonesia's exports. The difference results could be explained by difference in Indonesia's average import tariff and trading partners' average import tariff as shown in Figure 2 and Figure 3. Indonesia's average import tariff for environmental goods is all below 5%; while trading partners' average imports tariffs are vary i.e. 3 countries around 0% and 5 countries above 5%.

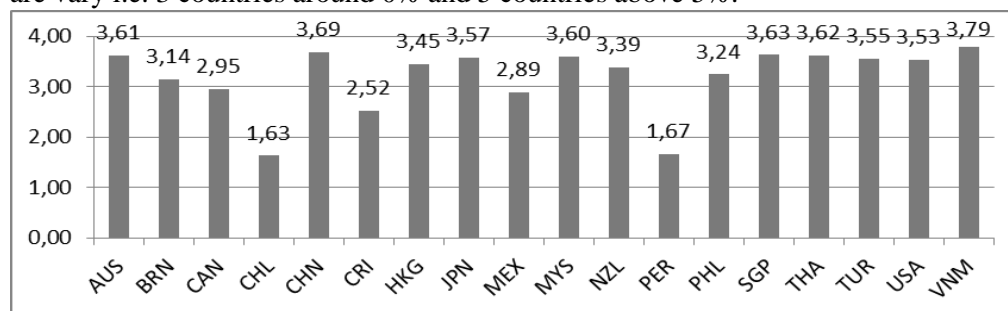


Figure 2 Indonesia's average import tariff of environmental goods to selected trading partners

Source: WITS (processed by authors)

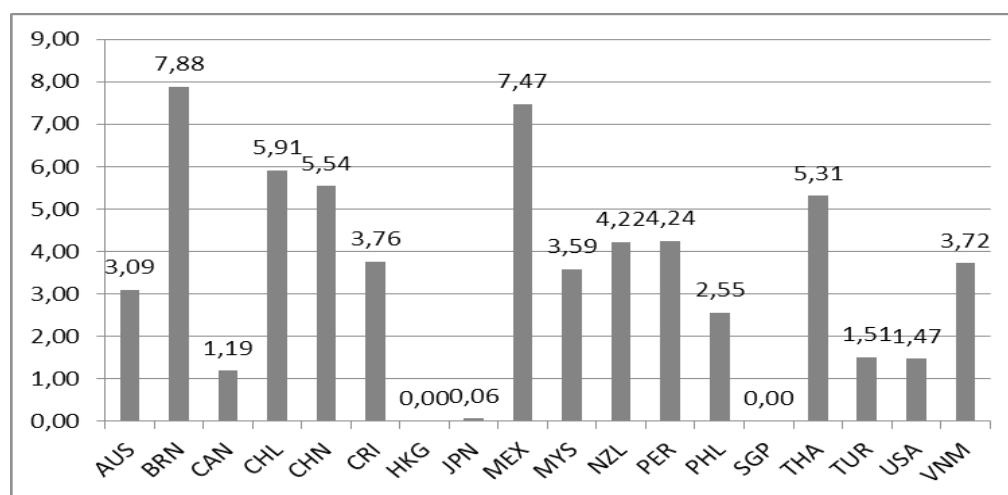


Figure 3 Trading partners' average import tariff of environmental goods to Indonesia

Source: WITS (processed by authors)

As for nontariff barrier measures, the regression results show that NTM positively influence Indonesia's export and import performance. These results do not support

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hypotheses that NTM affects international trade negatively; while in literature the positive coefficient of NTM for export performance is observed in case of Indonesia's tuna exports (Rindayati and Kristriana, 2018). Rindayati and Kristriana (2018) list possible explanations including increasing information regarding product safety, increasing product compatibility, and decreasing uncertainty. When these positive impacts exceed checking and certifying costs, it will increase trade volumes. Furthermore, different coefficient sign may also be influenced by how NTM is measured, i.e. when measured as frequency index it will be positive; while it becomes restrictive effect if the NTM is measured as coverage ratio (Mustafa et al., 2018).

Based on the results, Indonesia may continue to decrease import tariff for EGs since it does not significantly influence import performance. As for NTMs, government could further develop them, especially technical barrier to trade (TBT). For example, government could set up registration requirements while at the same time could efficiency on administration processes for registration. Lastly, government could also arrange offensive strategies to increase environmental good exports by improving technology and know-how (Kalirajan, 2016), to compensate tendency of single flow of environmental goods from developed to developing nations.

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