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# Quality of Indonesia's domestic institutions and export performance in the era of global value chains

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## Abstract

The focus of this research is on analysing the effects of institutional quality and trade agreements on Indonesia bilateral trade in four commodity groups in the era of global value chain (GVC). Employing a panel data gravity model of Indonesian export of four commodities to Indonesia's trading partners from 2000 to 2018 and estimating the Feasible Generalized Least Squares (FGLS) and the Poisson Pseudo Maximum Likelihood Method (PPML), the results of this study find that institutional quality plays a different role in explaining Indonesia's export performance of those four commodities, despite the fact that institutions contribute positively. On two commodities that are prospective to increase Indonesia participation in the global value chain, exported intermediates and consumer goods, we find that although both domestic institutions and trading partner institutions are significant to Indonesian export, but we argue that domestic institutions contribute more. This study also reveals that through tariff reductions, Indonesian trade agreements are significant regarding export of all the four commodities group. However, even though tariffs are significant, we find that the quality of institutions, especially domestic institutions, has a greater effect on Indonesia's exports.

**Keywords:** Institutional quality, Export performance, Global value chain, Indonesia

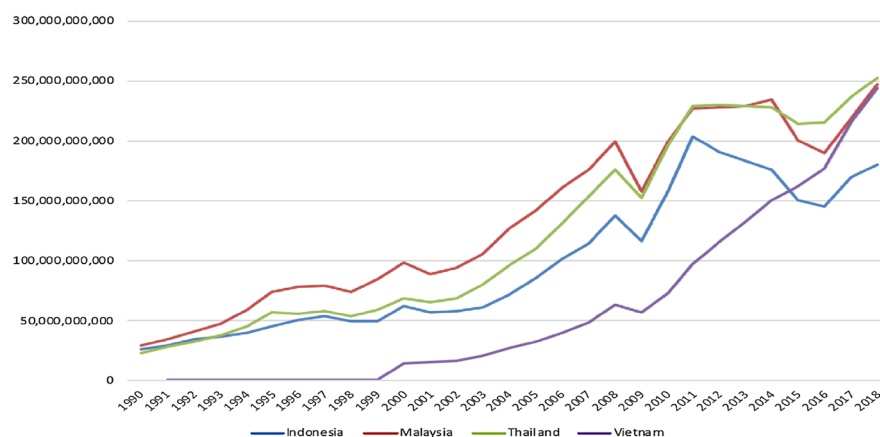
## 1 Introduction

For countries that adopt an open economic system, foreign trade, especially exports, has a very important role in driving national economic growth. International trade has played an important role in the process of economic development in many developing countries. This is because international trade, especially exports, is a significant source of foreign exchange, can stimulate domestic production, and can create jobs. Palley (2012) notes that the export-led growth strategy was applied in several countries in the Asian region, such as South Korea, Taiwan, Hong Kong, and Singapore, which at the time were developing countries in the 1970–1980 era; and they were then followed by Malaysia, Thailand, and Indonesia in the 1980s to 1990s. Islam (1998) shows that there is a causal relationship between exports and economic growth in the economies of India, Indonesia, Korea, and Thailand. Furthermore, the export-led growth strategy that emerged in the 1970s replaced the import substitution strategy, which has led to the emergence of

new industrial countries, such as South Korea, Taiwan, Hong Kong, China, and Mexico. Myint (1979) explains that the export-led growth mechanism can operate through three channels. First, expanding exports will increase direct profits from trade and facilitate economic growth. Second, exports contribute to economic development, especially through the provision of foreign exchange for developing countries for the purchase of capital goods and other inputs from abroad. Third, international trade and expansion of exports, indirectly, have an impact on productivity efficiency in the country as a consequence of economic openness, facilitating the spread of new needs and activities, new technology, and new economic organisation.

In the case of Indonesia, exports have long been one of the targets for boosting its economic growth. The export sector has been playing an important role in the Indonesian economy from the mid-1970s to the present. From the 1970s to the early 1980s, when world oil prices began to decline, oil and gas exports became a priority (Soesastro and Basri 2005). In response to the decline in world oil prices, the Indonesian government began to focus on manufacturing exports since the beginning of 1983. From 1983 to 1995, more than 24 economic reform packages were designed to increase investment, reduce trade barriers, increase efficiency, and strengthen the non-oil and gas export economy. This economic transformation enhanced Indonesia's economic performance, as demonstrated by an annual GDP growth of 6.3% between 1985 and 1990 (Soesastro and Basri 2005).

After 32 years of President Soeharto's reign (in office: 27th March 1968–21st May 1998) in the New Order era, economic reforms in the various eras of the next presidencies have continued with exports still being a policy priority and they have contributed significantly to the Indonesian economy. However, despite various economic reform programmes under different regimes, Indonesia's export value still shows a relatively poor performance. For example, in the last 3 decades it has always been consistently below that of Malaysia and Thailand (as the two exporting countries in the region of the Association of Southeast Asian Nations, ASEAN). Figure 1 shows the export value of Indonesia and 3 major exporter countries in the ASEAN region, namely, Malaysia, Thailand, and Vietnam (hereinafter referred to as the main ASEAN exporting countries).



**Fig. 1** Export value of selected ASEAN countries in US\$. Vertical axis is export value in US\$. Source: [www.wits.worldbank.org](http://www.wits.worldbank.org)

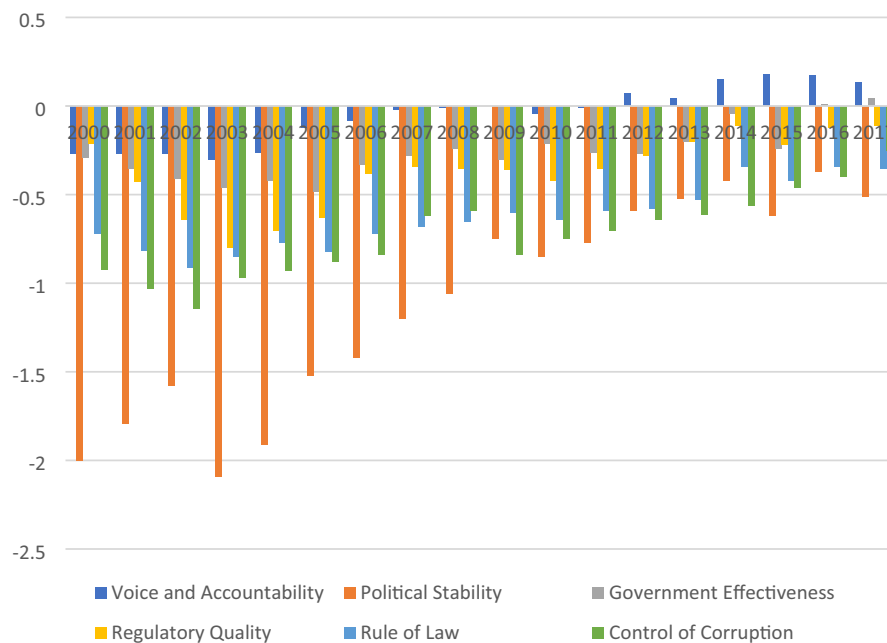
In the 1980s to 1993, Indonesia's export value surpassed that of Thailand, but was below that of Malaysia. From 1993 to 2016, Indonesia was below that of Malaysia and Thailand. Even since 2015, Vietnam's export value has surpassed that of Indonesia.

A number of empirical studies have pointed out the cause of stagnation, if not decline, Indonesia's export performance is not caused by uncompetitive exchange rates or higher labour costs, but is rather due to a decrease in foreign direct investment (Adams et al. 2006) and foreign trade policies that do not support export performance Soesastro and Basri 2005). Furthermore, Athukorala (2006) also emphasised the slow pace of microeconomic reform after the 1997 crisis as one of the causes of Indonesia's poor export performance. Athukorala's argument is also supported by Molnar and Leshner (2008) who state that internal constraints and developments in the international market have hindered Indonesia's competitiveness, including the relationship to trade policies. Another study, by Wengel and Rodriguez (2006), examined Indonesian exports by Small and Medium Enterprises (SMEs), and found that the overly complicated regulations and decentralisation in Indonesia made the costs of setting up a business in Indonesia too burdensome for SMEs, and are among the highest in Asia. The various export-inhibiting problems mentioned above are better known in the economic literature as institutional factors. In addition, a recent study by Isnawangsih and Lu (2018) recommends the importance of Indonesia in improving regulatory quality to increase global value chain participation. Thus, it is imperative for Indonesia to have good domestic institutions if it wants to improve its export performance by shifting reliance from raw materials exports, which tend to have low prices, to goods of higher quality and higher value.

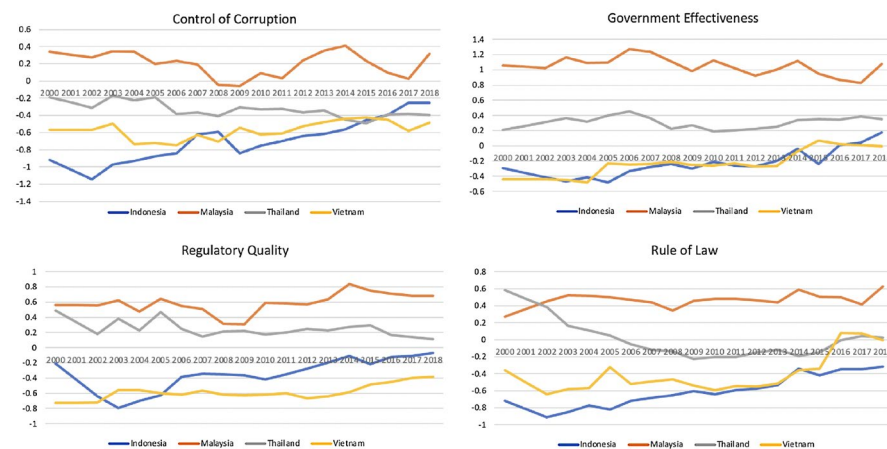
There are several institutions that publish data on the quality of institutions in various countries in the world. For example, Worldwide Governance Indicators (WGI) data published by the World Bank since 1996 can reflect the quality of institutions in political, legal and economic aspects in 215 countries. WGI measures institutional governance using 6 dimensions, namely, Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control for Corruption. Other available data for institutional qualities are law, bureaucracy and democratic accountability that published by the PRS Group which provides data for 140 countries; and POLITY IV institutional data published by the Center for Systemic Peace. Figure 2 illustrates the quality of institutions in Indonesia which is sourced from the Worldwide Governance Indicators (WGI).

World Governance Indicators calculates the quality of institutions in 215 countries on a scale from the worst (−2.5) to the best (2.5). From the figure above, it can be seen that during 2000 to 2017, the majority of the quality of Indonesian institutions were in the poor category, as reflected by numbers below 0. While the components that had positive numbers were only found in the last few years, namely, on the voice and accountability since 2012 and the government effectiveness since 2017. However, throughout this period, all components showed significant improvement. For comparison, Fig. 3 shows the quality of institutions of four quality dimensions related to trade (i.e., Government Effectiveness, Regulatory Quality, Rule of Law, and Control for Corruption) in four exporting countries in the ASEAN region.

In the figure above, it can be seen that from 2000 to 2018, the quality of Indonesia's domestic institutions (shown by blue lines) was generally below Malaysia and Thailand



**Fig. 2** Six dimensions of institutions quality in Indonesia. Value of institution quality is an index ranging from  $-2.5$  to  $2.5$ , with a score of  $2.5$  representing the strongest institutions. Source: Worldwide Governance Indicators



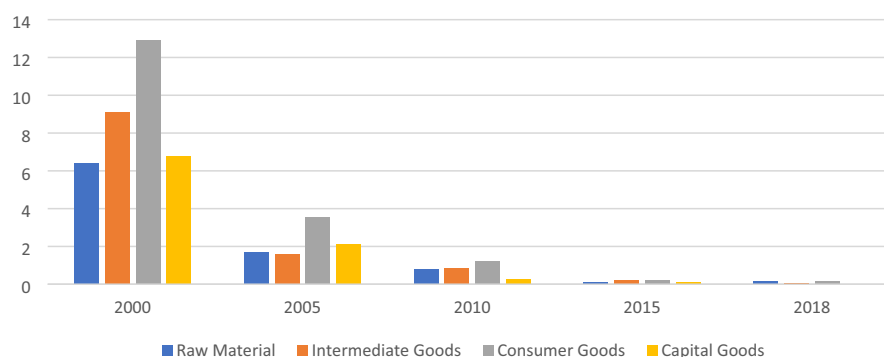
**Fig. 3** Four dimensions of institutions quality related to international trade of main ASEAN exporter countries. Value of institution quality is an index ranging from  $-2.5$  to  $2.5$ , with a score of  $2.5$  representing the strongest institutions. Source: Worldwide Governance Indicators

(red and grey lines, respectively). Meanwhile, compared to Vietnam (yellow lines), Indonesia only has advantages in terms of regulatory quality. These figures might explain why Indonesia is still struggling to increase its involvement in global value chain compared to other three countries in the ASEAN region.

Furthermore, in the era of trade liberalisation and the global value chain of the 2000s, Indonesia still struggles to increase its export performance, despite its involvement in several free trade agreements. One of Indonesia's efforts to improve export performance is by conducting international trade cooperation at various levels (bilateral, regional, and

**Table 1** Indonesia trade agreement cooperation in effect. Source: Asia Regional Integration Center (ARIC) Database, 2020

No	Agreements	Effective date
1	ASEAN Free Trade Area (AFTA)	1st January 1993
2	World Trade Organization (WTO)	1st January 1995
3	ASEAN-China FTA	1st January 2005
4	Indonesia-Japan EPA	1st July 2008
5	ASEAN-Japan FTA	1st December 2008
6	ASEAN-Korea FTA	1st January 2010
7	ASEAN-India FTA	1st October 2010
8	Preferential Tariff Arrangement-Group of Eight Developing Countries	25th August 2011
9	ASEAN-Australia-New Zealand FTA	10th January 2012
10	Indonesia Pakistan PTA	13th September 2013
11	Indonesia Australia CEPA	5th July 2020

**Fig. 4** Average import tariffs on Indonesia export to ASEAN countries. Value of average import tariffs is in percent. Source: [www.wits.worldbank.org](http://www.wits.worldbank.org)

multilateral). Indonesia has committed to actively participate in efforts to integrate the world economy, especially through the trade sector, and Indonesia has joined in various free trade and cooperation agreements. Table 1 contains information on Indonesia's trade cooperation that has been in effect:

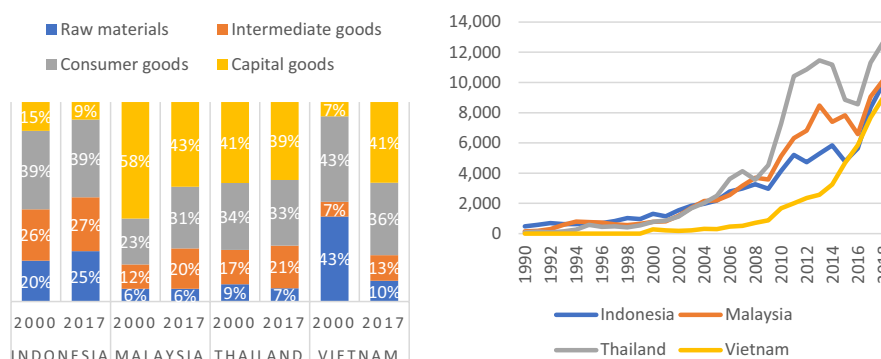
Through the above trade agreements, Indonesia experienced tariff reduction on its export to trading partners. For example, in the context of ASEAN Free Trade Agreement, on average tariff reductions faced by Indonesia exports in the destination countries were not only quite significant but also considered to be low. The tariff imposed by neighbouring countries in ASEAN has been as low as below 1% since 2010, as depicted in Fig. 4.

With the global production network phenomenon, it is imperative to consider the composition of commodities in analysing the trade performance of a country. In other words, determine if a country is trading more value-added products such as intermediate, capital or consumer goods relative to lower value added ones such as raw material. In the context of the global value chain (GVC), one factor that needs to be considered is China's role as a manufacturing centre in the Asia region. As stated by Athukorala

(2006), although growth in trade based on product fragmentation has become a global phenomenon, more important and rapid developments have occurred in the East and Southeast Asia region than in other regions of the world. Since the mid-2000s, many companies around the world have shifted their production processes to China with various inputs produced around the world. Indonesia and the other ASEAN countries have formed the ASEAN-China FTA since 2005. Figure 5 shows the main ASEAN exporting countries product compositions (left-side chart) and their intermediate goods export to China (right-side chart).

The data in the left chart of Fig. 5 show that the structure of Indonesia's export products has remained relatively unchanged between 2000 and 2017, and this pattern is different from other countries. Indonesia's raw materials exports have experienced an increase in composition, while other countries have tended to stagnate or even decline and switch to other higher value-added commodities, such as intermediate goods, consumer goods, or capital goods.

Furthermore, the right chart in Fig. 5 depicts exports of intermediate goods to China, which is considered to be the world's factory for manufacturing and assembling. It can be seen that from 1990 to 2003, the export value of Indonesian intermediate goods to China was higher than the three countries. However, since 2004 Malaysia and Thailand have had better export performance in intermediate goods than Indonesia, and since 2009, the export value gap has widened. This figure shows that Malaysia and Thailand have taken advantage of the ASEAN-China FTA, while Indonesia has not. What is even more worrying is that the trend of Vietnam's export value that exceeds Indonesia began to appear in 2016. Based on these data, it can be said that Indonesia's export performance is getting worse in the context of the global production network. This is also supported by empirical research conducted by Jongwanich (2010), who found that Indonesia, as a country that has not actively participated in the manufacturing product fragmentation process, is marked by the smallest growth in the share of manufactured exports among other countries in the ASEAN region. He specifically emphasizes the possibility of "Dutch Disease" phenomenon experienced by Indonesia, where exports of natural resource products dominate manufacturing exports. Furthermore, Jongwanich (2010) explains that among the 9



**Fig. 5** Selected ASEAN countries export compositions and their intermediate goods export to China. Note to the right graph: Value of intermediate goods export to China, in million US\$. Source: [www.wits.worldbank.org](http://www.wits.worldbank.org)

countries of the East Asia and Southeast Asia Region covered in his study, Indonesia has different export patterns and trends. For example, data shows that the other eight countries have a positive trend of increasing exports of products classified as machinery and transportation equipment (SITC 7), while Indonesia has not experienced a change in product composition, which is still textile and footwear products (SITC 8).

The importance for a country to export more varied, high-tech, and value-added goods is increasingly relevant in the era of globalisation and the global production network (Khandelwal 2010; Sheng and Yang 2016). This argument is based on the consideration that global production network involves contracts among firms, often a long term one. The research of Funke and Ruhwedel (2001) shows that producing highly differentiated export goods provides a competitive advantage that allows a country to sell more products. The results obtained conclusively support the hypothesis that increasing export variation both horizontally and vertically may be as important as having competitiveness in the aspect of price. Fugazza (2005) explains that institutional factors play an important role in supporting export competitiveness and performance at a more advanced stage, i.e., exports commodities that are capital intensive or differentiated products or products of higher quality. Furthermore, Dollar and Kidder (2017) explain that countries with good institutional quality, for example, property rights and rule of law, will tend to have good performance in global value chains (GVCs). Similarly, Nunn (2007) found that high-tech industries that produce more specialized products are sensitive to institutional quality. Poor institutions may, therefore, limit domestic production of this type of intermediate products.

Several studies show the importance of improving the quality of institutions as a companion to the policy of carrying out trade liberalisation through tariff reduction (Dollar and Kraay 2003; Méon and Sekkat 2008). The argument of Jansen and Nordås (2004) may apply to the Indonesian case. In their study, they explained that the tariff reduction by trading partner countries was not sufficient to improve export performance, due to the high transaction costs faced by exporters. For example, the World Bank's World Development Indicators data for 2018 show that time to export, in terms of hours, that are needed for documentary compliance in Indonesia is the longest (61.3 h) compared to its peer exporter countries in ASEAN (i.e., Malaysia: 10 h; Thailand: 11 h; and Vietnam: 50 h) as shown in Table 2.

**Table 2** Trade facilitation in time to export. Source: World Bank Development Indicators, 2018

Countries	Time to export, documentary compliance (hours)			Time to export, border compliance (hours)		
	2016	2017	2018	2016	2017	2018
China	21.2	21.2	8.6	25.9	25.9	25.9
India	38.4	38.4	14.5	106.1	106.1	66.2
Indonesia	61.3	61.3	61.3	53.3	53.3	53.3
Malaysia	10	10	10	48	45	28
Thailand	11	11	11	51	51	44
Vietnam	50	50	50	58	55	55

The primary objective of this research is to analyse the role of institutions quality on the Indonesian export in the era of global value chain and will be elaborated in the following way. First, the role of institutions will be analysed in the exports of four different product categories based on UNCTAD classification of Stage of Processing, namely, raw material, intermediate, consumer and capital goods. Raw materials and intermediate goods are used for further production chain abroad (i.e., forward value chain), consumer goods are intended for final users, while capital goods comprising machinery used to produce other goods abroad. Export of consumer goods by Indonesia although intended for final consumers abroad, several products are considered to be value chain products. For example, several international brands clothing and shoes products that being produced in Indonesia have imported components source from other countries (i.e., backward value chain). As suggested in the literature, the impact of the role of institutions on exports may differ between primary, low value-added products (i.e., raw material) and manufactured, higher value-added products (i.e., intermediate, capital and consumer goods). In the context of Indonesia, which, historically, still struggle to increase its export performance by shifting reliance on raw material exports to higher value commodities, it is important to analyse whether institutional quality influence each commodity group differently. Second, this study evaluates whether there are different roles among domestic and trading partner institutions within the scope of Indonesian export of the four commodities. The literature suggests that domestic quality institution is more important than trading partners' institution. Thus, examining the different quality of the roles of domestic vs trading partner institutions in the scope of the four group of commodities may shed some light on the future policy direction in domestic institutional quality. Third, given the fact that despite Indonesia's export performance are relatively not improving regardless of its involvement in several free trade agreements, this study also evaluates whether the qualities of institutions are more important than tariff reductions. In this case, tariff reductions are considered as a proxy of free trade agreements by Indonesia.

The novelty and contribution of this paper to the body of economic literature on institutions and trade, resides through its rather disaggregated nature of commodities under consideration. First, taking into account the fact that most of the studies examining the relationship between institutional quality are at the level of aggregate trade, and there have been few studies analysing the influence of institutions across different commodity groups, where these studies show that institutions influence more higher value-added products, this study will contribute by adding to the literature on how institutions can affect exports at a disaggregated level. In addition, based on the author's observations of the few studies studying the impact of institutional quality on international trade, no one has ever used disaggregated data of the UNCTAD classification: raw material, intermediate goods, consumer goods, capital goods. Second, considering the current microeconomic reforms in Indonesia as a developing country, the results of this study may be useful for further policy improvements in Indonesia, as well as other developing countries in general in an effort to increase the ability to export products with higher added value and more specifically to be more integrated into global value chains.



## 2 Literature review

The literature on institutions that has been rapidly developed in recent years has highlighted the role of institutional quality in various aspects of a country's economic performance, including international trade. North (1991) states that institutions are boundaries designed by humans to regulate political, economic, and social interactions. Institutions can be in the form of informal restrictions (sanctions, taboos, customs, traditions, and codes of ethics), and formal rules (construction, law, property rights). The term institutional in international trade refers to various structures which affect economic output, such as in terms of contract implementation (contract enforcement), copyright rules, investor protection, political system, etc. (Levchenko 2007). Previous research shows that institutions are determinants of comparative advantage (Costinot 2009; Levchenko 2007; Nunn 2007). Furthermore, Nunn and Treffer (2014) explain that institutional factors become a source of comparative advantage that operate differently from traditional comparative sources, such as a country's endowment. Several studies have shown that, quantitatively, institutions have the same important role as traditional sources of comparative advantage.

The economic literature has categorised formal theory of international trade and institutions as part of the New Trade Theory (NTT) group. However, some researchers (e.g., Clarida and Findlay 1992; Kindleberger 1978) argue that the concept of thinking about institutions in international trade has appeared in classical International Trade Theory. Parrinello (2002) explains that Adam Smith, in his book *An Inquiry into the Nature and Causes of the Wealth of Nations* (published on 9th March 1776) has implicitly explained the role of institutional factors in international trade, with a concept termed as a “magistracy” system. Adam Smith explained that the government must (1) perform important tasks, including protecting community members from injustice and keeping one party from oppressing another party; (2) provide a framework for efficient private market operations; (3) provide law and order enforcement; (4) provide physical and social infrastructure for the State; and (5) provide contract enforcement by private agents. Smith noted that, without all these factors, free trade and the market economy cannot function properly, written as follows:

*“Commerce and manufactures can seldom flourish long in any state which does not enjoy a regular administration of justice, in which the people do not feel themselves secure in the possession of their property, in which the faith of contracts is not supported by law, and in which the authority of the state is not supposed to be regularly employed in enforcing the payment of debts from all those who are able to pay. Commerce and manufactures, in short, can seldom flourish in any state in which there is not a certain degree of confidence in the justice of government” (Smith 1776 p.387).*

Furthermore, Parrinello (2002) describes the contribution of other classical economists, namely, David Ricardo and Ohlin, to the concept of institutions and trade. David Ricardo, in his original book on Comparative Advantage Theory, explains that institutional factors are the source of differences between countries that can explain the existence of comparative advantage, even in conditions of uniform tastes and uniformity of technology across countries. For example, Ricardo explained that differences in institutional factors can explain differences in the levels of wages of workers and levels of profit

between countries that trade. Parrinello (2002) also explains that Ohlin has contributed thoughts regarding institutions. Ohlin (1979) argues that the application of non-factor payments policies, such as taxes and social contributions by producers in a country, is likely to have an impact on the competitiveness of producers in producing goods. In addition, Ohlin provides an overview of the role of risk factors and social institutions in terms of investment, production, trade, contracts, delivery of goods, and so on. At the early development of the Global Value Chain (GVC) around the late 1990s to early 2000s, institutional factors were not widely discussed. Keane (2017) argues that this is because at that time good institutions were assumed to be attached to trade liberalisation policies. However, over time, there was a need to include aspects of domestic institutions and government support in a comprehensive framework for the development of the global value chain.

Our investigation of empirical studies on institutional factors, as one of the determinants of comparative advantage and foreign trade patterns, shows that this topic began to be widely published in the early 2000s, along with the availability of data that might more comprehensively describe the quality of a country's institutions. Due to data limitation, early empirical studies on this topic mostly used one indicator as an institutional proxy. For example, Anderson and Marcouiller (2002) utilised the security of exchange variable as a proxy for institutional quality. The data used are the result of a survey by the World Economic Forum in 1997 of company executives in 58 countries. The World Economic Forum found that lower institutional quality had a significant negative effect on trade. Another study that uses one variable as an institutional proxy is that by Levchenko (2007) who employed the Rule of Law Index data that were published by the World Bank Worldwide in their Worldwide Governance Indicators (WGI).

Over time, with the availability of more comprehensive data that measure institutional quality, research on the topic has grown significantly. For example, the aforementioned Worldwide Governance Indicators (WGI) data, that have been published by the World Bank since 1996, reflects the quality of institutions in political, legal, and economic aspects in 175 countries. The WGI measure institutional governance using 6 dimensions, namely, Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. Studies using these data include Babecká Kucharčuková et al. (2012); Gani and Prasad (2006); Iwanow and Kirkpatrick (2007); Méon and Sekkat (2008); and Soeng and Cuyvers (2018). Empirical studies utilising these data are among the most widely used, although with different variations in the use of the index between studies, where some use only a few indexes. Other empirical research on this topic also used institutional quality data published by organisations other than the World Bank. These include Angkinand and Chiu (2011); Berkowitz et al. (2006); Krenz (2016); and Ranjan and Lee (2007), who utilise law, bureaucracy, and democratic accountability data published by the Political Risk Services (PRS) Group which provides data for 140 countries. Angkinand and Chiu (2011) also used POLITY IV institutional data published by the Centre for Systemic Peace. Another study using the same data is that of Souva et al. (2008). Meanwhile, other researchers have used the Economic Freedom Index published by the Heritage Foundation (such as Faruq 2011; Ranjan and Lee 2007); as well as Corruption Perception Index data published by Transparency International (e.g., Abidin et al. 2013).

Although the institutional focus varies between empirical studies, where there are those that focus either on exporting or importing countries only and those that focus on both, almost all studies show that institutions quality contributes positively to trade. Only the study by Méon and Sekkat (2008) found that institutions have a negative impact on one commodity, namely, non-manufactured exports. However, there are some differences in the magnitude of positive impact of institutions on trade. First, regarding type of commodities. Majority of studies are employing total exports in investigating the role of institutions quality on export performance. However, although still limited in numbers, studies using disaggregated exports found that institutions quality are more important for high value commodities rather than raw materials. Using disaggregated export data, studies by Essaji and Fujiwara (2012); Levchenko (2007); as well as Méon and Sekkat (2008), found that institutions only have an impact on exports of manufactured products or commodities that are capital intensive. These findings support the Trade Network Theory hypothesis which states that transaction costs are more important for differentiated commodities compared to raw materials (Linders 2004). Essaji and Fujiwara (2012) also argue that the production of high value-added products requires high-value input, in which good institutions become its supporting capacity (*ceteris paribus*) due to a high level of contract compliance being required. Second, empirical researches also highlight different role of domestic/exporter vis. a vis foreign/importer institutions on exports. Linders (2004) and Francois and Manchin (2013) conducted research on the effect of the institutional quality of exporters' and importers' on their bilateral trade. The results show that institutional factors have a positive and significant effect on trade, but with a larger coefficient on the exporter side. This shows that the quality of the domestic institutions of the exporting country plays an important role in export performance. The findings of several empirical studies also support the argument for the importance of domestic institutions in providing incentives to high-value commodity producers. These include Essaji and Fujiwara (2012); Francois and Manchin (2013); Levchenko (2007); Méon and Sekkat (2008); and Ranjan and Lee (2007).

### 3 Methodology and data analysis

Based on literature studies on this topic, most of the previous studies used the gravity model as a tool for analysis, as does the present research. Notwithstanding, the gravity model has a good ability to explain the determinants of international trade, and this model is also flexible enough to adjust to the characteristics of variables and data. Several independent variables in the research model of Soeng and Cuyvers (2018) and Trung et al. (2018) were selected to be used in the present study, based on two main considerations: (a) adjusting to the research objectives and (b) its relevance to the Indonesian context as a number of studies examining Indonesia's export performance have found that internal conditions are one of the main constraining factors for Indonesian exports. For instance, those two studies did not include the tariff variable in their research. The present study includes bilateral tariffs with consideration to avoid the omitted variable bias problem. Jansen and Nordås (2004) stated that not including the tariff variable in the gravity model to analyse international trade patterns is very largely facing the problem of omitted variable bias. Besides this modelling justification, another supporting argument to include tariff in the equation is also based on the fact that Indonesia has

**Table 3** Definition and data sources of variables

Variables	Definition	Sources
Dependent Variable $Exp_{ijt}$	Indonesia Export of Commodity Group (i) to trading partner (j) at time (t) Four groups of commodities based on UNCTAD classification-Stage of Processing: raw material, intermediate goods, consumer goods, capital goods (US \$)	World Integrated Trade Solution (WITS) database
Independent variable		
$GDP_{Cap_j}$	Income per Capita of trading partner (US\$)	International Monetary Fund (IMF) Database
$Pop_j$	Population of trading partner (absolute number)	International Monetary Fund (IMF) Database
ER	Nominal Exchange Rate Rupiah to US Dollar (Rupiah/US\$)	Bank of International Settlement database
$Dist_{ij}$	Bilateral distance between Indonesia and trading partner (in kilometres)	CEPII Geodist Database
$Tariff_{ijt}$	Weighted applied tariff of commodity group (i) imposed by trading partner (j) on imported goods from Indonesia (in percentage points)	World Integrated Trade Solution (WITS) database
$TPIns_{jt}$	Four dimensions of institutions for Indonesia Trading Partner (index)	The World Governance Indicators (WGI) database
$Ins_{it}$	Four dimensions of Indonesia institutions quality (index)	The World Governance Indicators (WGI) database

several trade agreements with its trading partner (i.e., tariff reduction). We also include exchange rate as independent variable given the fact that a number of empirical studies revealed that exchange rate plays a vital role in explaining Indonesia's export. Finally, this study also includes trading partners' institutional quality as independent variable to examine whether they are having different impacts on exports of the four commodities under consideration. Thus, the model to be estimated is as follows:

$$LEXP_{ijt} = \beta_0 + \beta_1 LGDPCap_{jt} + \beta_2 LPop_{jt} + \beta_3 LER_t + \beta_4 LDist_{ij} + \beta_5 LTariff_{ijt} + \beta_6 LTPIns_{jt} + \beta_7 LIns_{it} + e_{it} \quad (1)$$

where the Dependent variable (LEXP) is Indonesia export value to its trading partner (j) in a group of four commodities (i), i.e., raw material; intermediate goods; capital goods; and consumer goods. The above equation (Eq. 1) suggests that Indonesia exports value is influenced by Indonesia domestic institutions (Ins); exchange rate of Indonesia Rupiah (ER); population of trading partner (Pop); income per capita of trading partner (GDP<sub>Cap</sub>); distance between Indonesia and trading partner (DIST); and import tariff rate imposed by trading partner on four commodities imported from Indonesia (Tariff) and trading partners' institutions quality (TPIns). L denotes values in natural logarithm. Table 3 depicts the definition and data sources of variables.

The gravity model above will be estimated using a panel of data on Indonesia's exports to its samples of trading partner with minimum value of Indonesia export share is 0.01%. Based on average data of 2000–2018, Indonesia were exporting to 73 countries represent minimum of 0.01% share in Indonesia's export and accumulatively represent around 99.1% of Indonesia's exports. However, we dropped two countries (Iraq and Timor Leste) from the samples due to limitation on import tariff data of these countries. The other

countries are not included in this study, because Indonesia's share of exports to these countries is very small (i.e., less than 0.01% or even zero of Indonesia's exports share), which means in this context we implicitly assume that almost no demand for Indonesian exports by these countries. In other words, with the fact that world trade is currently characterized by product differentiation, it is safe to assume that Indonesia's export products other than the 71 countries do not match either the needs or tastes of these countries. Thus, considering that in general the purpose of this study is to analyse the historical performance of the determinants of Indonesia's exports, it seems sufficient for this study to include a sample of 71 countries, where Indonesia has a certain export share to them. The main variable to be analysed in this study is the institutional variable. The data for institutional variables that will be used in this study are from The World Governance Indicators (WGI) developed by the World Bank with the consideration that these data are the most widely used in various previous empirical studies. Referring to Kaufmann et al. (2010), there are four dimensions that are directly related to the topic of the present study. The four dimensions are (a) Government Effectiveness and (b) Regulatory Quality, where these two dimensions indicate the government's capacity to formulate and implement good policies; (c) Rule of Law and (d) Control for Corruption which reflect how existing institutions regulate economic and social interactions between communities and their governments. Two dimensions of institutions related to politics, namely, Voice and Accountability, Political Stability, and Absence of Violence/Terrorism were not included in this study, because previous empirical research argued that although political factors affect trade, they are not as big as those directly related to economic institutions (Ranjan and Lee 2007; Souva et al. 2008). This database has several advantages over other institutional databases. First, WGI measures institutional quality in a relatively comprehensive manner that is relative to the other database as it is using 6 dimensions, namely, Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. Another advantage of this database is that, since it is computed from different data sources, any error or bias in the data computation is likely to be reduced in comparison with other data sources (Borrmann et al. 2006).

The following information describes the estimation strategy of the gravity model above. First, since the four dimensions of World Governance Indicators are highly correlated, putting all the dimensions of institutional quality index in one model would lead to the problem of multicollinearity. To avoid this problem, separate regression models are estimated to assess each of the institutions' dimensions. Hence, there are four regression models for each commodity group as shown in Eqs. (2)–(5):

$$\begin{aligned} LEXP_{ij,t} = & \beta_0 + \beta_1 LGDPCap_{jt} + \beta_2 LPop_{jt} + \beta_3 LER_t + \beta_4 LDist_{ij} \\ & + \beta_5 LTariff_{ij,t} + \beta_6 LTPCC_{jt} + \beta_7 LCC_{it} + e_{it} \end{aligned} \quad (2)$$

$$\begin{aligned} LEXP_{ij,t} = & \beta_0 + \beta_1 LGDPCap_{jt} + \beta_2 LPop_{jt} + \beta_3 LER_t + \beta_4 LDist_{ij} \\ & + \beta_5 LTariff_{ij,t} + \beta_6 LTPGE_{jt} + \beta_7 LGE_{it} + e_{it} \end{aligned} \quad (3)$$

$$LEXP_{ij,t} = \beta_0 + \beta_1 LGDPCap_{jt} + \beta_2 LPop_{jt} + \beta_3 LER_t + \beta_4 LDist_{ij} + \beta_5 LTariff_{ij,t} + \beta_6 LTPRQ_{jt} + \beta_7 LRQ_{it} + e_{it} \quad (4)$$

$$LEXP_{ij,t} = \beta_0 + \beta_1 LGDPCap_{jt} + \beta_2 LPop_{jt} + \beta_3 LER_t + \beta_4 LDist_{ij} + \beta_5 LTariff_{ij,t} + \beta_6 LTPRL_{jt} + \beta_7 LRL_{it} + e_{it} \quad (5)$$

where CC and TCC are the index of control of corruption for Indonesia and trading partners, respectively, GE and TGE are the index for government effectiveness for Indonesia and trading partners, respectively; RQ and TRQ are the index of regulatory quality for Indonesia and trading partners, respectively; and lastly RL and TRL are the index of rule of law for Indonesia and trading partners, respectively. Second, we apply a transformation to institution and tariff order to be able to apply log natural. Given the institutional index data are range from  $-2.5$  to  $2.5$ , following Soeng and Cuyvers (2018) we apply a transformation of the data to value between 0 and 10. On tariff data, given some import tariffs are zero due to free trade agreement between Indonesia and its trading partners, we follow transformation as in Jansen and Nordås (2004). Third, literature on gravity estimation suggesting the use of country and time fixed effect or the use of multilateral resistance to avoid coefficients bias. This study opts to consider both destination and destination country-time time fixed effects in the estimation process, and not the multilateral resistance. This is because based on our observations in previous studies analysing the relationship between institutions and international trade were only using country or time fixed effects, whereas we did not find any using multilateral resistance term. The multilateral resistance term is widely used in studies that analyse free trade agreements or analyse why the pair of countries tend to trade each other vis-à-vis the rest of the world.

Lastly, regarding the estimation method, we consider the use of the linear and non-linear methods as suggested by recent literature on estimation of gravity model in analysing bilateral trade. The literature on gravity estimations suggests that one should consider two main issues in estimating panel data of the gravity model, namely, the presence of non-constant variance or heteroskedasticity and autocorrelation. If these two exists, an estimation of the Ordinary Least Square (OLS) method on logarithmic models leads to inconsistent estimates (Santos Silva and Tenreyro 2006). The literature also highlights another important issue, which is the problem of zero trade flow in the export-import data (dependent variable) for gravity estimation, particularly for a high number of samples. Table 4 shows that there is zero export data for the four types of commodities. There are alternative estimation methods to the gravity model in the presence these problems that have been widely used in the literature, namely, non-linear method, such as Feasible Generalized Least Squares (FGLS), Poisson Pseudo Maximum Likelihood Method (PPML), Gamma Pseudo Maximum Likelihood (GPML), and the Heckman two-step method. Other authors also suggest considering dataset characteristics when deciding a particular method to be employed. Given the presence of zero export data, this study will also employ Poisson Pseudo Maximum Likelihood Method (PPML) estimation based on the consideration that PPML provides consistent and unbiased estimator in the presence of heteroscedasticity and the zero data problem, as suggested by



**Table 4** Descriptive statistics. Source: authors' calculation

Variable	Obs	Mean	Std. Dev.	Min.	Max.
exp_raw	1330	46,50,00,000	1,43,00,00,000	0	13,50,00,00,000
exp_int	1330	45,40,00,00,000	1,02,00,00,00,000	0	9,93,00,00,00,000
exp_con	1330	62,40,00,00,000	1,50,00,00,00,000	0	12,20,00,00,00,000
exp_cap	1330	18,00,00,00,000	47,30,00,00,000	0	4,13,00,00,00,000
lnexp_raw	1301	16.81497	3.151385	2.995732	23.32731
lnexp_int	1324	18.16235	2.072196	10.66681	23.0184
lnexp_con	1324	18.68726	1.872617	11.30498	23.22643
lnexp_cap	1321	16.99367	2.198933	8.05706	22.14162
LTPCC	1330	1.612519	0.4140156	0.4417983	2.296565
LTPGE	1330	1.667648	0.3965457	-0.6708144	2.2899
LTPRQ	1330	1.671555	0.4085303	-1.165451	2.253509
LTPRL	1330	1.627869	0.3994262	0.3441697	2.218411
LGDPCap	1330	8.897095	1.52738	4.921209	11.3898
LPop	1330	16.97241	1.505915	13.29205	21.05453
LER	1330	9.234839	0.1650427	9.038576	9.563595
Ldist	1330	8.96851	0.6550827	6.766303	9.870868
LCC	1330	1.268745	0.1373397	0.9976569	1.503391
LGE	1330	1.505684	0.0741043	1.394695	1.678918
LRQ	1330	1.452545	0.0997768	1.226183	1.580515
LRL	1330	1.323097	0.0966325	1.15436	1.474802
LTariff_Raw	1330	1.156069	1.054238	0	4.283449
LTariff_Intermediate	1330	1.535608	0.8502563	0	4.37827
LTariff_Consumer	1330	2.071582	0.8174688	0	4.562889
LTariff_Capital	1330	1.495707	0.9131969	0	3.615502

a number of authors (e.g., Álvarez et al. 2018; Francois and Manchin 2013; Silva and Tenreyro, 2006). Referring to Santos Silva and Tenreyro (2006), hence, Eqs. (2)–(5) estimated using PPML on level can be rewritten as follows:

$$EXP_{ij,t} = \exp[\beta_0 + \beta_1 GDP_{Cap_{jt}} + \beta_2 Pop_{jt} + \beta_3 ER_t + \beta_4 Dist_{ij} + \beta_5 Tariff_{ij,t} + \beta_6 TPCC_{jt} + \beta_7 CC_{it}] \eta_{it} \quad (6)$$

$$EXP_{ij,t} = \exp[\beta_0 + \beta_1 GDP_{Cap_{jt}} + \beta_2 Pop_{jt} + \beta_3 ER_t + \beta_4 Dist_{ij} + \beta_5 Tariff_{ij,t} + \beta_6 TPGE_{jt} + \beta_7 GE_{it}] \eta_{it} \quad (7)$$

$$EXP_{ij,t} = \exp[\beta_0 + \beta_1 GDP_{Cap_{jt}} + \beta_2 Pop_{jt} + \beta_3 ER_t + \beta_4 Dist_{ij} + \beta_5 Tariff_{ij,t} + \beta_6 TPRQ_{jt} + \beta_7 RQ_{it}] \eta_{it} \quad (8)$$

$$EXP_{ij,t} = \exp[\beta_0 + \beta_1 GDP_{Cap_{jt}} + \beta_2 Pop_{jt} + \beta_3 ER_t + \beta_4 Dist_{ij} + \beta_5 Tariff_{ij,t} + \beta_6 TPRL_{jt} + \beta_7 RL_{it}] \eta_{it} \quad (9)$$

**Table 5** Estimation outputs of the FGLS method

	Export of raw material				Export of Intermediate Goods				Export of Consumer Goods				Export of Capital Goods			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
LGDPCap	0.788*** (0.000)	0.964*** (0.000)	0.962*** (0.000)	0.860*** (0.000)	0.650*** (0.000)	0.795*** (0.000)	0.785*** (0.000)	0.577*** (0.000)	0.843*** (0.000)	0.986*** (0.000)	0.982*** (0.000)	0.768*** (0.000)	0.852*** (0.000)	0.952*** (0.000)	0.926*** (0.000)	0.838*** (0.000)
LPop	1.313*** (0.000)	1.565*** (0.000)	1.568*** (0.000)	1.365*** (0.000)	-0.0288 (0.845)	0.123 (0.399)	0.155 (0.286)	-0.0776 (0.597)	0.523*** (0.000)	0.656*** (0.000)	0.717*** (0.000)	0.440*** (0.002)	0.561*** (0.002)	0.678*** (0.000)	0.629*** (0.000)	0.499*** (0.006)
LER	-1.400*** (0.000)	-0.983*** (0.000)	-0.863*** (0.000)	-1.364*** (0.000)	-0.462*** (0.001)	-0.293* (0.052)	-0.132 (0.304)	-0.845*** (0.000)	0.322** (0.021)	0.430*** (0.004)	0.655*** (0.000)	-0.121 (0.443)	-0.682*** (0.000)	-0.396** (0.031)	-0.515*** (0.001)	-0.867*** (0.000)
Ldist	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)
LTariff_Raw	-2.151*** (0.000)	-2.137*** (0.000)	-2.117*** (0.001)	-2.223*** (0.000)												
LTarif_Intermediate					0.520 (0.369)	0.243 (0.678)	0.119 (0.839)	0.286 (0.617)								
LTariff_Consumer									0.142 (0.739)	-0.0872 (0.839)	-0.0776 (0.858)	-0.0382 (0.928)				
LTariff_Capital													-1.237 (0.103)	-1.340* (0.079)	-1.487* (0.051)	-1.446* (0.057)
LTPCC	1.030*** (0.001)				0.324* (0.072)				0.107 (0.549)				0.729*** (0.001)			
LCC	1.670*** (0.000)				1.686*** (0.000)				1.726*** (0.000)				0.734*** (0.008)			
LTPGE		1.260*** (0.000)				-0.0186 (0.909)				-0.391** (0.015)				0.379* (0.055)		
LGE		0.832				1.763***				2.042***				-0.0312		



**Table 5** (continued)

	Export of raw material				Export of Intermediate Goods				Export of Consumer Goods				Export of Capital Goods			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
LTPRQ		(0.191)	0.791*** (0.001)			(0.000)	0.0681 (0.616)			(0.000)	−0.00868 (0.949)			(0.945)	0.0989 (0.550)	
LRQ			0.339 (0.375)				1.139*** (0.000)				1.224*** (0.000)				0.358 (0.187)	
LTPRL				0.371 (0.317)				0.791*** (0.000)				0.368* (0.064)				0.123 (0.624)
LRL				1.792*** (0.004)				3.107*** (0.000)				3.401*** (0.000)				1.374*** (0.002)
_cons	−2.874 (0.526)	−12.02*** (0.004)	−11.60*** (0.004)	−4.035 (0.387)	14.27*** (0.000)	8.855*** (0.000)	7.820*** (0.001)	16.77*** (0.000)	−3.512 (0.177)	−8.121*** (0.001)	−10.45*** (0.000)	0.0775 (0.977)	3.398 (0.296)	−0.657 (0.827)	1.368 (0.635)	6.259* (0.062)
Destination	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects																
N	1297	1297	1297	1297	1320	1320	1320	1320	1320	1320	1320	1320	1317	1317	1317	1317

t statistics in parentheses, \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ p-values in parentheses \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

**Table 6** Estimation outputs of PPML method

	Export of raw material				Export of Intermediate Goods				Export of Consumer Goods				Export of Capital Goods			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
GDP-Cap	0.0000139*** (0.000)	0.0000100*** (0.007)	0.0000170*** (0.000)	0.0000116*** (0.001)	0.000010 8***	0.00000664* (0.056)	0.0000142*** (0.000)	0.00000973*** (0.006)	0.00000841* (0.066)	0.00000444 (0.300)	0.0000122*** (0.002)	0.00000665 649	0.00000000 (0.192)	0.00000000 (0.014)	0.00000000 (0.988)	0.00000000 (0.353)
Pop	1.65e-09*** (0.000)	1.50e-09*** (0.000)	1.72e-09*** (0.000)	1.60e-09*** (0.000)	1.63e-09*** (0.000)	1.48e-09*** (0.000)	1.67e-09*** (0.000)	1.63e-09*** (0.000)	1.41e-09*** (0.000)	1.21e-09*** (0.000)	1.42e-09*** (0.000)	1.36e-09*** 9***	7.68e-10*** (0.000)	4.59e-10** (0.021)	6.86e-10*** (0.001)	8.34e-10*** (0.000)
ER	-0.000179*** (0.009)	-0.000155* (0.051)	-0.000110** (0.038)	-0.000222*** (0.007)	-0.00013 8***	-0.0000977* (0.084)	-0.0000521 (0.168)	-0.000167*** (0.004)	-0.0000489 (0.418)	-0.0000188 (0.764)	-0.00000444 (0.992)	-0.0000869 (0.211)	-0.0000874 (0.164)	-0.0000573 (0.382)	-0.0000441 (0.350)	-0.000119* (0.091)
Dist	-0.000148*** (0.000)	-0.000157*** (0.000)	-0.000143*** (0.000)	-0.000152*** (0.000)	-0.000090 3***	-0.000094 4***	-0.0000878*** (0.000)	-0.0000900*** (0.000)	-0.0000277 (0.210)	-0.0000319 (0.129)	-0.0000285 (0.174)	-0.0000286 (0.169)	-0.0000251 (0.142)	-0.0000253 (0.129)	-0.0000294* (0.063)	-0.0000193 (0.240)
Tariff_Raw	-0.121*** (0.000)	-0.120*** (0.000)	-0.123*** (0.000)	-0.115*** (0.000)	-0.0335*** (0.000)	-0.0345*** (0.000)	-0.0334*** (0.000)	-0.0331*** (0.000)	-0.0477*** (0.000)	-0.0448*** (0.000)	-0.0450*** (0.000)	-0.0449*** (0.000)	-0.0477*** (0.000)	-0.0448*** (0.000)	-0.0450*** (0.000)	-0.0449*** (0.000)
Tariff_Intermediate																
Tariff_Consumer																
Tariff_Capital																
TPCC	0.0896* (0.066)				0.134*** (0.002)				0.192*** (0.000)				0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)

**Table 6** (continued)

	Export of raw material				Export of Intermediate Goods				Export of Consumer Goods				Export of Capital Goods			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
CC	0.870*** (0.001)				0.864*** (0.000)				0.644*** (0.007)				0.591** (0.017)			
TPGE		0.218*** (0.000)				0.259*** (0.000)				0.325*** (0.000)				0.570*** (0.000)		
GE		0.953** (0.017)				0.831*** (0.003)				0.646** (0.046)				0.625* (0.079)		
TPRQ			0.0627 (0.197)				0.125*** (0.005)				0.202*** (0.000)				0.425*** (0.000)	
RQ			0.702*** (0.002)				0.589*** (0.000)				0.503** (0.029)				0.352 (0.135)	
TPRL				0.153*** (0.003)				0.174*** (0.000)					0.258*** (0.000)			0.382*** (0.000)
RL				1.359*** (0.001)				1.246*** (0.000)					1.024*** (0.006)			0.830** (0.030)
cons	19.04*** (0.000)	16.94*** (0.000)	18.49*** (0.000)	17.15*** (0.000)	17.88*** (0.000)	16.14*** (0.000)	17.52*** (0.000)	16.37*** (0.000)	17.48*** (0.000)	15.78*** (0.000)	16.95*** (0.000)	15.93*** (0.000)	16.05*** (0.000)	13.61*** (0.000)	15.60*** (0.000)	15.13*** (0.000)
N	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330

p-values in parentheses \*p &lt; 0.10, \*\*p &lt; 0.05, \*\*\*p &lt; 0.01

#### 4 Empirical results and discussion

This section presents an analysis based on the estimation outputs of Eqs. (2) to (5). As previously described, estimation of the logarithm gravity model needs to take into account the problems of heteroscedasticity and zero trade data. In our initial attempt, estimation employing OLS method to Eqs. (2) to (5), we found the presence of the heteroscedasticity problem in three commodity groups estimations: raw materials, intermediate, and consumer goods; and autocorrelation problems for all commodities. In addition, there are some zero-export data in our samples; therefore, in this case, the zero data issue might present. Taking into consideration the two problems which are present in our study, the use of non-linear estimation is imperative to provide consistent results. Given that each non-linear method has its advantages/disadvantages (Gómez-Herrera 2013), we decided to use the Feasible Generalized Least Squares (FGLS) method in this study, based on the considerations that (a) this study using 71 countries sample as Indonesia trading partner and FGLS is more suitable for a small sample size (Sy et al. 2020); (b) some studies that compare different methods for gravity models also show that FGLS has more superiority compared to other methods (e.g., Doyle and Martinez-Zarzoso 2011; Martínez-Zarzoso 2013; Sy et al. 2020). We perform the test for the inclusion of year fixed effects, and the result suggest regression should not include time effects. For comparison and the robustness check, we also provide estimation outputs using the Poisson Pseudo Maximum Likelihood Method (PPML). The following two tables (Tables 5 and 6) depict estimation results.

Comparing the two estimation output tables above, in general, the estimation methods seem to affect the magnitude and significances in several parameters, but not the sign of the parameters for independent variables. In other words, one would safely argue that PPML method produces smaller coefficients in all independent variables. As expected, GDP per capita and population positively contribute to Indonesia export in all commodity groups, while the exchange rate is negative correlated. These all are consistent in the two estimation strategies, although the magnitudes are somewhat different. On the exchange rate variable, however, the two estimation strategies produce different sign and significant result across models particularly on consumer goods. Regarding the distance variable, the FGLS strategy with destination country fixed effect omitted this variable. On the other side, the PPML estimation suggest that distance significantly reduces export on raw material and intermediate goods. Different results appear on tariff variable, that is only the tariff of raw material and capital goods that significantly affecting export in FGLS strategy, while all tariff coefficients are significant in PPML estimation.

Focusing now on our variables of interest on institutional indicators, we find that both domestic and trading partners' institutions quality display the expected sign in the four commodities group, regardless of the estimation method. That is, all aspects of institutions contribute to the increase of Indonesia exports in the four commodities. Furthermore, with exception of tariff variable, institutions' quality variables seem to affect more on Indonesia exports relative to the other variables under consideration, given the fact that coefficients representing institutions are relatively higher than the other variables. The following table reproduce estimation

**Table 7** Estimation output for Tariff and institutional quality

	Export of raw material				Export of Intermediate Goods				Export of Consumer Goods				Export of Capital Goods			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Tariff_ Raw	−0.121*** (0.000)	−0.120*** (0.000)	−0.123*** (0.000)	−0.115*** (0.000)												
Tariff_ Inter- medi- ate					−0.0335*** (0.000)	−0.0345*** (0.000)	−0.0334*** (0.000)	−0.0331*** (0.000)								
Tariff_ Con- sumer									−0.0477*** (0.000)	−0.0448*** (0.000)	−0.0450*** (0.000)	−0.0449*** (0.000)				
Tariff_ Capital													−0.0693*** (0.000)	−0.0562*** (0.000)	−0.0571*** (0.000)	−0.0622*** (0.000)
TPCC	0.0896* (0.066)				0.134*** (0.002)				0.192*** (0.000)				0.363*** (0.000)			
CC	0.870*** (0.001)				0.864*** (0.000)				0.644*** (0.007)				0.591** (0.017)			
TPGE		0.218*** (0.000)				0.259*** (0.000)				0.325*** (0.000)				0.570*** (0.000)		
GE		0.953** (0.017)				0.831*** (0.003)				0.646** (0.046)				0.625* (0.079)		
TPRQ			0.0627 (0.197)				0.125*** (0.005)				0.202*** (0.000)				0.425*** (0.000)	
RQ			0.702*** (0.002)				0.589*** (0.000)				0.503** (0.029)				0.352 (0.135)	
TPRL				0.153*** (0.003)				0.174*** (0.000)					0.258*** (0.000)			0.382*** (0.000)

**Table 7** (continued)

	Export of raw material				Export of Intermediate Goods				Export of Consumer Goods				Export of Capital Goods			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
RL				1.359*** (0.001)				1.246*** (0.000)				1.024*** (0.006)				0.830** (0.030)
cons	19.04*** (0.000)	16.94*** (0.000)	18.49*** (0.000)	17.15*** (0.000)	17.88*** (0.000)	16.14*** (0.000)	17.52*** (0.000)	16.37*** (0.000)	17.48*** (0.000)	15.78*** (0.000)	16.95*** (0.000)	15.93*** (0.000)	16.05*** (0.000)	13.61*** (0.000)	15.60*** (0.000)	15.13*** (0.000)
N	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330

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

outputs from the PPML estimation only on two variables, institutions' quality, and tariffs, which are the focus of this study. As suggested in the literature review, the PPML produce consistent and unbiased estimator in the presence of heteroscedasticity and the zero data problem, hence we will use PPML output for further analysis on tariffs and institutions.

Table 7 suggests that the role of institution quality is different amongst group of commodities. That is, higher value-added commodities (i.e., intermediate, consumer and capital goods) have significant coefficients in all aspect of institutional quality. These findings are in line with Essaji and Fujiwara (2012); Levchenko (2007); as well as Méon and Sekkat (2008) who argue that institutions matter more on higher value-added products.

Despite the fact of the four institutions dimension increasing Indonesian exports, we have some interesting findings that might be considered as novel factors of this study. First, although both domestic and trading partners' institutions increase exports of all group commodities, in general the domestic institutions affect more than trading partners, as indicated by the higher coefficients on domestic institutions. These higher magnitudes of domestic institutions are consistently present in four institutional indicators. The only exception is on the Indonesia regulatory quality of the capital goods, although the coefficient is insignificant. Furthermore, on two commodities (i.e., intermediate and consumer goods) that are potentials to improve Indonesia involvement in the global value chain, both domestic and trading partners' institutions quality affect positively and significantly on Indonesian exports of the two commodities. We argue that, at least in the short to medium term, these two groups of commodities are relatively more prospective commodities for Indonesia exports improvement in the global value chain among three groups of higher value-added goods (i.e., intermediate, consumer and capital goods). The capital goods, on the other hand, has been the smallest share in Indonesia export composition, hence might be less prospective in the medium term due to rather limited resources available to the country in producing them. Hence, the results above imply that Indonesia needs to improve its domestic institution quality to be able to increase its involvement in global value chain and shifting from reliance on raw material export to intermediate or consumer goods export.

Next, examining individual institution dimensions on commodities' potential for Indonesian involvement in the global value chain (i.e., intermediate and consumer

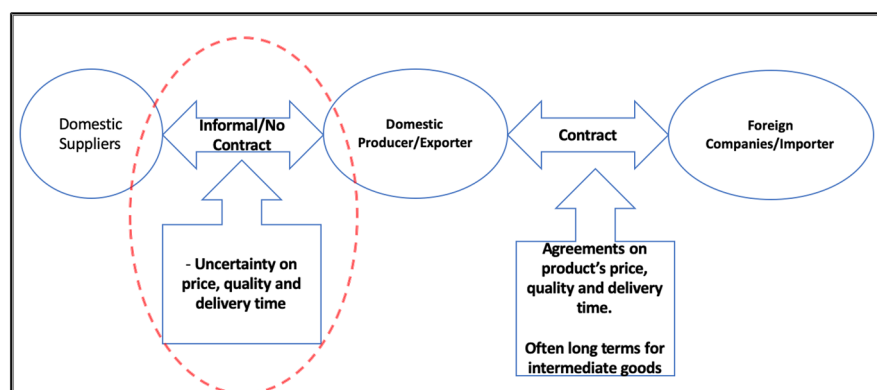
**Table 8** Data for starting a business and contract enforcement in selected East Asia major exporting countries. Source: Doing Business Database, The World Bank

Countries	Starting a business (Score)				Enforcing contract (Score)		
	2004	2016	2017	2018	2016	2017	2018
China	N/A	80.7	84.3	85.3	78.1	78.9	78.9
India	N/A	71.7	72.1	73.9	36.5	39.3	41.1
Indonesia	N/A	65.6	74.5	76.08	42.6	45.3	47.2
Malaysia	72.5	89.3	80	80	68.2	68.2	68.2
Thailand	75.4	82.6	84.6	91.6	65.5	65.5	67.9
Vietnam	66.1	82.7	81.7	82	82.7	81.7	82.02

goods), the two estimation results suggest that Indonesia Rule of Law is the highest institution factors which contribute to Indonesian export commodities on both goods, followed by Government Effectiveness. The Rule of Law represents confidence in the quality of economic agents, in terms of the legal system in a country which includes a judicial system, contract enforcement, property rights, and law enforcement. Essaji and Fujiwara (2012) argue that a poor contracting environment is hindering product quality improvements by producers. This is based on the consideration that the production of better-quality products, which in the present study might refer to intermediate or consumer goods as opposed to raw materials, requires intense collaboration between suppliers of input and producers of the two products. The production of higher value and better products must be facilitated by the so-called relationship-specific investment between suppliers and producers. In the absence of a decent contract environment, there are increases in business uncertainty and the relationship-specific investment would arguably be difficult to occur. Table 8 illustrates Indonesia's disadvantages in terms of starting a business and contract enforcement in comparison with other exporting countries.

In the case of Indonesia, the issue of producers' informal status also gives rise to problems in intermediate goods export. One might argue that the two indicators in Table 8 are correlated. That is, the non-conducive regulation to establish formal/legal businesses requiring high registration costs and extensive time to process, resulting in a large number of informal companies in Indonesia. Their informal status, in turn, makes them impossible to have legal and binding contracts with domestic producers/exporters. At the practical level of export transaction in Indonesia (e.g., agriculture-based processed commodities and low technology manufacturing), one might describe using Fig. 6 on how the lack of contracts between domestic suppliers and domestic producers provide another challenge in the export of intermediate goods (indicated by the red circles).

Most suppliers of agricultural products are small farmers without legal business entities, which are almost impossible to have a legal binding contract with exporter companies. In the absence of any formal contract between Indonesian exporters with domestic input suppliers, the exporters face a number of uncertainties in their relationship with the suppliers. These uncertainties include quantity and quality supplied,



**Fig. 6** Domestic supplier–exporter–importer relationship. Source: authors' observation



**Table 9** Trade facilitation in time to export. Source: Doing Business Database, The World Bank

Countries	Time to export, documentary compliance (hours)			Time to export, border compliance (hours)		
	2016	2017	2018	2016	2017	2018
China	21.2	21.2	8.6	25.9	25.9	25.9
India	38.4	38.4	14.5	106.1	106.1	66.2
Indonesia	62.6	61.3	61.3	53.3	53.3	53.3
Malaysia	10	10	10	48	45	28
Thailand	11	11	11	51	51	44
Vietnam	50	50	50	58	55	55

prices, as well as time of delivery. Thus, in the absence of any formal contract between domestic input suppliers and domestic exporters, not only do the domestic exporters face uncertainty in their production from raw material supply, but also, they are more likely to incur higher costs in compliance of the agreement with its importer, thereby making them less competitive. Furthermore, another possible drawback from this uncertain business environment, is that it gives disincentive to establishment of new export companies (i.e., new investment) producing intermediate goods for export markets.

Next, Government Effectiveness is viewed as a proxy for the ability of a government to deliver efficient and effective policies. This includes the quality of public services, bureaucracy, infrastructure, and public policies that directly and indirectly support the business environment for business transactions and exchanges in exports. An example of government support for export transactions might include trade facilitation. The following table depicts trade facilitation indicators for Indonesia and other exporting countries.

Table 9 shows that Indonesia's export facilitation is still poor, which is represented by indicators of document processing time and export processing time at ports. For example, in the indicator of time required in processing export documents, Indonesia has always been in the position over the longest period and there has been no improvement over the past 3 years. Meanwhile, in terms of port administration, Indonesia's position is only superior to India and Vietnam. However, during this period India has shown significant improvement, Vietnam has improved slightly, while Indonesia has not improved at all. With the lengthy process of managing document and port administration for the implementation of exports, it has an impact that generates higher costs, further reducing the competitiveness of Indonesia's export commodities.

Lastly, on the tariff variable, the PPML estimations seem to suggest that tariff reductions are significant with respect to Indonesia export performance. Despite its significances, however, their magnitudes are somewhat much lower than institutional quality parameters. These results, again, suggest that institutional qualities are important; and support the arguments of Dollar and Kraay (2003), Méon and Sekkat (2008), and Jansen and Nordås (2004) that improving the quality of institutions is imperative to complement tariff reductions through trade liberalisation or free trade agreements. Therefore, it seems safe to argue that Indonesian efforts in increasing export performance through

various trade agreements is on the right track, and this must be accompanied with improvements on institutions.

## 5 Conclusions

In the last two decades, East Asia countries have been emerging as the world's main exporters for global value chain activities. This, however, is less likely for Indonesia, despite its endowment resources and export potential. Indonesia has not been able to move its export from raw material dominance to intermediate or consumer goods, hence, this country is less integrated into the global value chain. Recent studies in international trade and institution highlight the importance of the domestic institution in supporting export performance of higher value commodities or commodities relevant to the global value chain.

The focus of this paper is to evaluate whether institutions, domestic partners, and trading partners, as well as import tariff by trading partners explain Indonesian export performance on four groups of commodities (raw material, intermediate, capital, and consumer goods) in the global value chain era. Other independent variables were also included in the analysis. FGLS and PPML estimation methods for the gravity model were used to analyse the Indonesian bilateral trade with 71 trading partners.

This study provides strong support for the important role of institutional quality and tariff reduction for Indonesia export. First, our models suggest that the quality of institutions of both trading partner and domestic contributes positively to Indonesian export performance in all group of commodities. Second, although both domestic institutions and trading partners institutions play significant roles, the magnitudes are somewhat different. That is, four aspects of domestic institutions affect more relatively with respect to trading partners' institutions as indicated by their coefficients. The main conclusion on the tariff variable, which is a proxy to evaluate the performance of Indonesian export from its free trade cooperation, is that tariff reduction significant to its export performance on the four commodities. Finally, our study seems to suggest that institutional quality in particular domestic institutions affect more Indonesia's export performance relative to tariffs and other variables.

Score range 0–100; 0 = the worst and 100 = the best

## Appendix 1

See Table [10](#)

**Table 10** List of Indonesia trading partners included in the study

1	China	36	Poland
2	Japan	37	Bulgaria
3	United States of America	38	Nigeria
4	India	39	Oman
5	Singapore	40	Sri Lanka
6	Korea, Republic of	41	Kenya
7	Malaysia	42	Iran, Islamic Republic of
8	Philippines	43	Tanzania, United Republic of
9	Thailand	44	Argentina
10	Taipei, Chinese	45	Benin
11	Viet Nam	46	Ukraine
12	Netherlands	47	Greece
13	Australia	48	Peru
14	Germany	49	Papua New Guinea
15	Hong Kong, China	50	Djibouti
16	Pakistan	51	Denmark
17	Spain	52	Algeria
18	Italy	53	Sweden
19	Bangladesh	54	Chile
20	United Kingdom	55	Portugal
21	United Arab Emirates	56	Togo
22	Belgium	57	Colombia
23	Saudi Arabia	58	Kuwait
24	Turkey	59	Latvia
25	Brazil	60	Israel
26	France	61	Ghana
27	Egypt	62	Haiti
28	Russian Federation	63	Jordan
29	Canada	64	Romania
30	Mexico	65	Slovenia
31	Myanmar	66	Lebanon
32	Switzerland	67	Panama
33	South Africa	68	Estonia
34	Cambodia	69	Angola
35	New Zealand	70	Yemen
		71	Qatar

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**Author contributions**

AB was a major contributor to the article, provided research idea and initial research framework, performed data gathering, estimation of the model and analysis. RI contributed to research framework and interpretation. BB supervised variables and data cleaning process, estimation process as well as gave partial economic analysis to econometric results. TA contributed to research framework and modelling process. All authors read and approved the final manuscript.

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**Availability of data and materials**

The data sets used and analysed during the current study are available from the corresponding author on request.

## Declarations

### Competing interests

The authors declare that they have no competing interests.

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