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Does Indonesia's High Level of Corruption Affect Its Trade Volume?

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Abstract

This article aims to examine the connection between corruption and the amount of trade in several commodities, including raw materials, capital goods, intermediate products, and consumer goods, with a specific emphasis on the Indonesian situation. Indicators of corruption utilized in this article include the Corruption Perception Index (CPI) and the Control of Corruption (COC). Meanwhile, the sum of Indonesia's exports and imports indicated the country's trade volume. For this issue, this article employs the gravity model and regresses it with either a fixed effect or a random effect model. The empirical findings show that both the CPI and COC levels of corruption in Indonesia have a negative impact on the amount of trade in capital goods. However, only the CPI shows a negative correlation with the prevalence of corruption in Indonesia, whereas consumer products, intermediate goods, and raw materials all show a positive correlation. The impact of COC on Indonesia's trade partners is complicated for the commodities this article looked at. The insights generated from this study hold significant value in shaping a more informed and accurate representation of how corruption permeates and impacts international trade dynamics, thus contributing to a more nuanced understanding of this critical issue.

Keywords:
corruption; trade volume; gravity model

How to Cite:

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INTRODUCTION

The economic impacts of corruption are difficult to pin down. Mauro (1995) suggests this might harm economic development, foreign direct investment (FDI), public investment, and trade. It is common knowledge that these investigations will bear fruit in the future (Huntington, 1968; Leff, 1964). Therefore, the quality of institutions may be inferred from levels of corruption, and economic development is influenced by corruption. Corruption has a variety of negative effects on international business. Numerous studies point to corruption as a factor that makes international trade more difficult. Most of their research indicates that corruption hinders international trade (Gil-Pareja et al., 2019; Saputra, 2019; Xiao et al., 2018). Corruption might undermine import limitations in countries with weaker currencies than others.

The literature on corruption and trade that is now available brings up three issues. To begin, a sampling of countries. The subject matter of archival writing is often a collection of states. De Jong & Bogmans (2011) took a sample from 190 countries. Misleading trade flow proxies have the potential to induce misunderstanding. Because market share does not imply trade flow at an "absolute level." It concluded that corruption does not boost export volume. The last problem is with the corrupted proxy. Others believe public opinion corruption indices such as the CPI, ICRG, and WBES are pointless. The number of countries represented by each indicator varies. As a result, judgments drawn from actual evidence are constrained. Since it is impossible to judge levels of corruption directly, many scholars use indices of corruption instead. The second constraint, on the time available for observation, leads to the third limitation. Many types of study use cross-country analysis since there are so few indications of corruption. Because of this, it is challenging to quantify corruption's long-term consequences on businesses and the causes they support (de Jong & Bogmans, 2011).

In light of these challenges, this essay investigates how corruption affects trade in Indonesia. In contrast to other studies, this paper investigates just the transaction volume involving four different commodities. The purpose of this technique is to get an understanding of how corruption impacts various things. We choose goods for the benefit of consumers, producers, and shareholders. The Corruption Perception Index (CPI) from Transparency International and the Control of Corruption (COC) from the Worldwide Governance Indicator will be used in this study. Indonesia's potential to export goods and attract foreign investment may suffer due to the country's widespread corruption. According to Henderson & Kuncoro (2004), local businesses view corruption as costly since bribing officials involves a more significant investment of time and capital. Using data from 2001, they discovered that businesses bribe 8% of public officials and pay 1% to local police. Investors from other countries believe that corruption is a significant problem in Indonesia.

Corruption is said to hurt business. Actual results by Ades & di Tella (1997), Musila & Sigué (2010), and Treisman (2007) supported this approach. Ades & di Tella (1997) used the Business International Corruption Index (BI Index) and the World

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Competitiveness Report to study corruption reasons in different countries. They found that higher GDP imports hurt corruption. Ades & di Tella (1997) and Treisman (2007) employed a GDP proxy for imports to investigate corruption sources across nations. They measured trade openness using import value and imports as a % of 1980 GDP. He utilized the CPI and BI as independent variables. The variables are insignificant for every regression, as evidenced by his WLS and OLS estimates. Unlike the preceding two kinds of literature, Musila & Sigué (2010) examined corruption and business differently. As a dependent variable, corruption determined trade volume. Export/import volume signified trade, but CPI and BI indices denoted corruption. The gravity model was used to construct a corruption problem in international trade encompassing 47 African states and 180 trading partners. OLS, Tobit, and WLS estimated the relationship between African trading partner corruption and exports and imports.

Corruption has varying effects on international trade. Through an institutional analysis, it is found that foreign aid, such as official development assistance and aid for trade, can moderate the negative impact of corruption on international trade (Bahoo et al., 2022). The World Trade Organization (WTO) has increasingly addressed the issue of corruption in international trade. It has taken a clear-cut approach to incorporate anticorruption measures and values within its framework. Studies have shown that corruption acts as a barrier to international trade, mainly through bureaucratic mechanisms of trade and investment licensing (Atsir & Sunaryati, 2018; Gil-Pareja et al., 2019). While perception-based indexes show a negative effect of corruption on trade, the "grease the wheels" view is supported by a structural index, especially in low and middle-income countries (Jayachandran, 2020). Additionally, corruption has been found to affect bilateral exports of goods from Vietnam to its trading partners (Cooray, 2009).

De Jong & Bogmans (2011) empirical study confirms this strategy, which predicts exporters' premiums or bribes. The logarithm of 2002 bilateral exports was their trade-dependent variable. Corruption was a priority variable assessed using broad corruption indices, its direct relationship to trade, and its intrinsic unpredictability. Dutt and Traca (2010) argued the conflict between corruption and trade protection. Manufacturing exports and imports from 122 countries are the dependent variables, the ICRG Index is a proxy for corruption, and tariffs quantify trade protection. A corruption-augmented gravity model, panel data, and OLS estimate showed that import tariffs by the importing country relate to corruption's impact on international trade. Their investigations showed a negative correlation between corruption and business, particularly with low tariffs. Paradoxically, pleasant connotations with corruption raise tariffs. Corruption aids business here.

In their investigation of international trade corruption, de Jong & Bogmans (2011) found similar outcomes. They investigated whether corruption hampers or benefits global trade. They averaged bilateral export data from 1999 to 2002 and constructed nine corruption indices from the Corruption Perceptions Index and the World Bank's Economic Survey to represent worldwide business. Based on corruption, they categorized the world's countries into four groups. Thus, 73 countries are in Group 1, 83 in Group 2,

26 in Group 3, and 8 in Group 4. They estimated using Baier Bergstrand OLS regression with a gravity model. They usually find that corruption hurts international trade using WBES corruption levels. However, corruption and institution quality indicators show the opposite. Corruption increases imports, according to one study.

Finally, Thede & Gustafson (2012) found comparable results. They analyzed corruption variables' effects on import flow compared to numerous representation approaches. Corruption is further distinguished by its severity, frequency, geographic concentration, practical impact, and predictability. This corruption indicator was created in 1999 using data from 32 post-communist Eastern European and sub-Saharan African countries and the World Business Environment Survey (WBES). They employed the Generalized Method of Moments (GMM) to investigate Anderson and Marcouiller's (2002) modified gravity approach and discovered that corruption's features hurt economic trade. Their results, like De Jong & Bogmans (2011), support the premise that corruption hurts a country's import flow. Their study also showed a positive coefficient variable of a constrained corruption function, proving corruption's benefits. This result showed them that corrupt activities pay off, particularly when it comes to opening new markets to foreign product importers.

Corruption's impact on economic trade was analyzed using a gravity approach. The results varied depending on the measures of corruption used. Perception-based indexes showed a negative effect of corruption on trade, but this effect was not widespread. However, a structural corruption index revealed evidence of a "grease the wheels" view, particularly in low and middle-income countries—differences in corruption levels also negatively impacted trade. Membership in regional trade agreements did not significantly alter these results (Men, 2022). A study specifically focused on the relationship between corruption and agricultural trade found that corruption can be trade-taxing when the protection level is low. However, with a higher degree of protection, corruption becomes trade-enhancing. These results were consistent across different measures of corruption (Pastpipatkul et al., 2017; Abidin et al., 2016).

Corruption affects Indonesia's business in many ways. Use laws and regulations first. The latter includes trade protection and low government pay (Setiyono & McLeod, 2010; Mc Leod, 2008). Both theoretical and empirical studies point to these criteria as essential in influencing the incidence of corrupt activities, including bribery, illegal logging, smuggling, and trade favoritism. According to Men (2022), specific policies that cause economic inefficiency foster corruption. In practice, customs officials are typically blamed for corruption's harmful effects on international trade. According to Dutt (2009) and Dutta & Kar (2018), corrupt officials may facilitate export and import operations to avoid high tariffs. When trade restrictions are high, smuggling is one of the various ways to move goods. Another example is beef import quotas. Second, products and services are acquired.

Men (2022) analyzes the impact of corruption on trade flows in Indonesia using the gravity model. The study introduces the Corruption Perceptions Index (CPI) and its secondary items as explanatory variables and constructs balanced panel data. The findings

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show that corruption in Indonesia has an inverted U-shaped relationship with its imports. Additionally, corruption in Indonesia and its trading partners leads to short-term growth in bilateral trade flows but fails to achieve sustained and healthy trade development. The study suggests that reforms in the legal system and anticorruption measures should be implemented to promote the prosperity and development of Indonesia's external trade.

The research gap in this paper is due to a need for a clear and complete knowledge of how corruption affects trade in Indonesia. While various studies are included, they must comprehensively study this connection in the Indonesian context. Furthermore, the specific commodities chosen for investigation and their relation to Indonesia's more significant trade dynamics are not fully described. The ambiguity in corruption's effect on trade volume, with some research finding positive impacts in specific circumstances, needs to be adequately addressed, and there is a need to investigate the implications of corruption on trade and economic growth in the country.

This study provides a substantial contribution to comprehending the influence of corruption on international trade, focusing specifically on the context of Indonesia. By adopting a more specialized contextual lens, the research offers a comprehensive and customized examination of the impact of corruption on domestic trade. Including several perspectives adds complexity to the existing literature on corruption and trade, enhancing our comprehensive understanding of the various mechanisms at play.

METHODS

The gravity model is commonly used to investigate bilateral trade between two countries. This model utilized Newton's theory concerning gravitational force. The fundamental gravity model for the trade problem is as follows:

$$\ln TRD_{ij} = \alpha_1 \ln GDP_i + \alpha_2 \ln GDP_j - \alpha_3 \ln D_{ij} + \varepsilon_{ij}, i \neq j \quad (1)$$

The equation explains that bilateral trade between country i and j, $trade_{ij}$, is determined positively by GDP_i is national income of country i, GDP_j is national income of country j, and negatively by physical distance between country i and j, D_{ij}.

The gravity model is modified to handle economic difficulties. GDP and distance in this model explain bilateral trade. Distance measures transportation costs, whereas GDP measures trade volume. Linnemann (1966) and Prais (1967) improved this model by adding population as a second measure of country size. The "augmented gravity model" describes this hypothesis. Proxy, or "gravity dummies," such as a common language, colonial past, or border, are used to explain trade movements between states. Gravity sandbags will be used to improve long-term memory. When studying governance's impact on trade, several studies consider corruption. Researchers use corruption indices to measure a nation's corruption. TI's CPI and WGI's COC are indices. This study will incorporate these indicators into the modified gravity model to quantify corruption's impact on international business.

This paper builds on De Jong & Bogmans (2011) and Akbarian & Shirazi (2012) to simulate corruption and trade volume in an economic environment. We will not

use common colonizer, colonial connections, or corruption squared like their models. Indonesia had just three conquerors, whereas our analysis included over 35 countries. Thus, the first two variables cannot affect it. The third variable shows an inverted U-shaped non-linear relationship between corruption and export and import countries (Dutt & Traca, 2010). However, this variable is confirmed to be substantially associated with other model components. Thus, their updated gravity model after removing these elements is as follows:

$$\ln TRD_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln POP_{it} + \alpha_4 \ln POP_{jt} + \alpha_5 \ln DST_{ij} + \alpha_6 CBR_{ij} + \alpha_7 LNG_{ij} + \alpha_8 COR_{it} + \alpha_9 COR_{jt} + \varepsilon_{ijt} \quad (2)$$

In the equation (2), i, j, and t indicate country i, country j, and time t respectively. Trade stands for export or import volume. GDP, DST, and POP comes from basic gravity model representing national income, distance measured from one capital city to another capital city, and population in a country respectively. Other variables which are widely used in gravity model are CBR and LNG. Where CBR denotes for common border and LNG is common language. Additional variable used to proxy corruption level is COR. Finally, ε_{ijt} is an error term assumed as well-behaved.

Instead of focusing on two countries like in equation (2), this research will examine the effect of corruption on trade in Indonesia using two proxies for corruption. The Corruption Perception Index (CPI) and the Control of Corruption Index (CC) will be surrogates for corruption. Both are used to gauge how well governments combat corruption. Both measures rely on the interpretation and summarization of survey data. Nonetheless, these two metrics have a high degree of consistency (about 98 percent). According to de Jong & Bogmans (2011), this high agreement between the two indicators may signify a "great consensus" among academics who advocated for both developments. While the Corruption Perceptions Index (CPI) focuses on this issue, CC is only one of several indicators of institution quality in the World Governance Index (WGI). Therefore, the equation (2) can be written into two different equations as follows:

$$\ln TRD_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln POP_{it} + \alpha_4 \ln POP_{jt} + \alpha_5 \ln DST_{ij} + \alpha_6 CBR_{ij} + \alpha_7 LNG_{ij} + \alpha_8 CPI_{it} + \alpha_{98} CPI_{jt} + \varepsilon_{ijt} \quad (3)$$

$$\ln TRD_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln POP_{it} + \alpha_4 \ln POP_{jt} + \alpha_5 \ln DST_{ij} + \alpha_6 CBR_{ij} + \alpha_7 LNG_{ij} + \alpha_8 COC_{it} + \alpha_9 COC_{jt} + \varepsilon_{ijt} \quad (4)$$

The disparities among equation (2), (3), and (4) are at index i and the addition of variable COC. Equation (2) use index i for many countries while equation (3) and (4) use the index to stand for Indonesia and j is for Indonesia's trading partner. In addition, equation (2) and (3) utilize corruption indicators (CPI) from TI whereas equation (4) derive corruption indicator (COC) from WGI. To understand how corruption impacts commodities, they are divided into four groups. Products comprise intermediate, final, raw, and capital products. To properly classify imported and exported commodities, equations (5), (6), (7), and (8) will have the trade symbol rearranged into four equations. X indicates export. This paper will abbreviate the export of raw materials (XRAW), produced capital

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(XCAP), intermediates (XIMD), and completed consumer items (XCNS). When X is replaced by M indicates imports.

$$\ln XTRD_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln POP_{it} + \alpha_4 \ln POP_{jt} + \alpha_5 \ln DST_{ij} + \alpha_6 CBR_{ij} + \alpha_7 LNG_{ij} + \alpha_8 CPI_{it} + \alpha_{98} CPI_{jt} + \varepsilon_{ijt} \quad (5)$$

$$\ln XTRD_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln POP_{it} + \alpha_4 \ln POP_{jt} + \alpha_5 \ln DST_{ij} + \alpha_6 CBR_{ij} + \alpha_7 LNG_{ij} + \alpha_8 COC_{it} + \alpha_9 COC_{jt} + \varepsilon_{ijt} \quad (6)$$

$$\ln MTRD_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln POP_{it} + \alpha_4 \ln POP_{jt} + \alpha_5 \ln DST_{ij} + \alpha_6 CBR_{ij} + \alpha_7 LNG_{ij} + \alpha_8 CPI_{it} + \alpha_{98} CPI_{jt} + \varepsilon_{ijt} \quad (7)$$

$$\ln MTRD_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln POP_{it} + \alpha_4 \ln POP_{jt} + \alpha_5 \ln DST_{ij} + \alpha_6 CBR_{ij} + \alpha_7 LNG_{ij} + \alpha_8 COC_{it} + \alpha_9 COC_{jt} + \varepsilon_{ijt} \quad (8)$$

This paper consists of 122 countries covering 10-year period, from 2013 to 2022. Trade volume and GDP information are available elsewhere. Bilateral trade volume figures use World Bank WITS. Akbarian & Shirazi (2012) advocate measuring bilateral trade in US dollars per thousand. In this article, raw material goods, capital goods, intermediate goods, and consumer products are treated as different commodities rather than a single trading volume. This categorization aims to gather additional data about corruptible goods. This article estimated GDP (US $ constant 2005) and population using the World Bank's WDI database.

In this paper, distance, population, and language determine gravity. CEPII (Centre d'Etudes Prospectives et d'Informations Internationales) provides all statistics except population, which comes from the World Development Indicators. Distance represents transportation costs when exporting or importing products. The unit is kilometers. There may be several meanings for "population". Exporting nations' populations represent their workforces. Meanwhile, the importing nation's population indicates market size. This article uses LNG and CBR as dummies. They are 1 if Indonesia and its trading partners share a border or ethnic language, 0 otherwise.

RESULTS AND DISCUSSION

Panel data may be estimated using three methods: Pooled Regression Model (PRM), Fixed Effect Model (FEM), and Random Effect Model (REM), each employing a unique dataset. FEM and REM are the primary focus of this study. Which strategy works best will be determined by the Hausman test. The first dataset's Hausman test shows many export/import models. In the export model, REM works for raw materials and FEM for others.

In contrast, import models should employ FEM for intermediate products and REM for raw materials, capital goods, and consumer goods. The Hausman test is done on the second dataset using three methods depending on whether the corruption index is included. The model is tested using just the CPI as a fraud indicator. The model is tested with and without CPI in the equations. Finally, the model is evaluated using the

CPI and COC as corruption indicators. Only the capital goods export model implies a strategy change, while the others trend in the same direction. REM should be used if our intermediate product export model utilizes one corruption indicator and FEM if it employs both. Raw resources and consumer items are better exported through REM, whereas FEM best exports capital goods. No matter the corruption indicator, the Hausman test for import models gives consistent recommendations. The best approach for each model is REM.

The models using the initial dataset (see Table 1 and Table 2) estimate Indonesia's GDP (GDP(i)) with an unexpected sign, but not its trading partner's GDP (GDP(j)). The export of capital goods model has an unexpected sign, although the export and import models demonstrate statistical significance for GDP(i). Exports and imports of raw materials positively correlate with GDP(i), adjusting for other factors. This finding aligns with several studies analyzing the relationship between exports, imports, and GDP in different countries and periods (Choi & Lee, 2019; Ria et al., 2023; Uslu, 2016). These studies have shown that exports and imports are crucial to economic growth. While some studies have found a positive correlation between exports and GDP, indicating that an increase in exports can lead to higher GDP, other studies have also highlighted the importance of imports in driving economic growth. Overall, the evidence suggests that exports and imports of raw materials can positively impact GDP. The variable differs dramatically between exclusion and corruption index inclusion in the import model. The GDP(i) significance level linked to export volume is 1.8% in the first treatment and 3.7% in the second. First-treatment raw material exports and purchases grew by 4.9%, and the second-import model by 7.7%.

In the export and import model of intermediate products and consumer goods, GDP(i) predicts higher Indonesian income increases trade in both categories of commodities. GDP(j), Indonesia's trading partners' GDP, exhibits expected but minor signals for exporting intermediate goods and buying raw materials. Indonesia's GDP(i) and trading partner's GDP(j) estimates from the second dataset match those from the first. The second set of models shows that Indonesia's GDP(i) does not influence intermediate product exports or imports but does on capital goods (negative) and other commodities. GDP(i) has a statistically significant negative effect on capital and consumer goods imports in the export model. In the import model, this variable boosts trade volume for raw materials and final consumer goods across all treatments. Except for raw material imports, Indonesia's trading partners' GDP(j) has a substantial coefficient with the correct sign in practically all export and import models.

Indonesia's population shows that POP(i) negatively affects exports and imports, except for capital goods, where GDP(i) exports are shockingly positive. The negative POP(i) values for capital, intermediate, and consumer products indicate a fall in Indonesia's exports as the population expands. Indonesia's rising domestic demand will reduce imports of raw materials, capital goods, intermediate products, and consumer goods. Some studies done by Bojnec & Fertő (2017) and Chi & Kilduff (2010) have also revealed that population size, economic development, and geographic distance

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influence exports and imports, with factors such as trade orientation, manufacturing importance, and high-technology goods also playing a role. Since the unexpected result is only in one model, export of capital goods, and because it is likely to be related to the crisis phenomena causing a significant drop in Indonesian trade volume, it may be reasonable to allow multicollinearity among POP(i), GDP(i), and CPI(i) for the export model. Negative POP(i) signals may be inappropriate for import models for many reasons.

The second dataset has more observations than the first. Therefore, regressions on Indonesia's population, POP(i), and other nations' populations perform better. The coefficient for POP(i) in the first dataset negatively influenced exports and imports for consumer items alone in the second dataset's model. Capital goods imports are positive. Hence, a 1% population growth might raise imports by 25% and 22%. Other items appear unaffected by POP(i). In Indonesia, a 1% increase in POP(j) decreases capital goods imports by 0.3%, raw material exports by 0.5%, and imports by 1.3% to 1.4%.

The export model for the first dataset demonstrates that changing distance travel time (DST) affects only raw commodities. Because this variable is not affected by the passage of time, FEM cannot be utilized to analyze consumer, intermediate, or capital products. When corruption is eradicated, an increase of one percent in distance is detrimental to exporting raw materials. The relevance of corruption was not affected in any way by its inclusion in the model (Olney, 2016). The gap is still considerable and unfavorable. No matter what treatment or model is used, the variable is always found to have a negative value in the import model that is based on the first dataset. This aspect is essential to the capital and consumer product market models. When routes are excessively lengthy, exporters and importers become less eager to travel (Fitzgerald & Haller, 2014; Larch et al., 2016). The regression analysis findings support the hypothesis performed on the second dataset, although DST is not statistically significant for some commodities (Jun, 2022). The increase in distance will make it more difficult for Indonesia to export and import raw materials, consumer products, capital goods, and intermediate goods. This one is moot since the model for exporting capital goods employs FEM, eliminating time-dependent variables like this one. The DST coefficient in the model for importing intermediate products is significantly on the negative side.

The first data set demonstrates that a shared border has little influence on the exports and imports of some different commodities. In contrast, LNG significantly affects the trade of just one product. The CBR and LNG coefficients in the export model are insignificant. A one percent increase in language may result in a 1.9 percent decrease in imports of capital goods (where CPI is not included in the model) and a 1.8 percent decrease, respectively. Despite this, some exports are unaffected by shared borders. The outcomes of the regression models that were run using the second dataset show that LNG does not have a statistically significant effect, but CBR does. If the CBR went up by 1%, raw material exports from Indonesia would increase by 2.1%, while imports of capital goods would increase by 3%.

CPI(i) has a positive and sizable effect on export and import models for particular commodities, whereas CPI(j) has an effect that is both large and negative on these models. Increasing CPIs are beneficial to the export of intermediate products, the import of consumer goods, and the import of raw materials. It demonstrates that an increase of one percentage point in corrupt practices leads to an increase in the export of raw materials. This condition lends credence to the FAO's claim that bribery, illegal logging, and illicit wood trafficking that help timber corporations utilize forestry resources and export timber to their nation or outside (Hansen et al., 2012; Lescuyer et al., 2014; Torres-Rojo, 2021).

The unethical practices of Indonesia's trade partners have a negative impact on the country's exports and imports of raw materials, as well as capital goods and consumer products. If the Corruption Perception Index (CPI) of Indonesia's trading partners continues to rise, the country will ship out fewer raw materials and import fewer finished, capital, and intermediate products. This condition is logical given that there are rules in place by governments and international organizations to prevent excessive mining and logging of natural resources.

There is no association between CPI, COC, and export model corruption, as shown by the second dataset. The Corruption Perception Index in Indonesia drives up imports of raw materials but brings both exports and imports of capital goods to a standstill. If other nations view Indonesia as corrupt, it will increase the amount of raw materials it imports while decreasing the amount of capital products it sells. This condition is because a negative perception of Indonesia's level of corruption can have a detrimental impact on the country's capacity to compete economically and attract investment from other nations (Alfada, 2019; Pujiati et al., 2023; Syukri et al., 2022). As a consequence, Indonesia may come to rely more heavily on the importation of raw materials for its industries, which are essential for production, while simultaneously experiencing difficulties in exporting its capital products to other nations. The dynamics of Indonesia's commerce are also impacted by the stability of the country's currency rate as well as the country's current account balance.

A negative COC is predicted for Indonesia using a model for importing capital goods that does not consider CPI. As a result, a one percentage point reduction in corruption in Indonesia as the result of enhanced control would reduce the country's dependency on capital from outside the country by the same amount. When the estimated model is applied to the first dataset, the Corruption Perception Index (CPI(j)) negatively influences Indonesia's exports and imports of raw materials, capital goods, and consumer items. The second data group has adverse effects on imports, positive effects on exports of capital goods, and neutral effects on imports of raw materials. The effects of the second group of data on imports of raw materials are neutral. Despite the neutral impact on raw material imports, controlling corruption enhances Indonesia's trade in consumer products, capital goods, and raw commodities, ultimately improving the country's trade balance and economic stability. Indonesia's consumer product exports and imports, as well as its imports and exports of capital goods and raw commodities, are all enhanced by the country's corruption control coefficient.

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Table 1. Estimation results of four commodities (Export Model)

Variables	REM			FEM			REM			REM		
	Raw Materials (XRAW)			Capital (XCAP)			Intermediate (XIMD)			Consumer (XCNS)		
$GDP_{(i)}$	4.227	1.337	5.736	-8.877*	-1.479	-6.622	3.551	-0.421	1.878	10.18**	10.89***	8.312
	(3.873)	(3.260)	(5.005)	(4.791)	(3.212)	(5.204)	(4.487)	(3.11)	(4.773)	(4.723)	(3.443)	(5.332)
$GDP_{(j)}$	1.342***	1.413***	1.981***	4.332***	4.469***	4.401***	1.224***	1.229***	1.322***	1.223***	1.072***	1.884***
	(0.445)	(0.323)	(0.366)	(0.508)	(0.963)	(0.882)	(0.044)	(0.185)	(0.187)	(0.117)	(0.189)	(0.332)
$POP_{(i)}$	0.289	1.815	-1.535	17.721	11.522	15.502	7.417	11.884	8.882	-30.341*	-33.125**	-28.223*
	(15.33)	(14.23)	(16.46)	(15.25)	(15.77)	(16.23)	(14.15)	(13.22)	(14.27)	(16.11)	(15.44)	(16.25)
$POP_{(j)}$	0.334*	0.376	0.648*	-0.208	-0.220	-0.212	0.050	0.221	0.188	0.188	0.267	0.334
	(0.554)	(0.377)	(0.521)	(1.383)	(1.847)	(1.717)	(0.231)	(0.231)	(0.211)	(0.332)	(0.283)	(0.443)
$CPI_{(i)}$	0.817		1.063	-2.259**		-1.793*	1.172		0.576	-0.222		-0.443
	(0.889)		(1.071)	(0.531)		(1.023)	(0.814)		(0.932)	(0.915)		(1.443)
$CPI_{(j)}$	-0.255		-0.877	0.387*		0.412*	-0.038		-0.026	-0.221		-0.018
	(0.167)		(0.702)	(0.223)		(0.092)	(0.115)		(0.145)	(0.243)		(0.554)
$COC_{(i)}$		-0.101	-0.151		-1.635	-0.445		0.712	0.334		0.369	0.556
		(0.533)	(0.490)		(0.793)	(0.537)		(0.514)	(0.241)		(0.445)	(0.745)
$COC_{(j)}$		0.271	-0.032		-0.059	0.033		0.062	0.055		0.885*	0.573
		(0.245)	(0.454)		(0.741)	(0.129)		(0.263)	(0.322)		(0.854)	(0.483)
DST	-1.421***	-1.362***	-1.234***				-1.312**	-1.218**	-1.433**	-1.217***	-1.443***	-1.845***
	(0.224)	(0.489)	(0.532)				(0264)	(0.411)	(0.856)	(0.223)	(0.774)	(0.475)
CBR	2.321*	2.652*	2.217*				1.187	1.312	1.855	0.544	0.775	0.375
	(1.262)	(1.372)	(1.366)				(1.422)	(1.237)	(1.554)	(1.211)	(1.885)	(1.274)
LNG	0.061	0.015	0.617				0.534	0.544	0.665	0.442	0.954	0.564
	(2.469)	(2.244)	(2.855)				(2.485)	(2.499)	(2.654)	(2.311)	(2.443)	(2.335)
Constant	-122.6	-106.9	-133.0	-264.2	-189.1	-227.7	-252.3	-215.4	-234.7	389.0	338.7	344.0
	(204.8)	(213.5)	(215.1)	(222.7)	(192.0)	(201.8)	(182.8)	(181.3)	(165.7)	(222.3)	(245.2)	(211.6)
Obs	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220
R-Squared	0.063	0.055	0.071	0.332	0.120	0.118	0.128	0.148	0.208	0.155	0.126	0.116
Country	122	122	122	122	122	122	122	122	122	122	122	122

Note: *, **, *** represent significance levels at 10%, 5%, and 1%, respectively.

Table 2. Estimation results of four commodities (Import Model)

Variables	REM			REM			REM			REM		
	Raw Materials (MRAW)			Capital (MCAP)			Intermediate (MIMD)			Consumer (MCNS)		
$GDP_{(i)}$	11.112***	6.372**	14.432***	-6.443*	1.309	-4.348	2.287	3.682	1.072	9.443***	11.334***	10.665***
	(4.063)	(3.773)	(4.766)	(3.337)	(2.429)	(3.738)	(3.515)	(2.562)	(3.938)	(3.148)	(2.285)	(3.537)
$GDP_{(j)}$	0.601	0.443	0.332	1.776***	1.663***	1.662***	1.887***	1.721***	1.673***	1.733***	1.741***	1.722
	(0.118)	(0.443)	(0.221)	(0.15)	(0.142)	(0.137)	(0.142)	(0.133)	(0.128)	(0.162)	(0.155)	(0.151)
$POP_{(i)}$	-16.91	-11.87	-19.88	23.441**	15.061	20.772*	-0.1772	-1.673	0.625	-28.723***	-32.33***	-30.28***
	(14.02)	(13.23)	(14.54)	(11.65)	(11.2)	(11.8)	(12.23)	(11.76)	(12.4)	(11.03)	(10.6)	(11.2)
$POP_{(j)}$	1.442***	1.412***	1.223***	-0.038	-0.195	-0.213	-0.335*	0.163	0.111	0.025	0.133	0.138
	(0.121)	(0.332)	(0.322)	(0.117)	(0.108)	(0.104)	(0.107)	(0.097)	(0.092)	(0.131)	(0.123)	0.121)
$CPI_{(i)}$	-1.443**		-1.234**	1.822***		-1.448	-0.091		-0.477	-0.214		0.06
	(0.657)		(0.457)	(0.35)		(0.469)	(0.383)		(0.508)	(0.316)		(0.43)
$CPI_{(j)}$	0.554		0.533	0.332		0.2812	0.331		0.488	0.173		0.3087
	(1.332)		(1.225)	(0.221)		(0.191)	(0.216)		(0.184)	(0.273)		(0.197)
$COC_{(i)}$		-1.332**	1.766		-0.977**	-0.122		0.53	0.802		-0.129	-0.036
		(0.445)	(2.644)		(0.13)	(0.21)		(0.152)	(0.236)		(0.107)	(0.184)
$COC_{(j)}$		0.765	2.546**		0.722**	0.698**		0.652	0.618*		0.516**	0.511**
		(1.443)	(0.556)		(0.084)	(0.01)		(0.072)	(0.006)		(0.099)	(0.027)
DST	1.554	1.546	-0.654	-1.221***	-1.122***	-1.118***	-1.663***	-1.773***	-1.733***	-2.773***	-2.644***	-2.882***
	(2.554)	(2.786)	(0.567)	(0.165)	(0.16)	(0.161)	(0.189)	(0.187)	(0.187)	(0.127)	(0.123)	(0.119)
CBR	1.456**	0.332	-0.778	3.443***	3.256**	2.997**	1.525	1.419	1.434	1.14	1.06	1.06
	(0.825)	(0.332)	(0.624)	(0.869)	(0.857)	(0.859)	(0.927)	(0.923)	(0.922)	(0.774)	(0.765)	(0.755)
LNG	-0.332***	0.335***	0.512	0.702	0.898	0.909	0.062	0.2724	0.239	-0.245	-0.113	-0.11
	(0.223)	(0.332)	(0.522)	(2.09)	(2.067)	(2.069)	(2.209)	(2.201)	(0.006)	(1.897)	(1.88)	(1.859)
Constant	-10.57	37.43	-17.55	-322.56**	-289.32**	318.17**	-56.31	-66.47	-36.47	311.72**	329.33**	322.45**
	(178.4)	(165.0)	(144.5)	(156.2)	(122.1)	(157.2)	(148.5)	(153.4)	(151.2)	(148.3)	(152.1)	(149.3)
Obs	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220
R-Squared	0.167	0.166	0.165	0.255	0.245	0.224	0.184	0.185	0.185	0.255	0.225	0.235
Country	122	122	122	122	122	122	122	122	122	122	122	122

Note: *, **, *** represent significance levels at 10%, 5%, and 1%, respectively.

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CONCLUSION

The gravity model's key variables - GDP(i), GDP(j), and DST - typically show significance in the first dataset. GDP(i) behaves strangely due to multicollinearity with POP(i) and CPI(i) but still aligns with Indonesian events influenced by recessions. For individual product export/import models, GDP(j) and DST are statistically significant. POP(i) has varying effects, positive for capital goods exports but negative in other models. LNG, CBR, and POP(i) behave unexpectedly, while POP(j) is negative for capital trade and positive in other models. Shared borders do not significantly impact trade except in one export/import model in the second dataset. LNG has a negative impact in the first dataset but a minor effect in the second dataset. Linguistic barriers do not affect Indonesia's foreign trade from 2003 to 2020. This paper estimates CPI and cost of living with mixed results. In the first dataset, Indonesian corruption, CPI(i), increases consumer product exports and intermediate goods imports. However, the second dataset negatively affects capital goods trade and positively affects raw material imports. CPI(j) negatively affects various imports in the first dataset, while the second dataset has mixed effects. COC(i) is only significant and negative for capital goods imports, whereas COC(j) shows positive significance in different trade categories. Higher corruption in Indonesia reduces capital goods trade.

Policymakers should prioritize anti-corruption efforts, such as implementing and enforcing anti-corruption laws and regulations. Strengthening institutional mechanisms to combat corruption is crucial. To protect Indonesia's trade interests, it is essential to monitor the corruption levels of trading partners. Trade policies and agreements should include clauses that address corruption and ensure that trading partners adhere to anti-corruption standards. This policy can help mitigate the negative effects of corruption on trade. Moreover, given that shared borders do not significantly impact trade, Indonesia should explore diversifying its trade partners beyond neighboring countries. Expanding trade relations with nations with more robust governance and lower corruption levels can be a strategic move to mitigate the adverse effects of corruption on trade.

Future research should consider additional variables like Indonesia's rule of law, democracy, and institutional qualities to understand corruption's impact on trade better. Further investigation with more variables is needed to effectively assess corruption's influence on commodities. Gathering more data and conducting comprehensive studies can provide a solid foundation for evidence-based policymaking.

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