Institutional Quality and Primary Sector Exports: Empirical Evidence from Indonesia

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Abstract: *Primary sector trade, which consists of products extracted from natural resources, is subject to the quality of institutions, given the volatility these commodities face in the global market. This paper aims to examine the relationship between institutional quality, institutional distance, and the primary sector exports of Indonesia. Using Poisson pseudo-maximum likelihood on the augmented gravity model of export of the primary sector between Indonesia and 188 trade partners from 2013 to 2022, the results suggest that better institutional quality in regulatory and governance effectiveness is significantly and positively related to primary sector exports. On the other hand, control of corruption and rule of law produce mixed results: these indicators have a negative but limited relationship with the primary sector exports of Indonesia, and a positive association with the exports of its trade partners. Furthermore, differences in institutional level favouring the trade partner have a positive relationship with primary sector exports, implying that the institutional distance is associated with increased exports of the primary sector.*

Keywords: Institutional quality; Primary sector; International trade; Export;
            Gravity model
JEL Classification: F10, F14, O5

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1.   Introduction

Institutional factors have increasingly been recognised as a key determinant of trade, complementing the traditional gravity model, which is one of the workhorse models in explaining bilateral trade. Institutional quality is particularly critical for countries whose exports depend on the primary sector (Natanael, 2024). This consists of products extracted from natural resources, such as agriculture and mining. The income generated from natural resources can serve as a boon for nations with strong institutions, while it may hamper those with weak institutional frameworks (Horváth & Zeynalov, 2014). Considering the substantial role of institutions in affecting trade, this study aims to answer the following questions: is institutional quality in Indonesia and its trade partners related to the export of primary sector products between the two parties? Is the difference in institutional quality associated with primary sector exports? Hence, this paper aims to examine the relationship between institutional quality and primary sector exports, as well as investigate the association between institutional distance and primary sector exports.

It is hypothesised that institutional quality is significantly and positively associated with primary sector exports. This is because high institutional quality, characterised by an efficient legal system and well-functioning informal institutions, is predicted to enhance trade (Yu et al., 2015). In contrast, low institutional quality reduces international competitiveness, negatively impacting trade performance (Karam & Zaki, 2016). Moreover, institutional distance is expected to have a positive relationship with primary sector exports. Higher institutional quality on the importer's side encourages bilateral trade, which is amplified when the institutional distance increases in favour of the importer (Álvarez, 2018).

This study introduces several novel contributions to the literature on bilateral trade and institutional quality. First, it addresses the puzzle of whether similarities in institutional quality consistently lead to increased exports, as raised by Heo et al. (2021), by incorporating differences in institutional quality between exporting and importing countries into an empirical model. Second, it offers insights into developing countries with large market sizes and primary sector-dominated trade structures, as existing research ideas on institutions might not yet cover a complete explanation for developing countries. Third, to the author's best knowledge, this study

is the first to examine the effect of institutional quality on primary sector exports—particularly for Indonesia, a resource-rich nation where the primary sector constitutes a large portion of total exports. The focus of the study is on the primary sector as its economic contributions are subject to the quality of institutions governing natural resources with the volatility these commodities face in the global market. Given the fluctuating nature of commodity prices, countries often experience significant positive and negative economic shocks (Collier, 2003). Additionally, primary sector products play a critical role in exports, especially for many developing countries (UNCTAD, 2023).

The structure of this paper is as follows: Section 2 reviews the existing literature on institutions and international trade. Section 3 outlines the data and methodology utilised in the study. Section 4 presents and discusses the results from both descriptive and quantitative analyses. Finally, Section 5 provides the conclusion of the study.

2.   Literature Review

The literature highlights the crucial role of institutions in an economy by shaping rules, policies, and agreements to foster economic growth. As institutions play a vital role in formulating procedures, rules, and regulations that contribute to policy development, higher institutional quality establishes secure frameworks for contract enforcement, reduces trade costs, and enhances transparency in international trade (Khan et al., 2024). Furthermore, institutional quality directly impacts the productivity of industries and firms, which in turn influences a country's export performance (Huyen et al., 2017; Khan et al., 2024).

Institutions are also considered a significant factor affecting the comparative advantage patterns among countries, in conjunction with traditional determinants such as factor endowments and technology (Acemoglu et al., 2005; Levchenko, 2007; Nunn, 2007). Additionally, countries with well-established institutions are better positioned to make informed decisions in international trade (LiPuma et al., 2013). The literature identifies two types of institutions that significantly influence a country's exports: international and domestic institutions. While international institutions play a more critical role in reducing tariffs and boosting exports, domestic institutions have a more limited role and indirectly influence tariff reduction. Studies indicates that international institutions are generally more

effective in facilitating trade than their domestic counterparts (Ojeaga et al., 2014).

Institutional quality is a widely used indicator in the literature on trade and institutions. Greater disparities in institutional quality between countries tend to have a more hindering impact on trade (Mendonça et al., 2014). Furthermore, higher quality institutions reduce uncertainty by addressing incomplete information and imperfect knowledge, lowering transaction costs, and promoting bilateral trade (North, 1993). In contrast, low institutional quality impedes bilateral trade by export market access restriction through its influence on poor trade infrastructure, with its adverse effects being particularly severe in developing countries (Francois & Manchin, 2013). A study by Yusuf et al. (2021) analyses the impact of institutional quality indicators on bilateral trade flows between Malaysia and 25 selected African members of the Organisation of Islamic Cooperation (OIC). Using the World Governance Indicators (WGI) of institutional quality and applying the Poisson pseudo-maximum likelihood (PPML) estimation technique, the findings reveal that government effectiveness, regulatory quality, and political stability negatively affect trade flows amongst African OIC members.

Some studies consider institutional heterogeneity and focus on country-specific institutional differences to assess the effects of institutional quality on bilateral trade, where it remains debatable. For instance, Araujo et al. (2016) present a theoretical model incorporating institutional variations in importing countries and the dynamics of exporting firms, arguing that stronger institutions in the importing country lead to a higher rate of firm entry into new export markets with increased sales. Export growth is also greater when firms operate in foreign markets with weaker institutions. Further, De Groot et al. (2004) analyse the impact of institutional quality on trade flows and find that higher institutional quality enhances bilateral exports, and institutional similarity between trading partners further accelerates trade growth. On the other hand, while the institutional conditions of the destination country and institutional distance between trading partners significantly affect bilateral trade, differences in institutional quality can have a positive impact (Álvarez et al., 2018). In particular, it is suggested that better institutional quality in the importing country facilitates bilateral trade, which is amplified when the institutional gap favours the importing country.

3.   Methodology

3.1   Data description

This study examines the export of primary sector commodities between Indonesia and its partners, with two dependent variables: Indonesia's exports of primary commodities to its trade partners and its imports of primary commodities as a proxy for partners' exports to the country, given the focus of the study on Indonesia and data limitations stemming from the commodity grouping provided by the Ministry of Trade Indonesia. The classification of primary commodities is based on the initial definition using the three-digit Standard International Trade Classification (SITC) codes issued by the United Nations Conference on Trade and Development (UNCTAD). Primary commodities encompass crude oil, oil and gas products, agriculture, and mining. Additionally, the Harmonised System (HS 6) code of commodities is applied to the dataset. Exports of primary commodities data are gathered from the Ministry of Trade Indonesia.

This paper employs institutional quality indicators using data from the WGI developed by the World Bank. While there are six dimensions of institutional quality in the database (Kaufmann et al., 2010), the literature highlights four institutional qualities relevant to trade, namely control of corruption (CC), government effectiveness (GE), rule of law (RL), and regulatory quality (RQ) (Oshota & Wahab, 2022). The indicators control of corruption and rule of law represent the institutional dimension, while government effectiveness and regulatory quality indicate the policy dimension (Hakim & Budi, 2024). These variables, deemed as suitable indicators of institutional quality in trade contexts, are expected to influence the level of uncertainty and, consequently, affect transaction costs (WTO, 2004). Therefore, this study will focus on analysing these four indicators.

Each institutional quality indicator reflects distinct yet interconnected aspects of governance (Kaufmann et al., 2010). The first indicator, control of corruption, measures the extent of public power misuse for private gain, including petty and grand corruption, erratic payments, corruption levels within administrations and companies, and the frequency of corrupt practices in public institutions. Corruption raises transaction costs by introducing uncertainty into transactions, thereby impeding bilateral trade (Álvarez et al., 2018). Government effectiveness measures the quality of government inputs,

including the government's capacity to design and implement effective policies, the quality of public services, and the credibility of government commitments to policy execution. According to the WGI, a competent and efficient bureaucracy is instrumental in fostering rapid trade growth. Regulatory quality focuses on the effectiveness of policies and regulations, assesses the capacity of the state to design and implement sound policies and reflects perceptions of policy-related barriers to market functioning, including the ability to address unfair competition, ease of starting new businesses, antitrust policies, and tax efficiency. The rule of law represents the overall quality of the legal system, capturing the ability of society to maintain fair and predictable rules for social and economic interactions. It assesses the effectiveness and public trust in law enforcement and the legal framework.

The analysis measures institutional distance using the differences in institutional quality between importer and exporter countries, capturing asymmetrical institutional barriers in trade. A positive value indicates that the institutional quality of the importing country is higher than the exporter and vice versa. The variable is lagged in the estimation to address potential endogeneity and align with the literature (Álvarez et al., 2018). The control variables used in the empirical model consist of the augmented gravity model variables, reflecting economic and demographic size, geographic distances, and trade policy in terms of trade facilitation. The gross domestic product (GDP) proxies economic size, where the data is sourced from UN Data (UNdata). Moreover, the demographic indicator of population data is collected from the World Development Indicators (WDI) developed by the World Bank.

Geographic and trade facilitation data are sourced from the Dynamic Gravity Dataset (DGD). The distance variable represents the population-weighted geodesic distance between major cities in origin and destination countries. Landlocked is a binary variable (1 if a country lacks ocean or water body access), which reflects a country's ability to trade via water transport, and contiguity is a dummy variable (1 if Indonesia and the partner share a land or river border). The preferential trade agreement (PTA) variable equals 1 if Indonesia and the partner have an active PTA covering goods in a given year. The variables are summarised in Table 1.

Table 1: Variables and data summary

Variable	Description	Source
Dependent variables		
exportprimary	Export value of primary sector products (USD)	Statistics Indonesia
importprimary	Import value of primary sector products (USD)	
Independent variables		
gdp	Nominal GDP (USD)	UN Statistics Division
population	Population of the country	World Development Indicators
distance	Geodesic distance between two major cities weighted by population	Dynamic Gravity Dataset
agree_pta_goods	Preferential trade agreement (PTA) in goods (1 = there is a PTA between the two trading countries)	
contiguity	Common border (1 = the two trading countries share a common border)	
landlocked	Access to an ocean or a water body connected to it (1 = the country is landlocked)	
cc_i	Control of corruption index value of Indonesia	WGI
cc_m	Control of corruption index value of trade partners	
ge_i	Government effectiveness index value of Indonesia	
ge_m	Government effectiveness index value of trade partners	
rq_i	Regulatory quality index value of Indonesia	
rq_m	Regulatory quality index value of trade partners	
rl_i	Rule of law index value of Indonesia	
rl_m	Rule of law index value of trade partners	
d_cc	Differences between the control of corruption index value of trade partners and Indonesia	
d_ge	Differences between the government effectiveness index value of trade partners and Indonesia	
d_rq	Differences between the regulatory quality index value of trade partners and Indonesia	
d_rl	Differences between the rule of law index value of trade partners and Indonesia	

3.2   *Model specification and estimation technique*

Among the various gravity model variables, the estimation model employed in this analysis follows the framework of Álvarez et al. (2018) and Huyen (2017), incorporating institutional quality into the most relevant variables to ensure the inclusion of determinants while adhering to established methodologies in the literature. The gravity model has evolved and been augmented to become the relevant empirical framework for predicting bilateral trade flows. The model posits that country size indicators and geographical distance between two trading countries are bilateral trade determinants (Tinbergen, 1962). According to the core principle of the gravity model, trade between two countries is directly proportional to their respective GDPs and inversely proportional to the distance separating them. This relationship is expressed in equation (1):

$$T_{ij} = \frac{Y_i . Y_j}{D_{ij}} \qquad\qquad (1)$$

The estimation model includes a set of control variables and the main variable of institutional quality. The analyses cover institutional quality in two different measurements: as the level of institutional quality index reflecting a trade enabler or barrier at the origin and destination countries, and as the difference between the institutional indicators of the importing and exporting countries indicating an institutional distance (Álvarez et al., 2018). These two measurements aim to explore the relationship between institutional quality and exports of primary sector products and evaluate how institutional distance affects trade dynamics. While these indicators of institutional quality are imperfect, they could still reflect an exhaustive set of variables capturing the quality of institutions, allowing sensitivity checks of the results.

This paper employs the augmented gravity model to a panel dataset of exports of primary commodities between Indonesia and 188 partners consisting of developed and developing countries over the period of 2013 to 2022, motivated by data availability. Following Álvarez et al. (2018) and Huyen (2017), the relationship between the export of primary sector products and institutional quality can be expressed as:

$$Y_{imt} = \beta_0 + \beta_1 lnGDP_{i,t} + \beta_2 lnGDP_{m,t} + \beta_3 lnDistance_{im,t} + \beta_4 lnPop_{i,t}$$
$$+ \beta_5 lnPop_{m,t} + \beta_6 PTA_{im} + \beta_7 Contiguity_{im} + \beta_8 Landlocked_{im} \quad (2)$$
$$+ \beta_9 IQ_{i,t-1} + \beta_{10} IQ_{m,t-1} + \lambda_t + \varepsilon_{imt}$$

Meanwhile, the estimation models for the relationship between the export of primary sector products and the difference in institutional quality of importing and exporting countries is expressed in equation (3):

$$Y_{imt} = \beta_0 + \beta_1 lnGDP_{i,t} + \beta_2 lnGDP_{m,t} + \beta_3 lnDistance_{im,t} + \beta_4 lnPop_{i,t}$$
$$+ \beta_5 lnPop_{m,t} + \beta_6 PTA_{im} + \beta_7 Contiguity_{im} + \beta_8 Landlocked_{im} \quad (3)$$
$$+ \beta_9 IQ^D_{im,t-1} + \pi_t + v_{ijt}$$

Where i, m, and t are countries i denoting Indonesia and m denoting trade partners at year t, respectively; β is the coefficient; *GDP*, distance, and population of the trading countries are measured in natural logarithm forms; *PTA*, *contiguity*, and *landlocked* are binary variables; $IQ_{i,t-1}$ is the lag Indonesia's institutional quality and $IQ_{m,t-1}$ is the lag of the trade partner's institutional quality, which the values are represented by each of institutional quality indicators; $IQ^D_{im,t-1}$ represents the lag of institutional differences between the two trading countries; λ_t and π_t are country-pair-specific effects; and ε and v is the error term. Equations (2) and (3) are estimated separately for two measurements of the outcome variable Y_{imt}, which is the export of primary sector products of Indonesia and trade partners and in the reciprocal direction, to conduct the empirical analysis.

All model specifications incorporate country-pair fixed effects to account for time-invariant factors, such as supply capacity, market size, and trade policies between trading partners, and to consider the focus on changes within a specific pair of countries over time. The structural variables extracted from the theoretical model are considered pertinent determinants in the estimation (Álvarez et al., 2018). Log-linearisation is also used for part of the control variables as it is commonly used and suggested in gravity model studies (Martínez-Zarzoso, 2013), as shown in equations (2) and (3). While some control variables are expressed in logarithmic form, the institutional quality variables, binary variables, and dependent variables remain in their original forms as the PPML method handles dependent variables in levels,

avoiding the biases associated with ordinary least squares (OLS) under logarithmic transformations.

The analysis mitigates the potential endogeneity issue in institutional measures by lagging their values to correct potential correlations between these independent variables and the error term (Nunn, 2007; Álvarez et al., 2018). Governance quality likely exerts a lagged effect on trade, though the exact lag period is less critical due to the slow-changing nature of institutional indicators (Álvarez et al., 2018). Furthermore, this study disaggregates institutional quality into its indicators, including CC, GE, RQ, and RL, and tests these individually, providing a detailed analysis of each factor's impact and serving as a robustness check.

The econometric model is estimated using the PPML approach, which is well-suited for addressing issues such as a high frequency of zero trade values, potential endogeneity, and other econometric challenges (Silva & Tenreyro, 2006; Francois & Manchin, 2013). PPML offers two key advantages over OLS. First, it mitigates the bias caused by heteroscedasticity. Second, it allows for the inclusion of zero-trade observations, ensuring consistent estimation regardless of their presence. By applying equal weights to all observations, PPML accounts for heteroscedasticity without disproportionately affecting noisier data points. This method is particularly effective for estimating the gravity model in multiplicative form, especially when dealing with zero trade values (Silva & Tenreyro, 2006). The PPML estimator is also reliable in most situations and has become the standard method for gravity model estimation due to its ability to remain consistent and unbiased in the presence of heteroscedasticity and zero values (Silva & Tenreyro, 2006). Additionally, the PPML can handle the bias from serial correlated error and multicollinearity due to a high correlation among independent variables in the gravity model (Álvarez et al., 2018).

This study employs the zero-inflated PPML (ZI-PPML) model as part of its sensitivity analysis. The choice of ZI-PPML addresses concerns about overdispersion and the presence of excess zero trade flows, which have been identified as limitations of the standard PPML approach (Burger et al., 2009; Martínez-Zarzoso, 2013; Martin & Pham, 2020). The ZI-PPML model offers a more robust alternative by accounting for two distinct groups within the data, one group consists of country pairs with strictly zero trade flows, reflecting situations where no trade is possible due to structural trade barriers

or mismatches between supply and demand. The other group includes country pairs that currently have zero trade flows but possibly engage in trade in the future, given factors such as distance or institutional proximity (Burger et al., 2009; Martin & Pham, 2020).

4. Results and Discussion

4.1 Descriptive analysis

Table 2 provides the descriptive statistics of this analysis. It is interesting to note that the mean values for the institutional quality indicators of Indonesia as the exporter are diverged. While government effectiveness and regulatory quality have a positive mean, indicating relatively good institutional quality, control of corruption and the rule of law are negative throughout the analysis period, reflecting low levels of quality in these areas.

Moreover, the mean of institutional distance for government effectiveness and regulatory quality shows negative values, indicating that exporting countries have higher institutional levels in these indicators than importing countries. Conversely, the institutional distance for control of corruption and the rule of law is positive, suggesting that importers exhibit higher institutional quality in these areas than exporters. Additionally, Table 3 presents the correlation matrix between the variables, showing positive correlations between exports of the primary sector and institutional quality indicators and institutional distance.

Table 2: Descriptive statistics

Variable	Observations	Mean	Minimum	Maximum
exportprimary	1880	4.335e+08	0	3.703e+10
importprimary	1880	1.638e+08	0	8.225e+09
distance	1880	10328.308	1107.691	19190.279
gdp_i	1880	1.034e+12	8.609e+11	1.319e+12
gdp_m	1880	4.420e+11	36193811	2.574e+13
pop_i	1880	2.653e+08	2.533e+08	2.755e+08
pop_m	1880	38321890	10694	1.417e+09
agree pta goods	1880	.255	0	1
contiguity	1880	.016	0	1
landlocked	1880	.191	0	1

Variable	Observations	Mean	Minimum	Maximum
cc_m	1880	-.03	-1.798	2.403
ge_m	1880	-.027	-2.439	2.285
rq_m	1880	-.031	-2.523	2.252
rl_m	1880	-.034	-2.406	2.125
cc_i	1880	-.465	-.66	-.299
ge_i	1880	.067	-.326	.437
rq_i	1880	.042	-.158	.288
rl_i	1880	-.342	-.533	-.189
d_cc	1880	.435	-1.486	3.059
d_ge	1880	-.094	-2.679	2.575
d_rq	1880	-.073	-2.63	2.41
d_rl	1880	.309	-2.098	2.504

Table 3: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) exportprimary	1.000					
(2) importprimary	0.585	1.000				
(3) ln_distance	-0.274	-0.170	1.000			
(4) ln_gdp_i	0.058	0.057	0.000	1.000		
(5) ln_gdp_m	0.383	0.435	-0.043	0.034	1.000	
(6) ln_pop_i	0.049	0.050	0.000	0.944	0.029	1.000
(7) ln_pop_m	0.336	0.320	-0.108	0.013	0.688	0.014
(8) agree_pta_goods	0.276	0.264	-0.219	0.000	0.330	0.000
(9) contiguity	0.074	0.031	-0.327	0.000	-0.022	0.000
(10) landlocked	-0.105	-0.121	-0.044	-0.000	-0.104	-0.000
(11) lag_cc_i	0.015	0.026	0.000	0.604	0.018	0.641
(12) lag_cc_m	0.073	0.178	0.044	-0.000	0.207	-0.001
(13) lag_ge_i	0.052	0.051	0.000	0.882	0.030	0.902
(14) lag_ge_m	0.162	0.236	-0.015	-0.005	0.392	-0.005
(15) lag_rq_i	0.061	0.057	0.000	0.846	0.031	0.817
(16) lag_rq_m	0.096	0.210	0.048	-0.001	0.395	-0.001
(17) lag_rl_i	0.032	0.029	0.000	0.600	0.016	0.666
(18) lag_rl_m	0.098	0.200	0.019	-0.005	0.266	-0.003

Variables	(7)	(8)	(9)	(10)	(11)	(12)
(1) exportprimary						
(2) importprimary						
(3) ln_distance						
(4) ln_gdp_i						
(5) ln_gdp_m						
(6) ln_pop_i						
(7) ln_pop_m	1.000					
(8) agree_pta_goods	0.398	1.000				
(9) contiguity	0.011	0.023	1.000			
(10) landlocked	0.015	-0.192	-0.062	1.000		
(11) lag_cc_i	0.009	-0.000	-0.000	0.000	1.000	
(12) lag_cc_m	-0.298	-0.214	-0.045	-0.105	-0.005	1.000
(13) lag_ge_i	0.012	0.000	0.000	-0.000	0.470	0.001
(14) lag_ge_m	-0.180	-0.117	-0.029	-0.117	-0.004	0.911
(15) lag_rq_i	0.011	0.000	0.000	-0.000	0.306	0.002
(16) lag_rq_m	-0.158	-0.198	-0.030	-0.123	0.001	0.860
(17) lag_rl_i	0.009	-0.000	-0.000	-0.000	0.552	-0.001
(18) lag_rl_m	-0.271	-0.214	-0.060	-0.114	-0.004	0.940

Variables	(13)	(14)	(15)	(16)	(17)	(18)
(1) exportprimary						
(2) importprimary						
(3) ln_distance						
(4) ln_gdp_i						
(5) ln_gdp_m						
(6) ln_pop_i						
(7) ln_pop_m						
(8) agree_pta_goods						
(9) contiguity						
(10) landlocked						
(11) lag_cc_i						
(12) lag_cc_m						
(13) lag_ge_i	1.000					
(14) lag_ge_m	-0.004	1.000				
(15) lag_rq_i	0.922	-0.003	1.000			
(16) lag_rq_m	-0.000	0.923	-0.002	1.000		
(17) lag_rl_i	0.700	-0.003	0.651	-0.001	1.000	
(18) lag_rl_m	-0.001	0.936	-0.001	0.914	0.002	1.000

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) exportprimary	1.000						
(2) importprimary	0.585	1.000					
(3) ln_distance	-0.274	-0.170	1.000				
(4) ln_gdp_i	0.058	0.057	0.000	1.000			
(5) ln_gdp_m	0.383	0.435	-0.043	0.034	1.000	0.383	
(6) ln_pop_i	0.049	0.050	0.000	0.944	0.029	1.000	
(7) ln_pop_m	0.336	0.320	-0.108	0.013	0.688	0.014	1.000
(8) agree_pta_goods	0.276	0.264	-0.219	0.000	0.330	0.000	0.398
(9) contiguity	0.074	0.031	-0.327	0.000	-0.022	0.000	0.011
(10) landlocked	-0.105	-0.121	-0.044	-0.000	-0.104	-0.000	0.015
(11) lag_d_cc	0.071	0.174	0.043	-0.067	0.204	-0.072	-0.297
(12) lag_d_ge	0.147	0.220	-0.015	-0.195	0.376	-0.199	-0.178
(13) lag_d_rq	0.087	0.201	0.047	-0.117	0.387	-0.112	-0.159
(14) lag_d_rl	0.095	0.197	0.019	-0.050	0.264	-0.054	-0.271

Variables	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) exportprimary							
(2) importprimary							
(3) ln_distance							
(4) ln_gdp_i							
(5) ln_gdp_m							
(6) ln_pop_i							
(7) ln_pop_m							
(8) agree_pta_goods	1.000						
(9) contiguity	0.023	1.000					
(10) landlocked	-0.192	-0.062	1.000				
(11) lag_d_cc	-0.212	-0.044	-0.104	1.000			
(12) lag_d_ge	-0.114	-0.028	-0.114	0.895	1.000		
(13) lag_d_rq	-0.196	-0.030	-0.121	0.850	0.920	1.000	
(14) lag_d_rl	-0.213	-0.059	-0.114	0.936	0.923	0.910	1.000

The primary sector has dominated Indonesian trade and export structure in the last decade, continuously contributing to more than half of Indonesian total exports. Figure 1 shows the primary sector's domination in the contribution to Indonesia's total exports from 2013 to 2022 moderately fluctuated with a gradually decreasing trend, indicative of a gradual shift of the economy from natural resources to manufacturing basis of production

and the sector's responsiveness to global market conditions and domestic economic policies.

The primary sector remains a cornerstone of Indonesia's export landscape. Its contribution, while subject to fluctuations, reflects a resilient sector capable of adapting to changing global and domestic landscapes. Between 2013 and 2016, there was a marked decline in the primary sector's contribution, dropping from 61.77% in 2013 to 51.19% in 2016, which might be attributed to global commodity price drops, reduced demand, or internal shifts in economic focus. Meanwhile, the period of 2018 to 2022 shows some volatility within 50 to 55% of the contribution to total exports.

**Figure 1**: Share of primary sector and manufacturing sector to Indonesia's total export
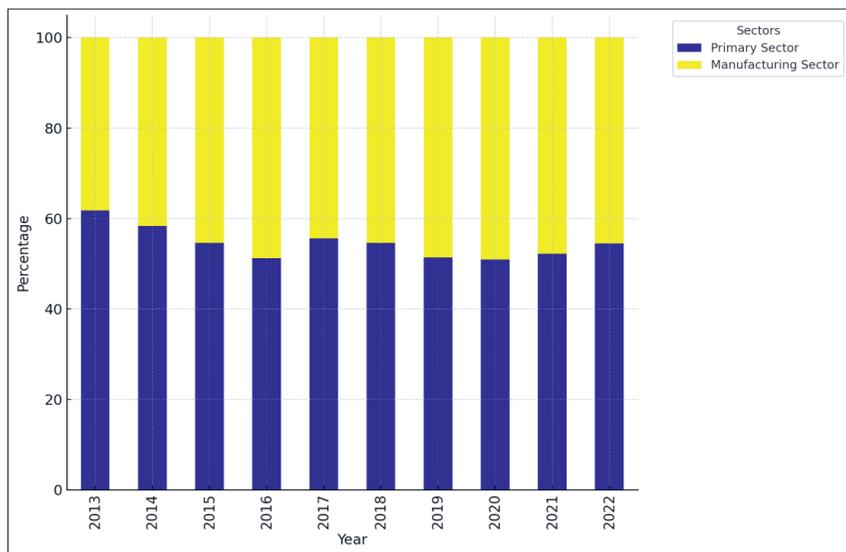
Source: Author's calculation based on Statistics Indonesia (2023)

From the institutional perspective, Figure 2 shows that control of corruption, government effectiveness, regulatory quality, and the rule of law in Indonesia generally fluctuated, but exhibited positive trends, reflecting better governance and a conducive environment for sustainable development. Government effectiveness and regulatory quality were indicators with the highest value, and they demonstrated substantial progress from a negative value before 2018 to an increasing and positive value after 2018, reflecting a considerable improvement in the quality of public services, the capacity

and independence of the public service, the quality of policy formulation and implementation, the credibility of the government's commitment to such policies, regulatory processes, reduced red tape, and fairer competition.

Figure 2: Indonesia's institutional quality indicators
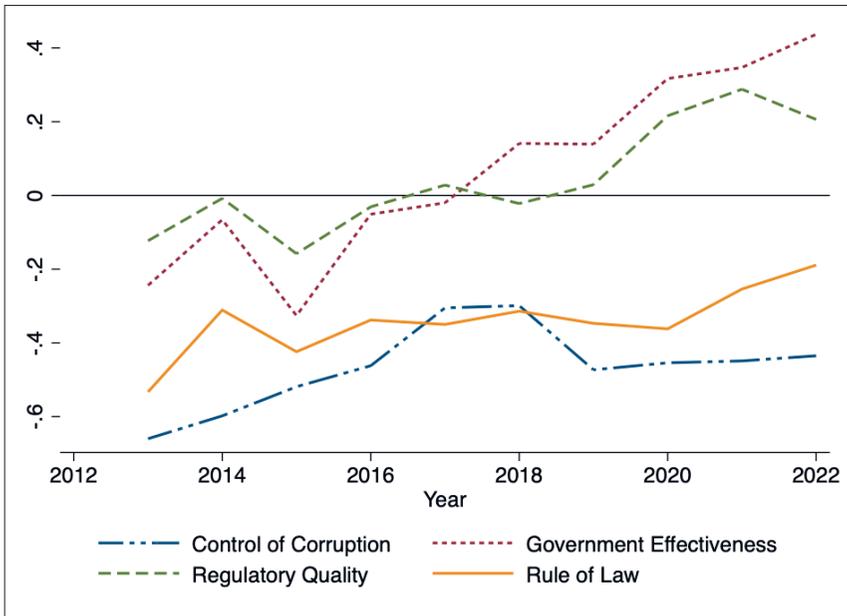
Source: Author's calculation based on WGI (2023)

4.2   *Quantitative analysis*

The estimation model is fitted using the PPML approach with country-pair fixed effects. Table 4 and Table 5 present the results, including the augmented gravity model variables, namely GDP, geographical distance, contiguity, landlocked status, and trade agreements in goods. All results are statistically significant, particularly for the second model, Indonesian primary sector exports and coefficient signs align with expectations and display consistency across all models.

Table 4: Estimation results of primary sector exports to
Indonesia and institutional quality

Variables	Dependent variable: Trade partners' primary sector exports to Indonesia			
	(1)	**(2)**	**(3)**	**(4)**
ln_distance	-0.286***	-0.236**	-0.277***	-0.290***
	(0.110)	(0.110)	(0.105)	(0.110)
ln_gdp_i	1.744	1.846	1.444	1.938
	(1.383)	(1.476)	(1.440)	(1.381)
ln_gdp_m	0.712***	0.713***	0.639***	0.677***
	(0.0399)	(0.0478)	(0.0456)	(0.0403)
ln_pop_i	-3.437	-5.383	-5.297	-3.986
	(7.758)	(8.599)	(7.350)	(8.052)
ln_pop_m	-0.00544	-0.0347	0.0804*	0.0208
	(0.0400)	(0.0479)	(0.0462)	(0.0408)
agree_pta_goods	1.066***	1.047***	1.097***	1.074***
	(0.166)	(0.163)	(0.158)	(0.167)
contiguity	0.581***	0.472***	0.440**	0.491***
	(0.180)	(0.181)	(0.177)	(0.181)
landlocked	-0.910***	-0.948***	-0.812***	-0.924***
	(0.136)	(0.135)	(0.140)	(0.141)
lag_cc_i	-0.0709			
	(0.659)			
lag_cc_m	0.325***			
	(0.0719)			
lag_ge_i		0.128		
		(0.703)		
lag_ge_m		0.334***		
		(0.0863)		
lag_rq_i			0.633	
			(0.778)	
lag_rq_m			0.494***	
			(0.0866)	
lag_rl_i				-0.321
				(1.133)
lag_rl_m				0.399***
				(0.0800)
Constant	22.19	57.41	67.22	28.19
	(117.0)	(141.7)	(112.0)	(123.5)
Country-pair fixed effect	Yes	Yes	Yes	Yes
Observations	1,692	1,692	1,692	1,692
R^2	0.554	0.542	0.593	0.564

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.

Table 5: Estimation results of Indonesian primary sector exports
and institutional quality

Variables	Dependent variable: Indonesian primary sector exports to trade partners			
	(1)	**(2)**	**(3)**	**(4)**
ln_distance	-1.185***	-1.140***	-1.181***	-1.198***
	(0.0563)	(0.0594)	(0.0564)	(0.0561)
ln_gdp_i	2.616***	2.609***	1.809**	2.845***
	(0.651)	(0.740)	(0.779)	(0.666)
ln_gdp_m	0.635***	0.607***	0.635***	0.604***
	(0.0656)	(0.0792)	(0.0652)	(0.0613)
ln_pop_i	-5.945*	-12.17***	-10.01***	-9.183***
	(3.442)	(4.281)	(3.692)	(3.563)
ln_pop_m	0.255***	0.263***	0.260***	0.285***
	(0.0737)	(0.0767)	(0.0754)	(0.0674)
agree_pta_goods	0.494***	0.498***	0.505***	0.483***
	(0.0934)	(0.0941)	(0.0927)	(0.0916)
contiguity	0.199**	0.147	0.153*	0.145*
	(0.0828)	(0.0899)	(0.0824)	(0.0866)
landlocked	-0.887***	-0.897***	-0.840***	-0.871***
	(0.270)	(0.271)	(0.275)	(0.273)
lag_cc_i	-0.790**			
	(0.317)			
lag_cc_m	0.149*			
	(0.0849)			
lag_ge_i		0.474		
		(0.387)		
lag_ge_m		0.198*		
		(0.108)		
lag_rq_i			1.214***	
			(0.420)	
lag_rq_m			0.165*	
			(0.0924)	
lag_rl_i				-0.0325
				(0.593)
lag_rl_m				0.221***
				(0.0828)
Constant	47.90	169.5**	149.6***	105.5*
	(51.34)	(73.25)	(56.75)	(54.17)
Country-pair fixed effect	Yes	Yes	Yes	Yes
Observations	1,692	1,692	1,692	1,692
R^2	0.922	0.917	0.922	0.924

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.

4.2.1 Augmented gravity model

The analyses in Table 4 and Table 5 reveal that percentage changes in the GDP of both exporters and importers have a significant positive effect on the primary sector exports of Indonesia and its partners. This finding aligns with gravity model predictions and previous literature, which posit a positive relationship between bilateral trade flows and the economic size of trading partners (Huyen et al., 2017).

Geographical distance consistently shows a significant and negative sign across all estimation models, indicating an inverse relationship between primary sector exports and the distance between countries, consistent with prior research (Khayat, 2019; Abreo et al., 2021). Additionally, contiguity and landlockedness are significantly attributed to primary sector exports. Contiguity is associated with increases in exports, while landlockedness is negatively associated, aligning with previous studies (Álvarez et al., 2018; Oshota & Wahab, 2022).

Furthermore, trade facilitation through preferential trade agreements in goods shows a positive, statistically significant association with increased primary sector exports for both Indonesia and its trade partners at the 1% level. Additionally, the findings show that percentage changes in the population of Indonesia's trade partners have a positive relationship with exports, whereas changes in the population of Indonesia have a negative association. This mixed result for coefficient sign and significance of the population variable aligns with previous studies (Huyen et al., 2017; Yusuf et al., 2021).

4.2.2 Institutional quality

Turning to the main variables in this study, institutional quality indicators, the estimation results in Table 4 and Table 5 reveal that government effectiveness and regulatory quality in Indonesia and trade partners are positively associated with primary sector exports. However, government effectiveness in Indonesia is statistically insignificant, suggesting its direct link with the export of primary products appears limited. Meanwhile, the government effectiveness of Indonesia's trade partners demonstrates a significant positive relationship with primary sector exports, indicating that better government effectiveness on the side of trade partners facilitates Indonesia's primary product exports.

The results also show that regulatory quality in exporting and importing countries has a positive and statistically significant relationship with primary sector exports. It underscores the ability of the Indonesia's government to formulate and implement effective policies that support the country's exports by reducing uncertainty through clear, transparent, and predictable regulations. On the other side, it reflects the encouraging state intervention in trade partner countries that might facilitate market entry for exporters. Nonetheless, the larger coefficient and significance for the regulatory quality of the respective exporting country suggests that while regulatory quality is a noteworthy feature of institutional quality, the regulatory quality of the exporting side has a more substantial influence on primary sector exports.

While the control of corruption and the rule of law of the trade partners are positively and significantly associated with primary sector exports in all models, as expected, unexpected negative coefficients are revealed for these indicators in Indonesia. It is worth noting that Indonesia's mean values for these institutional quality indicators were negative throughout the analysis period, as shown in Table 2 above, reflecting low levels of control of corruption and the rule of law. The negative relationship between control of corruption in the exporting country and primary sector exports indicates that higher control of corruption is associated with decreased exports of primary products, aligning with previous studies (Abreo et al., 2021; Yusuf et al., 2021; Yunan, 2023). A possible reason is that stricter corruption controls may increase compliance requirements and administrative burdens for businesses, thus raising trade costs and potentially discouraging exporters. Moreover, in Indonesia's case as the exporter, its lower control of corruption reflects weaker anti-corruption mechanisms and limited accountability, with a perception of more pervasive corruption in the public sector. Meanwhile, high levels of corruption can impose significant economic costs, leading to institutional inefficiencies that hinder growth and economic development (Yusuf et al., 2021). Empirical studies similarly highlight the obstructive impact of corruption on trade (Thede & Gustafson, 2012; Ali & Mdhillat, 2015).

The coefficient for the rule of law of Indonesia is also negative but statistically insignificant, indicating a weaker or less certain relationship with exports. While improvements in the rule of law theoretically support trade by establishing stronger legal frameworks and protections, its impact on primary sector trade may be limited. On the other side, Indonesia's low

score on the rule of law below the world average, as highlighted by the Index of Economic Freedom in 2023, reflects deficiencies in property rights, judicial effectiveness, and government integrity. Poor institutional structures and inefficient governance often lead to unequal power distribution and ineffective use of resources, impairing export diversification and reducing the natural resource sector's positive contribution to overall exports (Zeynalov, 2017).

Overall, the PPML gravity model results indicate that the regulatory quality of Indonesia and its trade partners emerges as the main contributing factor of primary product exports of both parties relative to other institutional quality indicators. The coefficient is positive and statistically significant and shows a relatively large magnitude compared to other institutional quality variables.

4.2.3 Institutional distance

Tables 6 and 7 present the estimation results on the relationship between institutional differences between importers and exporter and their relationship with primary sector exports. The augmented gravity variables maintain statistically significant and expected coefficient signs across all models, confirming the results of the previous section.

Moreover, the findings indicate that while the institutional quality differences in all quality indicators have a statistically significant and positive relationship with primary sector exports of trade partners to Indonesia, only institutional distances in control of corruption and the rule of law in favour of the trade partners remain significantly and positively associated with exports of Indonesia to its counterparts. As a positive value for the institutional quality distance indicator implies that the institutional quality of the trade partners surpasses that of the exporting country, the greater the positive value of this indicator, the larger the institutional advantage of the trade partners.

Table 6: Estimation results of primary sector exports to Indonesia
and institutional distance

Variables	Dependent variable: Trade partners' primary sector exports to Indonesia			
	(1)	(2)	(3)	(4)
ln_distance	-0.287***	-0.241**	-0.280***	-0.290***
	(0.111)	(0.109)	(0.105)	(0.110)
ln_gdp_i	1.710	2.082	2.361*	1.940
	(1.374)	(1.432)	(1.359)	(1.383)
ln_gdp_m	0.715***	0.720***	0.652***	0.677***
	(0.0395)	(0.0492)	(0.0459)	(0.0403)
ln_pop_i	-2.619	-2.774	-4.488	-3.824
	(7.473)	(7.751)	(7.337)	(7.460)
ln_pop_m	-0.00802	-0.0407	0.0664	0.0207
	(0.0393)	(0.0492)	(0.0466)	(0.0407)
agree_pta_goods	1.064***	1.043***	1.093***	1.073***
	(0.166)	(0.162)	(0.158)	(0.167)
contiguity	0.579***	0.475***	0.446**	0.491***
	(0.182)	(0.180)	(0.175)	(0.181)
landlocked	-0.911***	-0.948***	-0.818***	-0.924***
	(0.137)	(0.135)	(0.140)	(0.141)
lag_d_cc	0.320***			
	(0.0725)			
lag_d_ge		0.320***		
		(0.0858)		
lag_d_rq			0.471***	
			(0.0830)	
lag_d_rl				0.398***
				(0.0800)
Constant	7.146	0.254	26.10	24.96
	(110.2)	(114.2)	(108.2)	(109.7)
Country-pair fixed effect	Yes	Yes	Yes	Yes
Observations	1,692	1,692	1,692	1,692
R^2	0.554	0.541	0.587	0.564

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.

Table 7: Estimation results of Indonesian primary sector exports and institutional distance

Variables	Dependent variable: Indonesian primary sector exports to trade partners			
	(1)	**(2)**	**(3)**	**(4)**
ln_distance	-1.184***	-1.148***	-1.183***	-1.198***
	(0.0561)	(0.0600)	(0.0571)	(0.0560)
ln_gdp_i	2.724***	2.932***	2.933***	2.854***
	(0.672)	(0.730)	(0.753)	(0.668)
ln_gdp_m	0.624***	0.626***	0.654***	0.605***
	(0.0659)	(0.0749)	(0.0632)	(0.0610)
ln_pop_i	-8.066**	-8.368**	-9.021**	-8.804***
	(3.537)	(3.692)	(3.809)	(3.413)
ln_pop_m	0.267***	0.247***	0.239***	0.284***
	(0.0738)	(0.0724)	(0.0720)	(0.0671)
agree_pta_goods	0.496***	0.495***	0.499***	0.483***
	(0.0936)	(0.0952)	(0.0962)	(0.0917)
contiguity	0.201**	0.154*	0.162*	0.145*
	(0.0852)	(0.0913)	(0.0905)	(0.0868)
landlocked	-0.882***	-0.899***	-0.855***	-0.872***
	(0.271)	(0.271)	(0.273)	(0.273)
lag_d_cc	0.169**			
	(0.0849)			
lag_d_ge		0.166		
		(0.101)		
lag_d_rq			0.129	
			(0.0877)	
lag_d_rl				0.220***
				(0.0821)
Constant	86.43*	86.64	99.12*	97.83**
	(52.21)	(54.40)	(55.65)	(49.76)
Country-pair fixed effect	Yes	Yes	Yes	Yes
Observations	1,692	1,692	1,692	1,692
R^2	0.920	0.912	0.910	0.925

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.

The results, therefore, denote that a higher institutional distance favouring the trade partner is associated with increases in the export of primary products and vice versa, corroborating previous findings (Yu et al., 2015; Álvarez et al., 2018). This result also addresses the research question of whether institutional similarities enhance trade by indicating that different, instead of similar, levels of institutional quality between trading

partners might lead to increased exports, particularly of primary sector products. Exporters are plausibly concerned with reducing destination-country risks, such as unfamiliarity with formal and business practices, behavioural standards, non-payment in cross-border transactions, and contract enforcement, which can be mitigated by high governance standards in the importing country (Yu et al., 2015; Álvarez et al., 2018).

It is important to note that governance quality and familiarity with the established framework of rules and norms significantly impact business costs between trading nations (De Groot et al., 2004). Higher institutional quality and a robust governance environment lowers business costs, by fostering a more efficient business climate that supports increased trade flows. Consequently, institutional differences may serve as a source of comparative advantage (Levchenko, 2007).

4.3 Sensitivity check

This study conducts several sensitivity checks to ensure the robustness of the results, including applying country-pair fixed effects to control for time-invariant bilateral characteristics and decomposing institutional quality into individual components, that is, control of corruption, government effectiveness, regulatory quality, and the rule of law, for separate estimation. Additionally, a ZI-PPML model is employed, as shown in Appendix 1 and Appendix 2. The results show that, in general, the coefficient signs and magnitudes of the augmented gravity variables, institutional quality indicators, and institutional distance are similar, corroborating the findings from the PPML model in the previous discussion.

5. Conclusion

This research highlights the relationship between institutional quality and Indonesia's primary sector exports. The findings reveal that better regulatory quality and governance effectiveness are significantly and positively related to primary sector exports. However, the control of corruption and the rule of law produce mixed results: these indicators have a negative but limited relationship with primary sector exports of Indonesia, and a positive association with the exports of its trade partners. Furthermore, the results suggest that institutional differences between trading partners, favouring the

trade partner, are positively associated with increased primary sector exports, indicating that the institutional distance links with increased primary sector exports.

It should be acknowledged that this study is limited in terms of its focus on institutional quality as a static factor, which does not account for the impact of institutional adaptation. Moreover, this study does not capture the relationship between institutional quality and subsector-specific trade. Therefore, future studies could consider dynamic changes in institutional quality, exploring how improvements or deteriorations in institutional quality over time impact trade. Additionally, further research could delve into institutional impacts on subsector-specific trade flows, offering a granular view of how governance structures affect different types of primary products.

CRediT Author Statement

Yeremia Natanael: Conceptualisation, Design of Methodology, Data Collection, Formal Analysis, Writing – Original Draft preparation and editing.

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Conflicts of Interest

The author declares that there is no conflict of interest.

Data availability

Data will be made available on request.

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Appendices

<p style="text-align:center">**Appendix 1**: Zero inflated Poisson estimation result of institutional quality</p>

Variables	Dependent variable: trade partners' primary sector exports to Indonesia			
	(1)	(2)	(3)	(4)
ln_distance	-0.259***	-0.203***	-0.247***	-0.258***
	(0.000)	(0.000)	(0.000)	(0.000)
ln_gdp_i	1.755***	1.861***	1.431***	1.952***
	(0.000)	(0.000)	(0.000)	(0.000)
ln_gdp_m	0.698***	0.695***	0.632***	0.667***
	(0.000)	(0.000)	(0.000)	(0.000)
ln_pop_i	-3.459***	-5.464***	-5.290***	-4.018***
	(0.000255)	(0.000279)	(0.000248)	(0.000256)
ln_pop_m	0.00717***	-0.0198***	0.0850***	0.0291***
	(0.000)	(0.000)	(0.000)	(0.000)
agree_pta_goods	1.145***	1.136***	1.193***	1.167***
	(0.000)	(0.000)	(0.000)	(0.000)
contiguity	0.565***	0.450***	0.421***	0.473***
	(0.000)	(0.000)	(0.000)	(0.000)
landlocked	-0.863***	-0.898***	-0.757***	-0.869***
	(0.000)	(0.000)	(0.000)	(0.000)
lag_cc_i	-0.0702***			
	(0.000)			
lag_cc_m	0.335***			
	(0.000)			
lag_ge_i		0.134***		
		(0.000)		
lag_ge_m		0.348***		
		(0.000)		
lag_rq_i			0.647***	
			(0.000)	
lag_rq_m			0.493***	
			(0.000)	
lag_rl_i				-0.330***
				(0.000)
lag_rl_m				0.402***
				(0.000)
Constant	20.56***	56.55***	65.22***	26.27***
	(0.00386)	(0.00467)	(0.00381)	(0.00393)
Observations	1,692	1,692	1,692	1,692

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.

Appendix 2: Zero inflated Poisson estimation result of institutional distance

Variables	Dependent Variable: Trade Partners' Primary Sector Exports to Indonesia			
	(1)	**(2)**	**(3)**	**(4)**
ln_distance	-0.260***	-0.207***	-0.249***	-0.258***
	(0.000)	(0.000)	(0.000)	(0.000)
ln_gdp_i	1.720***	2.108***	2.360***	1.954***
	(0.000)	(0.000)	(0.000)	(0.000)
ln_gdp_m	0.701***	0.703***	0.645***	0.667***
	(0.000)	(0.000)	(0.000)	(0.000)
ln_pop_i	-2.607***	-2.740***	-4.475***	-3.868***
	(0.000243)	(0.000247)	(0.000246)	(0.000244)
ln_pop_m	0.00460***	-0.0259***	0.0714***	0.0290***
	(0.000)	(0.000)	(0.000)	(0.000)
agree_pta_goods	1.143***	1.133***	1.189***	1.167***
	(0.000)	(0.000)	(0.000)	(0.000)
contiguity	0.564***	0.453***	0.426***	0.473***
	(0.000)	(0.000)	(0.000)	(0.000)
landlocked	-0.864***	-0.897***	-0.763***	-0.869***
	(0.000)	(0.000)	(0.000)	(0.000)
lag_d_cc	0.330***			
	(0.000)			
lag_d_ge		0.334***		
		(0.000)		
lag_d_rq			0.469***	
			(0.000)	
lag_d_rl				0.402***
				(0.000)
Constant	4.874***	-3.161***	23.65***	23.28***
	(0.00361)	(0.00369)	(0.00366)	(0.00363)
Observations	1,692	1,692	1,692	1,692

Variables	Dependent variable: Indonesian primary sector exports to trade partners			
	(1)	**(2)**	**(3)**	**(4)**
ln_distance	-1.263***	-1.224***	-1.254***	-1.271***
	(0.000)	(0.000)	(0.000)	(0.000)
ln_gdp_i	2.727***	2.940***	2.975***	2.866***
	(0.000)	(0.000)	(0.000)	(0.000)
ln_gdp_m	0.607***	0.604***	0.623***	0.573***
	(0.000)	(0.000)	(0.000)	(0.000)
ln_pop_i	-8.063***	-8.347***	-9.033***	-8.753***
	(0.000153)	(0.000154)	(0.000154)	(0.000153)
ln_pop_m	0.255***	0.240***	0.245***	0.292***
	(0.000)	(0.000)	(0.000)	(0.000)
agree_pta_goods	0.294***	0.301***	0.315***	0.302***
	(0.000)	(0.000)	(0.000)	(0.000)
contiguity	0.129***	0.0841***	0.0915***	0.0767***
	(0.000)	(0.000)	(0.000)	(0.000)
landlocked	-0.967***	-0.979***	-0.923***	-0.943***
	(0.000)	(0.000)	(0.000)	(0.000)
lag_d_cc	0.163***			
	(0.000)			
lag_d_ge		0.169***		
		(0.000)		
lag_d_rq			0.153***	
			(0.000)	
lag_d_rl				0.245***
				(0.000)
Constant	91.27***	90.92***	102.9***	101.1***
	(0.00228)	(0.00231)	(0.00229)	(0.00228)
Observations	1,692	1,692	1,692	1,692

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.