DOES CORRUPTION IMPEDE INTERNATIONAL TRADE? AN EMPIRICAL ANALYSIS OF EIGHT ASIAN COUNTRIES

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ABSTRACT*: The purpose of this study is to investigate the causality (long-run relationship) between corruption and trade openness. The authors have used the sample of eight Asian countries namely Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Sri-Lanka, and Thailand from 1990 to 2017. This study has used the Dynamic Fixed Effect (DFE) Model, based on Hausman Test results. Furthermore, for the robustness, Authors have used a technique developed by Lučić et al., [17]. The estimated results have confirmed that there is no long-run causality (equilibrium) between corruption and trade openness, but short-run coefficients are significant meaning that there is short-run causality between corruption and trade openness. Based on the estimated result this study provides a policy suggestion to the policymakers of these eight countries that the current corruption level has a significant influence on the foreign investors. The legal system related to international trade of these countries should be corruption-free to attract more foreign investors.*

Key Words. Corruption, trade openness, causality, Dynamic Fixed Effect, and International Monetary Fund

1. INTRODUCTION

Identifications of trade openness in developed countries and their growth rate confirms that liberalized countries show higher economic growth. Based on that, less developed countries tried to adjust their policies to promote international trade for a higher growth rate. But to make trade policies "frictionless" is always a challenge for developing countries [1]. A plausible explanation was provided by United Nations [2] that there are strong barriers such as corruption that are significantly highlighted as a cause hindering international trade in developing countries. To make developing countries free from corruption United Nations presented UN Convention against Corruption. UN passed a legal document to promote anti-corruption policies.

On the other hand, it has been observed that corruption in the government sector is the main reason for its adverse impact on the well-being of society and institutional quality itself [3]. Moreover, International Monetary Fund and The World Bank have argued that corruption is one of the determinants that cause poor performance of institutions and cause a great obstacle to socio-economic development.

Although corruption unethical and immoral act and is counted as a crime, its negative effects on economic activities have received special attention among economists [4]. Because of the high demand for corruption data various organizations are actively engaged in public corruption data. But, corruption by nature taken place hiddenly, and measuring the actual quantity of corrupt activities is not possible. Due to that, these organizations provide the corruption data in the perception form [5].

In the beginning Transparency International (TI) provides corruption perception index (CPI) from 45 countries in 1995 and 2021 they have published for 180 countries. This study is also using corruption perception data for eight Asia countries namely Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Sri-Lanka, and Thailand from 1990 to 2017.

2. LITERATURE REVIEW

In the literature, corruption has several definitions. The most common definition that is used in previous studies is "a misuse of public offices for private benefit " which was proposed by Transparency International. Although, corrupt act differs from one country to another depending on the economic, political and social environment. On the other hand, researchers are not on one page to admit the impacts of corruption on economic activities [5]. The one school of thought believes in the *"grease in the wheel"* approach, in which they argue that corruption has a positive impact on economic activities because corruption ack a greasing the bureaucrats to perform well, and it investors argue that corruption help in facilitating international trade [6, 7].

The second school of thought believes that corruption is like *"sand in the wheel"* of economic activities, in which they argue that corruption has a negative impact on economic activities through inducing costs and inefficiencies [8, 9, 10]. The most common argument in this school of thought is that the poor quality of institutions negatively affects the level of inclusive development of the country [11,12].

There is numerous empirical evidence confirming the corruption-trade openness nexus as the *"sand in the wheel"* approach, by considering both exports and imports in this literature. The most highlighted channel for corruption and international trade is when there is the poor quality of institutions, which refers to low quality of customs services. Tt causes a longer waiting time, due to that country will face fewer imports [13]. On the other side, there is various empirical evidence which argues that longer waiting time discourages exporters as well [14]. The second channel highlight in the *"sand in the wheel"* approach is that the impact of corruption on trade openness depends on the nature of bribes. For instance, if the bribes paid to the government officials were unknown for traders, it has more damage to international trade because it causes uncertainty for trades. However, when bribes are known and predictable in advance have less damage to international trade [15].

Hence, researchers are not on the same page to explain the relationship between corruption and trade openness. Both schools of thought, the *"grease in the wheel"* and *"sand in the wheel"* approaches have theoretical as well as empirical evidence. So, to confirm whether this study will support the *"grease in the wheel"* or *"sand in the wheel"* approach next section discusses the methodology to estimate the relationship between corruption and trade openness for eight Asian countries from 1990 to 2017.

3. RESEARCH METHODOLOGY

Applying the Ordinary Least Square (OLS) or Vector Autoregressive (VAR) method on non-stationary data will give us spurious results, meaning that for instance the results of regression will show a significant relationship between the variables but in reality, they are uncorrelated. Due to that Kao [16] introduced the cointegration test for panel data by using both DF and ADF tests. His test is similar to the

standard approach used in Engler-Granger. Hence this test starts with the regression of the panel model is highlighted in equation (1)

$$IT_{it} = \alpha_{it} CPI_{it} + \varepsilon_{it} \quad (1)$$

In the equation IT stands for international trade and CPI stands for corruption perception index and above the dependent and independent variables are assumed to be non-stationary.

$$\hat{\varepsilon_{it}} = p\hat{\varepsilon_{it}} + u_{it} \quad (2)$$

When we rearrange equation (1) that we will get equation (3) as stated below.

$$\hat{\varepsilon_{it}} = (IT_{it} - \hat{\alpha_{it}} CPI_{it}) \quad (3)$$

Where $\hat{\varepsilon_{it}}$ is the estimated residuals from (4.47). The null hypothesis is Ho: p = 1 meaning that dependent and independent variables are not cointegrated with each other. The alternative hypothesis is Ha: p < 1 meaning that dependent and independent variables are cointegrated with each other. Kao (1999) developed the Dickey-Fuller type as well as Augmented Dickey-Fuller test statistics to check the cointegration in the panel. The Dickey-Fuller type (4 Type) test statistics and Augmented Dickey-Fuller.

An Autoregressive Distributed lags (ARDL) Model is actually based on the ordinary least square (OLS) model and it is applicable for stationary, non-stationary, and mixed order of integration. Through a simple linear transformation, we can construct dynamic Vector Error Correction Models (VECM) from the Autoregressive Distributed Lags (ARDL) Model. Such as, VECM integrates the short-run dynamics including the equilibrium of the long run, by excluding the problem of spurious results, which occur due to non-stationary data. To understand more about the ARDL model, mathematically we can construct a simple model as stated below.

$$IT_{it} = \alpha + \beta CPI_{it} + e_t \quad (4)$$

We can develop the error correction version of Autoregressive Distributed lags (ARDL) as stated below.

$$\Delta IT_t = \alpha_0 + \sum_{i-1}^{p} \beta_i \, \Delta IT_{t-i} + \sum_{i-1}^{p} \gamma_i \, \Delta CPI_{t-i} + \lambda_1 IT_{t-1} + \lambda_2 CPI_{t-1} + \mu_t \quad (5)$$

In the equation above, the first part with β and γ are explaining the short-run dynamics of the model, and the next part with $\lambda 1$ and $\lambda 2$ are representing the long-run relationship. The null hypothesis of the ARDL model is that there is no long-run relationship, meaning that $\lambda 1+\lambda 2 = 0$. Similarly, the alternative hypothesis is that there is a long-run relationship meaning that the sum of λs is no equals to zero ($\lambda 1+\lambda 2 \neq 0$). This study will use the Dynamic Fixed Effect (DFE) version of ARDL in which the estimator restricts all the coefficients of slope and assume that these are equal across countries but on the other hand, DFE allows for the difference in intercepts of the countries.

For the robustness, this study is using the causality technique used by [17] in which they estimated the causality between corruption and economic growth based on theoretical support, meaning that they assumed that as corruption increases economic growth should decrease, and when corruption decrease economic growth must increase and later on, that correlation was counted as true otherwise false. In the end, they calculate how many trues are there over the period of time. Higher the true value will confirm that causality between them. Similarly, This research will include International Trade instead because it has been confirmed through previous empirical studies that corruption also has an adverse impact on international trade.

(1, 1) If Corruption decreases and International Trade increases will be marked true (T)

(-1, -1) If Corruption increases and International Trade decreases, will be marked true (T)

(1, -1) If Corruption decreases and International Trade decreases, will be marked false (F)

(-1, 1) If Corruption increases and International Trade increase will be marked false (F)

Each lag will be denoted as stated below:

$CPI(t)$ Denotes change in Corruption in year t

$CPI(t+n)$ Denotes change in Corruption n years after year t

$IT(t)$ Denotes change in International Trade in year t

$IT(t+n)$ Denotes change in International Trade n years after year t

Where n = 1, 2, 3 . . . 28

So, the following will be possible outcomes:

$CPI(t+n) * IT(t) = 1$ [True (T)]

$CPI(t+n) * IT(t) = -1$ [False (F)]

4. ESTIMATED RESULTS

The main objective of this study is to find the long-run relationship between corruption and international trade. To achieve this objective, it's mandatory to start from the stationary and this study has used several panel unit root tests namely Levin-Lin-chu Unit-Root test Fisher-Type Unit-Root test, Hadri LM Unit-Root test, Harris-Tzavalis Unit-Root test, Breitung Unit-Root test, and Im-Pesaran-Shin Unit-Root test. The results of these unit root tests are displayed in table.1. The results are mixed because some unit root tests are have confirmed that corruption is non-stationary (namely the Hadri LM Unit-Root test and Breitung Unit-Root test) but others are confirming the opposite. Similar results for trade openness such as the Fisher-Type Unit-Root test is confirming that trade openness is stationary at I(0) but the remaining are confirming opposite of it.

Table.1: Unit Root results of corruption and Trade openness

		Corruption		Trade	Openness
Unit root tests		p_value	Results	p_value	Results
Levin-Lin-chu Unit-Root test	Adjusted t*	0.0016	Stationary	0.2091	Unit Roots
Fisher-Type Unit-Root test	Inverse chi-squared (16)	0.0000	Stationary	0.0024	Stationary
	Inverse normal	0.0000	Stationary	0.0003	Stationary
	Inverse Logit t (44)	0.0000	Stationary	0.0008	Stationary

	Modified Inv.Chi2	0.0000	Stationary	0.0001	Stationary
Hadri LM Unit-Root test	Z	0.0000	Unit Roots	0.0000	Unit Roots
Harris-Tzavalis Unit-Root test	rho	0.0000	Stationary	0.7804	Unit Roots
Breitung Unit-Root test	Lamda*	0.5494	Unit Roots	0.6259	Unit Roots
Im-Pesaran-Shin Unit-Root test	z-t-tilde-bar	0.0000	Stationary	0.7398	Unit Roots

Note: null hypothesis of Levin-Lin-chu Unit-Root test, Fisher-Type Unit-Root test, Hadri LM Unit-Root test, Breitung Unit-Root test, and Im-Pesaran-Shin Unit-Root test is "Panel contains unit roots". And null hypothesis of the Harris-Tzavalis Unit-Root test is "All panels are stationary".

After confirming the stationarity the second step is to check the cointegration between corruption and international trade. It will help to confirm that whether these variables are moving together in the long run or not. It will also confirm the long-run equilibrium (convergence) between them.

To achieve this objective the first step was to find the appropriate lags to do so the maximum two lags were taken as shown in table.2. This study has followed the Newey-West and Augmented AIC lag section criteria. Where both tests have suggested a round of lag one and moreover, for cointegration all the results of Kao Panel cointegration tests are insignificant as shown in the last corner. Hence, there is no long-run causality (and no long-run equilibrium) between corruption and international trade.

Table.2: Kao Panel-Data Cointegration Test for Corruption and Trade Openness

Variables	**Tests**	**Lags**			**Statistics**
		Maximum lags imposed	**Newey-West**	**Augmented (AIC)**	
Corruption - International Trade	Modified Dickey-Fuller	2	0.88	1	0.2715
	Dickey-Fuller				-0.9079
	Augmented Dickey-Fuller				-0.7526
	Unadjusted Modified Dickey-Fuller				0.2009
	Unadjusted Dickey-Fuller				-0.9599

Note: *** indicates Probability value < 0.01, ** indicates Probability value < 0.05, and * indicates Probability value < 0.1. The null hypothesis of Kao Panel-Data Cointegration is "there is no cointegration". AIC stands for Akaike's information criterion.

After confirming the cointegration between corruption and international trade the next step is to find the appropriate model to find the causal relationship. To achieve this objective Hausman Test is a commonly recommended technique. Through this test, first, it can be confirmed that Pooled Mean Group (PMG) is an appropriate model or Mean Group (MG) as shown in the second column of the table.3 that PMG is an appropriate model.

But when it was cross-checked Dynamic Fixed Effect (DFE) model with PMG, it confirmed that DFE will be the appropriate model. Hence, this study will apply DFE to check the causal relationship between corruption and international trade.

Table.3: Selection among Pooled Mean Group (PMG), Mean Group (MG), and Dynamic Fixed Effect (DFE) by using Hausman Test

Dependent variables	Hausman Results		PMG vs. MG	Hausman Results		PMG vs. DFE
International Trade	chi2(1)	3.64	PMG	chi2(1)	10.26	DFE
	Prob>chi2	0.055		Prob>chi2	0.0014	

Note that the null hypothesis of the Hausman test is that "the gap in coefficients is not systematic," so if the null hypothesis is accepted, Pooled Mean Group (PMG) is the best solution.

Table.4 depicts the estimated results of the Dynamic Fixed Effect (DFE) model, where the first column shows the explanatory variables. The second column shows the coefficient of long-run causality which shows the insignificant result because the probability value is more than 10 percent. It also confirms the results of the Kao Panel cointegration test. The third column depicts the short-run coefficients, in which the error correction variable explains the combined effects of lag values of international trade and corruption and its lag. It shows significant results with a p-value of less than 1 percent. Moreover, corruption is also showing statistically significant results meaning that there is short-run causality run from corruption to international trade. Although the coefficient of corruption is positive it reflects a negative impact because by definition higher value of the corruption perception index reflects less corruption in

a country and a lower value of the corruption perception index reflects more corruption.

Table.4: Dynamic Fixed Effect (DFE) results of Corruption and International Trade

VARIABLES	Long-Run Coefficient	Short-Run coefficients
Error Correction		-0.00140***
		(0.000387)
D. Corruption		0.00228*
		(0.0205)
L_Corruption	-15.39	
	(13.48)	
Constant		0.121***
		(0.0325)
Observations	216.	216.

Note: Standard errors are in parentheses and *** indicates probability value < 0.01, ** indicate probability value < 0.05, and * indicate probability value < 0.1.

To confirm that whether there is short-run causality between corruption and international trade or not. This study is using a technique used by Lucic (2016). The results are highlighted in the table.5 GroupWise and the yearly result has been shown in figure.1. The results show that true values are fluctuating over the period of time graph clearly shows there is no convergence hence there is no long-run causality but higher true values are confirming the results of the DFE model that there is short-run causality running from corruption to international trade.

Table.5: Impact of corruption on International Trade, group-wise display

$COR(t) * ITt(n-n)$	Number of (T) Combinations	Percentage (%)
$COR(t) * ITt(1-4)$	107.5	14.2
$COR(t) * ITt(5-8)$	115.3	15.2
$COR(t) * ITt(9-12)$	112.0	14.8
$COR(t) * ITt(13-16)$	114.3	15.1
$COR(t) * ITt(17-20)$	119.3	15.8
$COR(t) * ITt(21-24)$	115.3	15.2
$COR(t) * ITt(25-27)$	97.0	9.6

Source: Authors' Calculation

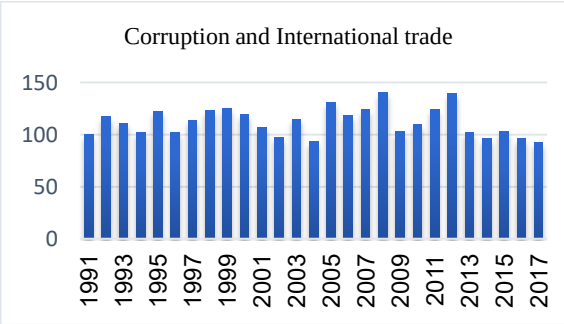

Figure 5.1: Number of True Values showing the negative relationship of corruption on International Trade

5. CONCLUSIONS

This study is an attempt to find the long-run relationship between corruption and trade openness. To achieve this objective this study has used the sample of eight Asian countries namely Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Sri-Lanka, and Thailand from 1990 to 2017. Based on pre estimation techniques it has been confirmed that Dynamic Fixed Effect (DFE) Model will be an appropriate model for this study. The estimated results have confirmed that there is no long-run causality between corruption and international trade, but there is short-run causality running from corruption to international trade. Furthermore, for robustness, this has used a technique developed by [17]. Based on the estimated result this study has supported the *"Sand in the wheel"* approach meaning that corruption has a negative influence on international trade. Moreover, this study provides a policy suggestion to the policymakers of these eight countries that if they want to promote international trade and want to encourage foreign investors to participate more in trade, then the legal system related to international trade of these countries should be corruption-free.

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