Exploring the Trade Facilitation Role of Regional Trade Agreements (RTAs): A Comparison of BRICS and the Next Eleven Economies

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Abstract

Regional trade integration plays a pivotal role in enhancing bilateral trade between member countries. The present study assesses the trade facilitating role of regional trade agreements (RTAs) of BRICS and the Next Eleven (N-11) economies using annual bilateral trade over the period 2000–2019. For empirical estimation, we applied structural gravity with Poisson pseudo maximum likelihood estimator. The findings show higher effect of the RTAs for imports compared to exports for both BRICS and the N-11 countries. While the RTAs of BRICS countries mostly facilitate exports of metals, chemical products, plastic and rubber; the RTAs' role is more pronounced for the exports of animal products, cereals, fruits, vegetable, in addition to labor intensive industries such as textile, footwear, and leather in the N-11 economies. Furthermore, the findings show that the adjustment in the exporting process in response the entry of an FTA is affected by the governance quality prevailing in the source country. In this context, Bangladesh, Egypt, Iran, Nigeria, and Pakistan particularly need to improve governance quality to spur their export performance.

Introduction

The term BRIC was coined by the Goldman Sachs Group for the four countries that would reshape the world economy– Brazil, Russia, India and China (Sachs, 2001). Later, South Africa was included in the bloc in 2010. Since its inception the BRICS countries are considered as a bloc of emerging economies which have a substantial potential to affect the world economy. Similarly, the Next Eleven (N-11) economies were chosen based on their future potential (O'Neill, Wilson, Purushothaman, & Stupnytska, 2005). The N-11 comprised a mixed bag: South Korea, Mexico, Indonesia, Turkey, Iran, Egypt, Nigeria, the Philippines, Pakistan, Bangladesh, and Vietnam. These countries have extremely diverse economic and social conditions, and very different levels of wealth. Given the size of its output, the N-11's growth is contributing significantly to the world economy, alongside the primary drivers of China and India. Figure 1 below shows the location and relative exports on the BRICS and N-11 countries.

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Due to their relevance in the global economy, there are several studies analyzing one or the other aspect to compare these two groups of countries. For instance, the impact of global integration measured as foreign direct investment and share of trade as percentage of GDP) on economic growth of BRICS is higher compared to the N-11 economies (Choudhry, Marelli, & Signorelli, 2020). The N-11 countries have a significant growth potential, but still there are factors that could hamper them from following the BRICS growth path. Although, the N-11 is implausible to rival the BRICS as a grouping in scale, N-11 GDP could reach two-thirds the size of the G7 by 2050 (ALOnaizi & Gadhoum, 2017). The N-11 may attain a triple-digit growth emerging in the technology sector (Lawson, Heacock, & Stupnytska, 2007). Thus, N-11 may be one such group of nations having the right potential to excel and grow exponentially in the coming decades. Hence, the next 11 countries may be sturdily recognized as a group of nations that may succeed the BRICS for a momentous growth route (Rancic & Jakovljevic, 2016).
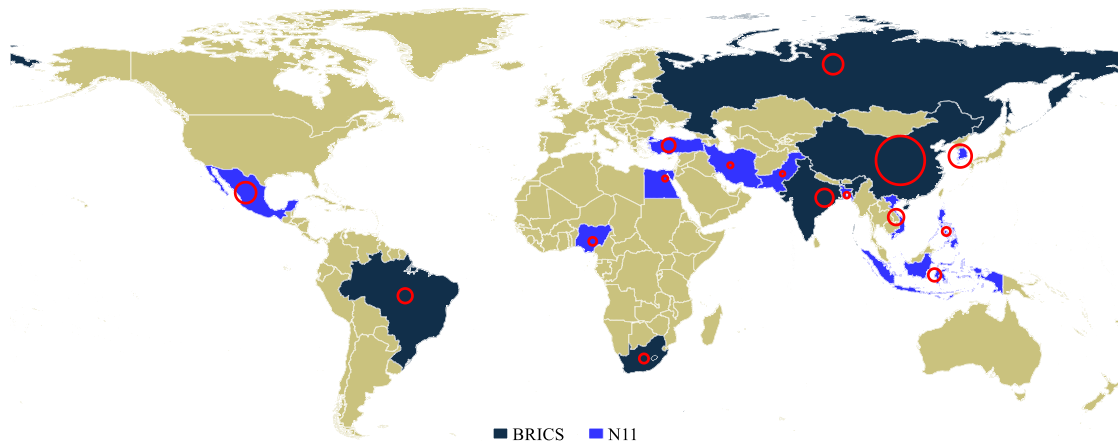

Figure 1- BRICS and the Next Eleven economies

While the exports of the five BRICS members are almost double compared to the eleven countries, commonly named as the Next Eleven economies. Nevertheless, the composition of their trade is dramatically similar, as presented in Table 1. However, the export growth of the N-11 economies is not at all par with the BRICS countries. As shown by Figure 2, the aggregate exports of BRICS countries were smaller than the N-11 economies before 2000. However, the BRICS exports grew exponentially over the last two decades. Although the exports of other BRICS members increased significantly, however, the major contribution in this regard is from China. On the other side, the exports of the N-11 countries increased with a slower rate.

Tariff reduction, as a result of a trade agreement, lowers barriers to trade and enhances circulation of capital, labor, and migration. Consequently, it deepens economic integration among member countries (Kahouli & Maktouf, 2015). Therefore, trade agreements have become a crucial component of the contemporary global economy in terms of trade creation (De Silva & Lee, 2018).

Table 1: Trade of BRICS and N-11 across major industrial sectors

Products	BRICS Exports		BRICS Imports		N-11 Exports		N-11 Imports	
	Value	Share	Value	Share	Value	Share	Value	Share
Animals	50.7	1.4	52.9	1.8	15.9	1.3	23.0	1.8
Vegetables	105.5	3.0	108.5	3.7	52.4	4.2	46.7	3.6
Food products	68.6	1.9	46.0	1.6	30.2	2.4	35.7	2.7
Minerals	55.4	1.6	182.7	6.2	12.1	1.0	22.1	1.7
Fuel	352.3	9.9	539.8	18.3	89.8	7.2	236.6	18.1
Chemicals	213.8	6.0	285.2	9.7	71.7	5.7	113.0	8.7
Plastic and rubber	129.7	3.6	131.5	4.5	69.1	5.5	65.3	5.0
Leather	40.1	1.1	11.4	0.4	8.1	0.6	8.0	0.6
Wood	71.2	2.0	64.4	2.2	23.4	1.9	23.8	1.8
Textiles	301.9	8.5	58.8	2.0	108.1	8.7	62.1	4.8
Footwear	68.6	1.9	11.7	0.4	26.4	2.1	7.2	0.5
Stone and glass	155.1	4.4	140.1	4.8	30.5	2.4	32.7	2.5
Metals	271.6	7.6	159.8	5.4	98.3	7.9	123.8	9.5
Machinery and electronics	1160.8	32.6	816.7	27.7	422.9	33.8	377.1	28.9
Transport	169.1	4.8	170.5	5.8	129.3	10.4	67.1	5.1
Miscellaneous	342.5	9.6	166.2	5.6	61.2	4.9	61.3	4.7

Note: Values are given in billion US$. Shares are calculated as percentage share of each product out of the total exports (imports) of the country group i.e., BRICS and N-11. Source: UN Comtrade. The stated product groups are standard tariff groups in the Harmonized System of Product Classification of the World Custom Organization.

There is a body of literature related to the impact of RTAs on trade, however, the findings are rather inconclusive. Most of the studies such as Jean and Bureau (2016) and Freeman and Pienknagura (2019) support the trade facilitation role of the trade agreements. The impact of RTAs can be across both intensive and extensive margin (Foster, Poeschl, & Stehrer, 2011). However, the impact may be dependent on the depth of the agreement. Nevertheless, other studies find that the trade creating effect of most existing FTAs are fragile.
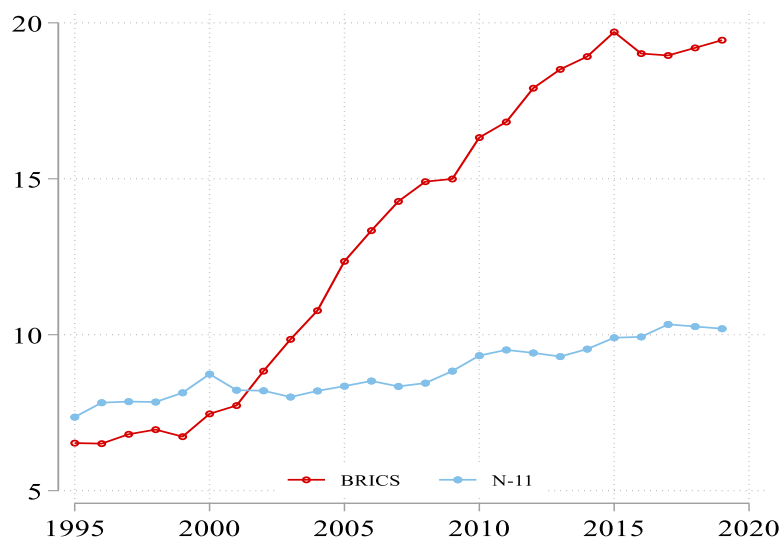

Figure 2 - World exports (percent shares) of BRICS and the N11 economies

Therefore, the objective of the current study is to examine the role of RTAs on bilateral trade across various industries to provide deeper and industry-specific policy insights. Furthermore, the institutional quality prevailing in a country affects the exporting process and the ability of exporting firms to redesign their process and product attributes specific to the destination market. Therefore, institutional quality has an impact on the ability of exporting countries to reap benefits accruing from the implementation of the FTA, as a good governance, reduces transaction. While earlier studies investigate the role of governance quality on exports, however, the role of governance on the effectiveness of RTAs is not yet clear. In this regard, this study particularly looks into the role of institutional quality for the effectiveness of RTAs of these countries. This is the first study to compare the impact of regional trade agreements on trade of BRICS and the N-11 economies using structural gravity for annual trade data over the period 2000-2019[2]. The main contribution of the study is that while the RTAs play trade a facilitating role, their impact is more pronounced for imports as compared to exports. Second, the governance quality of the exporting country augments the effectiveness of the RTAs. Furthermore, the N-11 countries are mired into the exports of low value-added produced related to agriculture sectors, or labor-intensive light manufacturing. Therefore, these countries need to constitute a prudent trade integration policy to foster their export growth rate.

The remainder of this paper is organized as follows. Literature related to regional trade agreements and governance quality is outlined in the following section. Estimation method and data sources are described in Section 3, followed by results in Section 4. Section 5 concludes the study.

Review of Literature

The current study divides the prior literature into two main streams relating to the main theme of the paper. Firstly, we discuss the literature documenting the relationship between trade agreements and trade flows. Secondly, we discuss the role of governance or institutional quality in fostering the trade relations among member countries.

Trade Agreements and Trade Flows

The systemic and critical literature review of prior studies reveals the interesting yet controversial findings about the effect of the bilateral or multilateral effects of trade agreements (TAs) on international trade patterns and facilitation. A number of researchers have documented a positive impact of free trade agreements among countries on bilateral trade and trade creation (Baier & Bergstrand, 2002; Jagdambe & Kannan, 2020). Free trade agreements have a significant impact on global chain and trade flows (Yao, Yasmeen, Li, Hafeez, & Padda, 2019). Moreover, regional trade agreements (RTAs) are considered to promote bilateral trade flows among member countries (Kahouli, 2016). Rahman (2016) examined the role of World Trade Agreement (WTO) in enhancing merchandise trade in BRICS economies. They found that WTO membership does not affect the total merchandise trade of BRICS countries. Jabalameli and Rasoulinezhad (2018) analyzed and compared the trade patterns of BRICS countries with their each trading partner based on UN five regional groups. They found the mixed evidence about trade flows among each BRICS economy with these

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[2] Trade data for 2020 and 2021 is available for most of these countries. However, trade flows have been affected due to the Covid-19 pandemic to various degrees across these countries. To avoid any of such effects, we restricted our sample for the period 2000-2019.

five regional groups; their findings showed that China is more affected by the greater pace of globalization than other BRICS countries who have experienced regionalization. Moreover, Navarrete and Tatlonghari (2018) developed the modified gravity model to assess the effect of economic partnership agreement (JPEPA), along with ASEAN agreement, on the exports of Philippines to Japan. They showed that the declining import tariff rates imposed by Japanese government on Philippines promoted the Philippines's export to Japan. Moreover, ASEAN trade agreement had a positive impact on bilateral trade between the two countries. Based on gravity analysis, Baniya, Rocha, and Ruta (2020) verified the positive effect of Belt and Road Initiative (BRI) on trade flows among participating economics. BRI initiative has three times more effect on trade gains in those countries which focused on infrastructure development, have products with time-sensitive inputs and countries exposed to global value-chin integration and upgraded infrastructure.

Campi and Dueñas (2019) explored the role of trade agreements, with and without the provisions of intellectual property (IP) rights, in affecting the trade flows between countries. Their panel data estimation based on dynamic gravity model disclosed the positive effect of trade agreements on bilateral trade between the selected countries, but TAs with no IP provisions have a stronger impact on trade than TAs with IP chapter. However, the lag effects of TAs with IP chapter has a significant effect on bilateral trade in the long-run. On the other hand, Osabuohien, Efobi, Odebiyi, Fayomi, and Salami (2019) analyzed the impact of regional economic integration, along with other determining factors, on bilateral trade among West African countries, based on gravity model estimation. Their findings revealed that regional economic integration and multilateral trade restrictions determine the intra-regional trade among these countries. However, another set of studies fail to provide evidence about the beneficial role of free trade or regional agreements on trade flows. For instance, Akhter and Ghani (2010) found that SAARC countries under different trade integration agreements reduce the trade flows among member and non-member countries. These findings suggest that the design, structure and effectiveness of these RTAs is also important for promoting bilateral trade agreements rather than merely signing these contracts. Similarly, Afesorgbor (2019) finds little evidence about the positive impact of regional trade integration on bilateral trade; trade flows in this case are more influenced by bilateral diplomatic relations as compared to TRAs. On the other, technical trade barriers (TBT) imposed by World Bank adversely affected imports from WTO member countries in case of Pakistan (Mustafa, Padda, & Safdar, 2020). In a similar fashion, Mustafa, Mukhtar, Padda, and Safdar (2020) found that Sanitary and Phytosanitary Agreement (SPS)and technical Barriers to Trade (TBT) impede imports of South Asia and these measures could be used to improve trade deficits of South Asian countries. The controversial evidence about TAs on trade flows could also be associated with traditional gravity models, which ignore sample heterogeneity and other model specification problems (Stack, 2009). Therefore, Dadakas, Ghazvini Kor, and Fargher (2020) recommend the application of the new and robust specification models such as pseudo-Poisson maximum likelihood estimators (PPML), which controls for zero trade flows, multilateral resistance and heteroscedasticity.

Mugwe (2022) investigated into the effect of African Continental Free Trade Area (AfCFTA) which is in the process of implementation. The study found that most countries are yet to implement it effectively. In this regard, the importance of the integration of Information and communication

technology is emphasized. Similarly, Hayakawa and Imai (2022) examined the role of RTAs in trade facilitation while looking for any adverse impact on trade in essential medical products during the COVID pandemic. Their findings showed that onset of the pandemic had hurt exports of these goods. This adverse effect is found to be lowered for economies engaged in RTAs. In the same context, Sun Luo and Zhou (2022) analysed the impact of RTAs on the quality of Chinese exports. They found that RTAs' clause quantity measured by clause coverage rate generate "spaghetti bowl" effect. However, the clause quality measured by law commitment rate can significantly promote export quality for Chinese manufacturers. Based on literature review, the current study hypothesizes that:

H_1: *Regional Trade Agreements (RTAs) have a significant positive impact on bilateral trade.*

Institutional Quality and Trade Flows

The empirical findings of some studies also found conflicting evidence about the effect of economic integration agreements on international trade flows. Kohl (2014) argues that institutional quality could be one of the pertinent factors affecting bilateral trade. The quality of formal institutions may reduce the transaction costs among trading countries by improving the business practices and trading environment (De Groot, Linders, Rietveld, & Subramanian, 2004). Some researchers empirically showed that institutional quality could play a significant role in affecting the trade patterns in the world. Bojnec, Fertő, and Fogarasi (2014) reported the positive effect of institutional quality on agro-food exports of BRICS countries. The similar results were confirmed by Florensa, Márquez-Ramos, and Recalde (2015) in case of Latin American countries. Bilgin, Gozgor, and Lau (2017) scrutinized the role of corporate governance and institutional quality on exports of 166 countries using the gravity model. Their empirical results unveiled that stronger democratic intuitions and more rule-based corporate governance mechanism enhance the exporting performance of the selected countries. On the other hand, the inflexible labor regulations and higher shareholder protection reduce the volume of exports between these countries. In a similar vein, Álvarez, Barbero, Rodríguez-Pose, and Zofío (2018) examined the effect of institutional quality on bilateral trade patterns of 186 countries by applying the gravity model based upon pseudo-Poisson maximum likelihood estimation. Their findings indicated that institutional difference between exporting and importing countries and level of institutional quality in destination country significantly influence trade flows between the countries. Lin, Flachsbarth, and von Cramon-Taubadel (2020) empirically analyzed the effect of intuitional quality (using World Governance Indicators (WG)I)) on bilateral trade of countries involved in the trade of coconut products. Based on structural gravity model, they found the mixed evidence for the selected indicators of WGI; the government effectiveness and corruption control increase trade of value-added products but the voice and accountability reduces the bilateral trade. Similarly, Alhassan and Payaslioglu (2020) tested the effect of economic and political institutions on bilateral trade flows of low-income and emerging African economies. Their finding revealed that the impact of these institutions vary across income groups and this effect is more prominent in emerging economies. However, economic institutions have greater influence on bilateral trade in low-income countries than emerging countries. Khorana and Martínez-Zarzoso (2020) also documented the positive effect of country governance on exports of commonwealth countries (CW). Moreover, the trade among CW countries with regional trade agreements experience a higher growth in exports (three time higher)

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than the trade with the rest of the world.

Several research studies at individual country-level have also proved the positive role of institutional quality on trade flows. Hasiner and Yu (2018) documented that better institutional quality of exporting countries increases the Chinese meet imports. Similarly, Bekele and Mersha (2019) empirically tested the determinants of Ethiopian coffee exports by deploying the dynamic gravity model. Their findings revealed that the institutional quality is a significant factor in enhancing export while GDP of imported countries and weighted distance showed the positive and negative effects on exports, respectively, as depicted by gravity model. In a recent study, Yusuf, Afolabi, Shittu, Gold, and Muhammad (2021) analyzed the effect of governance indicators on bilateral trade flows between Malaysia and selected African OIC countries. Their empirical outcomes revealed that the poor institutional quality in African countries adversely affect the bilateral trade flows among OIC member countries in Africa. Based on previous literature, it is concluded that institutional quality has a moderating role between RTAs and bilateral trade among member countries. Therefore, we hypothesize that:

H_2: Institutional quality (Governance) positively moderates the relationship between regional trade agreements (RTAs) and bilateral trade.

Methodology

Model construction

Gravity model has been main workhorse for empirical trade analysis. Analogical to the Newtonian law of gravitation, Tinbergen (1962) and Ravenstein (1885) pioneered the gravity trade model as bilateral trade is directly proportional to economic masses of trading partners and inversely proportional to the distance between them. In addition to GDP and distance, later studies augmented the model using commonality of border and language as well as other variables. While these models were empirical estimation, they lacked the theoretical foundation. Anderson (1979) presented a theoretical gravity trade model based on elasticity of substitution by origin and constant elasticity of substitution expenditures. Later, Armington-CES approach of Anderson and Van Wincoop (2003) became the benchmark for the current gravity trade analysis. With respect to the trade cost, the model is based on two multilateral resistance terms: the outward multilateral resistance to captures the resistance faced by exports from origin i to destination j relative to other destinations; and the inwards multilateral resistance to captures the resistance faced by destination *j* importing from origin *i* relative to other origins of exports.

As a starting point, we estimate the following model based on the traditional variables. To capture economic mass, we include annual GDPs of the exporting and importing countries. Similarly, the country-pair variables such as bilateral distance, existence of a common official language and shared border also included. Our econometric model based on the traditional approach is specified in Eq. 1. Nevertheless, the estimation approach with traditional variable does not account for various sources of unobserved heterogeneity. More recently, trade analysis is carried out using the structural gravity approach (Anderson & Yotov, 2020; Freeman & Pienknagura, 2019; Heid, Larch, & Yotov, 2021; Oberhofer & Pfaffermayr, 2021). A comprehensive account on how to model trade agreements

in the gravity equation is explained by Yotov, Piermartini, and Larch (2016). In this approach, exporter-specific time-variant variables e.g GDP_{it} is absorbed by exporter-time fixed effects, importer-specific time-variant variables e.g., GDP_{jt} is absorbed by exporter-time fixed effects; whereas country-pair specific time-invariant variable such as bilateral distance, language commonality and contiguity are absorbed by the country-pair fixed effects. In this way, we can find more rigorous estimation for the variables related to the WTO membership and the FTAs as these are country-pair specific and time-variant in nature. Following the structural gravity approach, we specified the structural gravity model as given in Eq. 2, where α_{it}, β_{jt}, and γ_{ij} respectively denote exporter-time, importer-time, and country-pair fixed effects.

$$\begin{aligned} \text{Trade}_{ijt} = \exp[\alpha_i + \beta_j + \gamma_t + \delta_1\ln(GDP_{it}) + \delta_2\ln(GDP_{jt}) + \delta_3\ln(\text{Distance}_{ij}) \\ + \delta_4\text{Language}_{ij} + \delta_5\text{Contiguity}_{ij} + \delta_6WTO_{ijt} + \delta_7RTA_{ijt}] \, \varepsilon_{ijt} \end{aligned} \tag{1}$$

$$\text{Trade}_{ijt} = \exp[\alpha_{it} + \beta_{jt} + \gamma_{ij} + \delta_6WTO_{ijt} + \delta_7RTA_{ijt}] \, \varepsilon_{ijt} \tag{2}$$

We analyze both exports and imports of the BRICS and the Next Eleven economies. The dependent variable is exports (imports) in US dollars of an origin i to a destination j during year t. Note that the variable is taken in levels which allows inclusion of the cases of zero exports (imports) between the country-pairs. Log-transformed values of the gross domestic product of exporter and importer measured in US dollars are denoted by $\ln GDP_{it}$ and $\ln GDP_{it}$, respectively. $\ln \text{Distance}_{ij}$ captures the bilateral distance in kilometers between country-pairs whereas Language and Contiguity are dummies to record language commonality and shared border. Similarly, the variable WTO_{ijt} takes value 1 in case both exporter and importer are the members of the World Trade Organization; and 0 otherwise. Finally, WTO_{ijt} denotes the existence of a regional trade agreement between a country-pair. Furthermore, to account for trade evolution over time, we included fixed effects for exporting countries, importing countries, and years respectively denoted by α_i, β_j, and γ_t.

Next, we incorporate the element of governance level in to the scenario. Martínez-Zarzoso and Márquez-Ramos (2019) present a framework to illustrate the relation between governance quality and exporting process. Instead of the impact of governance quality on the volume of bilateral exports, we analyze how the effectiveness of an RTA is affected by the governance conditions. In response to a policy change such as the implementation of an RTA, any variation in trade flows occurs as firms make adjustments such as construction of marketing channels in the destination market where sales are expected to expand, training, product redesigning to meet local tastes etc. The adjustment costs (both fixed and variable), information costs, and transaction costs related to the RTA process are affected by governance quality. Country level data was first constructed by Kaufmann, Kraay, and Mastruzzi (2007) in the form of six indicators; Control of Corruption, Government Effectiveness, Political Stability, Regularity Quality, Rule of Law, and Voice and Accountability[3]. Based on these indicators, we computed an index of overall governance quality Gov_{it} ranging from 1 (lowest) to 10 (highest) of the source country (exporter) i. Furthermore, we formulate $Govdiff_{ijt}$ to capture the difference in the governance quality of exporter and importer. To estimate the impact of the

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[3] see Kaufmann, Kraay, and Mastruzzi (2010) for detail on the underlying data sources and aggregation method.

governance level on the effectiveness of an RTA, the interaction terms are included in the equations 3–6 below.

$$\text{Trade}_{ijt} = \exp[\alpha_i + \beta_j + \gamma_t + \delta_1 \ln(\text{GDP}_{it}) + \delta_2 \ln(\text{GDP}_{jt}) + \delta_3 \ln(\text{Distance}_{ij})$$
$$+ \delta_4 \text{Language}_{ij} + \delta_5 \text{Contiguity}_{ij} + \delta_6 \text{WTO}_{ijt} + \delta_7 \text{RTA}_{ijt} \qquad (3)$$
$$\times \text{Gov}_{it}] \, \varepsilon_{ijt}$$

$$\text{Trade}_{ijt} = \exp[\alpha_i + \beta_j + \gamma_t + \delta_1 \ln(\text{GDP}_{it}) + \delta_2 \ln(\text{GDP}_{jt}) + \delta_3 \ln(\text{Distance}_{ij})$$
$$+ \delta_4 \text{Language}_{ij} + \delta_5 \text{Contiguity}_{ij} + \delta_6 \text{WTO}_{ijt} + \delta_7 \text{RTA}_{ijt} \qquad (4)$$
$$\times \text{Govdiff}_{ijt}] \, \varepsilon_{ijt}$$

$$\text{Trade}_{ijt} = \exp[\alpha_{it} + \beta_{jt} + \gamma_{ij} + \delta_6 \text{WTO}_{ijt} + \delta_7 \text{RTA}_{ijt} \times \text{Gov}_{it}] \, \varepsilon_{ijt} \qquad (5)$$

$$\text{Trade}_{ijt} = \exp[\alpha_{it} + \beta_{jt} + \gamma_{ij} + \delta_6 \text{WTO}_{ijt} + \delta_7 \text{RTA}_{ijt} \times \text{Govdiff}_{ijt}] \, \varepsilon_{ijt} \qquad (6)$$

Along with traditional gravity variables, ordinary least square estimator has traditionally been used for statistical estimation of the RTAs. However, zero trade values are dropped due to the log transformation which leads to sample selection bias. After seminal papers of Silva and Tenreyro (2006) and Silva and Tenreyro (2011), Poison pseudo maximum likelihood (PPML) estimator has become a common approach in the gravity trade estimation. The advantage of PPML is that it allows for zero trade as well as heteroscedasticity which is commonly prevalent in trade data. Álvarez et al. (2018) and Lien, Lo, and Bojanic (2019) and Kamel (2021) and Heid et al. (2021) are some of the recent studies using PPML estimator for gravity trade analysis. Note that we separately estimated the models for both exports and imports.

Data sources

The present study analyzes annual bilateral trade of BRICS and the Next Eleven economies over the period 2000–2019. The trade data is sourced from the Direction of Trade database of the International Monetary Fund. In addition to the aggregate trade, we analyzed exports of various industrial sectors. Furthermore, exports disaggregated at sectoral level are included. Based on the Harmonized System (HS) of product classification, products are grouped into fifteen sectors as follows[4]. Animal products (01–05); cereals, fruits and vegetables (06–15); foodstuffs (16–24); minerals (25–26); fuel (27); chemical products (28–38); plastic and rubber (39–40); leather (41–43); wood products (44–49); textile and apparel (50–63); footwear (64–67); stone and glass (68–71); metals (72–83); mechanical and electronic equipment (84–85); and transportation (86–89). This disaggregate export data is taken from the United Nations Comtrade database through World Integrated Trade Solutions utility of the World Bank. Export values are measured in current US$.
Information related to FTAs is sourced from Mario Larch's Regional Trade Agreements Database from Egger and Larch (2008). The WTO membership data is obtained from the WTO website. Annual GDP values in current US$ are taken from World Development Indicators, whereas the data on governance is borrowed from the World Governance Indicators database of the World Bank. Centre d'Etudes Prospective et d'Informations is the source for traditional gravity variables including

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[4] See more on Harmonized System (HS) of product classification at https://wits.worldbank.org/ referencedata.html

bilateral distance between countries, language commonality, and contiguity. The bilateral distance is measured in kilometers while the other two variables are binary in nature. Our data set is consisted of annual exports of 16 exporting countries to 184 importers. A complete list of exporters and importers is presented in Appendix A.

Results and Discussion

Table 2 below presents the regression estimates for the BRICS and the Next Eleven (N11) countries. The estimations with traditional variables are stated under columns 1, 3, 5, and 7; while the even numbered columns show the estimates of structural gravity, which is methodologically superior model specification.

First, we look at the traditional variables. The estimates show a positive relationship between GDP and trade i.e., the larger the exporting economy, the larger the exports and imports. Similarly, the economic size of the importing country implies larger demand for imports. On the other hand, there is a negative impact of the bilateral distance between two trading partners. Larger distance implies more transportation cost, hence hindering the trade flow. In case the trading partners shares the same language, it fosters trade flow as the common language ease the business communication between the exporting and importing firms. Furthermore, contiguity denote the shared border between the exporter and importer. The coefficient obtained for this variable is interesting. While we see a positive impact of contiguity for both BRICS and the N11 countries, the impact is more pronounced indicating that the trade of the N11economies is more concentrated to neighboring countries as compared to that of the BRICS. The impact of WTO membership is also found to be positive or statistically significant for most of the model specifications.

Table 2 : Structural gravity of aggregate exports and imports

	BRICS				Next Eleven			
	Exports		Imports		Exports		Imports	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(GDP_{it})$	0.563***		0.458***		0.322***		0.563***	
	(0.066)		(0.047)		(0.085)		(0.074)	
$\ln(GDP_{jt})$	0.467***		0.503***		0.518***		0.583***	
	(0.065)		(0.068)		(0.051)		(0.065)	
$\ln(Distance_{ij})$	-0.882***		-0.751***		-0.813***		-0.587***	
	(0.036)		(0.022)		(0.026)		(0.023)	
$Language_{ij}$	0.424***		0.228***		0.293***		-0.032	
	(0.057)		(0.039)		(0.063)		(0.039)	
$Contiguity_{ij}$	0.337***		0.096		0.927***		0.795***	
	(0.099)		(0.069)		(0.065)		(0.053)	
WTO_{ijt}	0.088	0.124**	0.056	0.197***	0.135*	0.027	0.132*	0.295**
	(0.057)	(0.057)	(0.043)	(0.074)	(0.071)	(0.166)	(0.079)	(0.132)
RTA_{ijt}	0.175***	**0.086**	0.242***	**0.171***	0.381***	**0.083***	0.112**	**0.203***
	(0.043)	**(0.037)**	(0.042)	**(0.046)**	(0.050)	**(0.026)**	(0.049)	**(0.023)**
$\alpha_i, \beta_j, \gamma_t$	Yes		Yes		Yes		Yes	
$\alpha_{it}, \beta_{jt}, \gamma_{ij}$		Yes		Yes		Yes		Yes
N	17,442	17,248	17,442	17,184	32,042	31,284	32,042	31,122

Notes: Dependent variable is annual bilateral exports (imports) is taken in levels. α_i, β_j, and γ_t respectively denote exporter, importer, and time fixed effects; whereas α_{it}, β_{jt}, and γ_{ij} denote exporter-time, importer-time, and country-pair fixed effects. Coefficient values for the fixed effects are not reported for brevity. Robust standard errors are given in parentheses. Statistical significance is denoted as *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Now, we look at the estimates for the regional trade agreements – out main variable of interest. As indicated by the corresponding coefficients, the impact of RTAs is positive and statistically significant across the model specifications. However, we prefer the estimates of structural gravity. The Table 2 shows that the impact of the RTAs for the exports of the two groups is comparable, and it is roughly $100(e^{0.08} - 1) = 9$ percent. Moreover, we notice that the impact of RTAs is more pronounced for their imports than exports. The impact of the RTAs on the imports of the N11 is $100(e^{0.203} - 1) = 22.5$ percent.

Going further, we examine the potential trade facilitation effects of the RTAs across various industrial sectors. The estimates are presented in Table 3. For BRICS countries, the regional trade agreements are found to be more supportive for the exports of metals and plastic & rubber articles. Other sectors with positive impact of the RTAs include leather chemical products, fuels, and wood products. We obtained negative coefficients for the exports of stone & glass, and textile articles. This implies a trade diversion from these industrial sectors to others due to the trade agreements. On the other side, RTAs of the N11 economies are facilitating mostly agriculture-based exports such as animal products, vegetables, fruits, and cereals. Furthermore, we see positive impact of the RTAs for labor intensive manufacturing industrial sectors including textile and footwear, in addition to fuel exports mostly from Iran and Nigeria. Contrary to BRICS, the exports of sectors such as metals, machinery & electronics and chemical products in the N11 economies do not enjoy any facilitation by the RTAs.

Table 3: Structural gravity of exports across industrial sectors

	BRICS exports			N-11 exports		
	(1)	(2)	(3)	(4)	(5)	(6)
	Coefficient	SE	N	Coefficient	SE	N
Animal products	-0.083	(0.067)	15,933	0.111*	(0.057)	26,144
Cereals, fruit and vegetable	-0.028	(0.090)	16,700	0.232***	(0.046)	29,581
Foodstuff	-0.060	(0.078)	17,134	0.128***	(0.033)	30,376
Minerals	0.172*	(0.099)	15,591	0.432***	(0.126)	23,193
Fuel	0.318**	(0.142)	15,957	0.605***	(0.112)	21,616
Chemical products	0.248***	(0.035)	17,353	0.005	(0.037)	30,783
Plastic and rubber	0.388***	(0.045)	17,363	0.183***	(0.026)	30,558
Leather	0.321***	(0.062)	16,469	0.462***	(0.072)	26,700
Wood products	0.154**	(0.063)	17,335	0.186***	(0.046)	30,378
Textile and apparel	-0.127**	(0.062)	17,280	0.220***	(0.045)	31,321
Footwear	-0.108	(0.071)	16,620	0.244***	(0.074)	26,578
Stone and glass	-0.226**	(0.095)	17,234	-0.004	(0.117)	29,340
Metals	0.453***	(0.062)	17,352	0.078	(0.050)	30,358
Machinery and electronics	0.051	(0.042)	17,421	-0.110***	(0.030)	30,934
Transportation	0.115	(0.077)	17,102	0.113***	(0.039)	28,355

Notes: Dependent variable annual bilateral exports is taken in levels. All estimations are based on structural gravity as specified in Eq. 2. Only the coefficient values of RTAs are reporter for brevity. Robust standard errors are given in parentheses. Statistical significance is denoted as *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Next, we examine the RTAs impact on trade in relation to the institutional quality prevailing in the exporting countries. Based on the six indicators of governance quality, we computed an index of overall governance quality Gov_{it} ranging from 1 (lowest) to 10 (highest) of the source country (exporter) i. Similarly, the variable $Govdiff_{ijt}$ captures the difference in the governance quality of exporter and importer. To estimate the impact of the governance level on the effectiveness of an RTA, the interaction terms are included as given in the equations 3–6. The estimates reported in Table 4 show a positive effect of better institutional quality on the effectiveness of the RTAs. Similarly, the higher institutional quality score of an exporting country compared to the destination country make it easy to comply with the exporting process and make any adjustments specific to destination market. This is evident form the positive coefficients of the variable $Govdiff_{ijt}$ both for the BRICS and the Next Eleven economies.

Table 4: Structural gravity of RTAs and governance

	BRICS exports				Next Eleven exports			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(GDP_{it})$	0.557***	0.559***			0.229***	0.317***		
	(0.066)	(0.066)			(0.088)	(0.085)		
$\ln(GDP_{jt})$	0.467***	0.464***			0.498***	0.494***		
	(0.065)	(0.065)			(0.051)	(0.052)		
$\ln(Distance_{ij})$	-0.889***	-0.874***			-0.827***	-0.835***		
	(0.036)	(0.036)			(0.025)	(0.025)		
$Language_{ij}$	0.436***	0.431***			0.287***	0.258***		
	(0.057)	(0.057)			(0.064)	(0.065)		
$Contiguity_{ij}$	0.346***	0.314***			0.992***	1.021***		
	(0.098)	(0.096)			(0.065)	(0.064)		
WTO_{ijt}	0.092	0.086	0.125**	0.125**	0.177**	0.147**	0.024	-0.013
	(0.057)	(0.057)	(0.056)	(0.056)	(0.071)	(0.070)	(0.165)	(0.173)
$RTA_{ijt} \times Gov_{it}$	0.022***		**0.014****		0.041***		**0.010****	
	(0.006)		**(0.006)**		(0.005)		**(0.003)**	
$RTA_{ijt} \times Govdiff_{ijt}$		0.036***		**0.021****		0.042***		**0.023****
		(0.007)		**(0.007)**		(0.009)		**(0.005)**
α_i, β_j, γ_t	Yes		Yes		Yes		Yes	
α_{it}, β_{jt}, γ_{ij}		Yes		Yes		Yes		Yes
N	17,442	17,442	17,248	17,248	32,042	32,042	31,284	31,284

Notes: Dependent variable is annual bilateral exports (imports) is taken in levels. α_i, β_j, and γ_t respectively denote exporter, importer, and time fixed effects; whereas α_{it}, β_{jt}, and γ_{ij} denote exporter-time, importer-time, and country-pair fixed effects. Coefficient values for the fixed effects are not reported for brevity. Robust standard errors are given in parentheses. Statistical significance is denoted as *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Figure 3 portrays the institutional quality of the BRICS and the N11 economies in global context. On the horizontal axis, we have GDP per capita (in logarithmic form) whereas the vertical axis represents the governance index. For reference, the horizontal dotted lines show the governance levels for high income, upper middle income, lower middle income, and low-income countries[5]. Noticeably, South Korea has the highest score for the governance index among the BRICS and N11 countries. Among BRICS states, Brazil, China, and Russia have the governance score lower than other countries of the world with comparable GDP per capita value. In the N-11 economies, Iran, Nigeria,

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[5] The World Bank's classification of countries across income groups is followed.

Pakistan, Bangladesh, and Egypt have very low value of the governance index. The governance quality in these countries is not only worse than other BRICS and the N-11 economies but also lower than their counter partners in terms of GDP per capita.

Global median for high icome (HI), upper middle income (UMI),
lower middle income(LMI), and low income (LI)
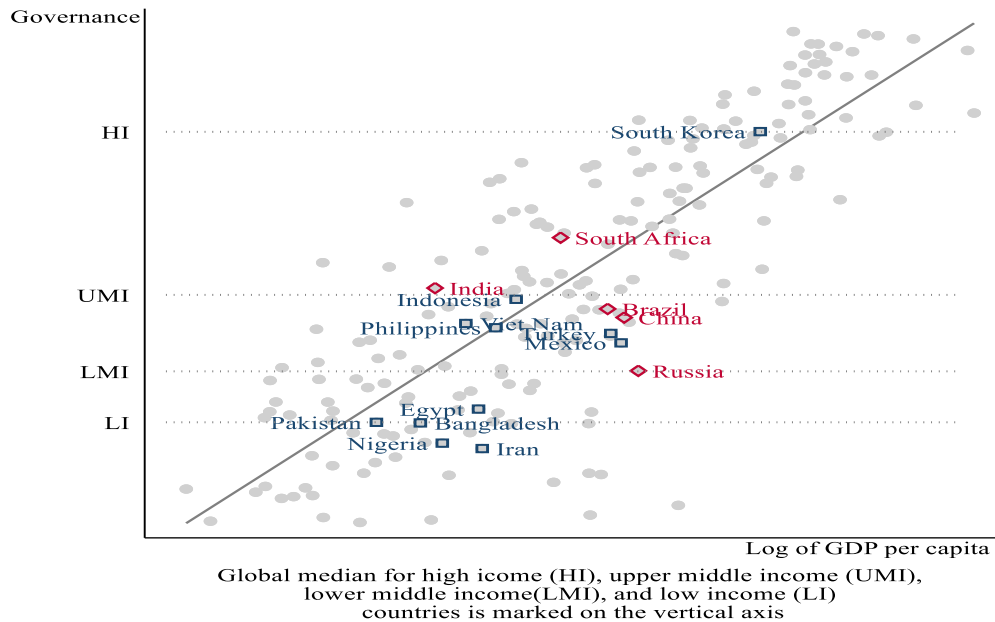countries is marked on the vertical axis

Figure 3 - Governance quality in the BRICS and N-11

To dig further into the governance quality, Table 5 reports the score of individual governance indicators for the countries under discussion. Looking from the perspective of indicators, most of the BRICS and the N-11 countries are doing relatively well in relation to governance effectiveness. On the other hand, their performance in terms of political stability is worse, with the lowest values for Iran, Nigeria, and Pakistan. From individual countries, Brazil, Russia, Turkey, and India have major problem in terms of political stability; China, Vietnam, and Egypt have low value for the indicator voice & accountability; whereas Iran, Nigeria, Pakistan, and Bangladesh have low level of governance across all the six indicators.

Table 5- Governance indicators of BRICS and N-11 economies for 2019

	Control of corruption	Governance effectiveness	Political stability	Regularity quality	Rule of law	Voice & accountability
Brazil	42.8	43.3	21.2	48.1	47.6	56.5
Russia	23.1	58.2	26.4	36.1	25.0	17.9
India	47.6	59.6	19.8	48.6	52.4	56.0
China	45.2	71.6	37.7	42.8	45.2	6.8
South Africa	59.6	66.8	36.8	61.5	51.0	67.6
Bangladesh	16.3	23.6	15.6	15.4	27.9	26.6
Egypt	27.9	36.5	12.3	18.8	38.0	8.2
Indonesia	38.0	60.1	27.4	51.4	42.3	51.7
Iran	14.4	32.2	5.7	6.7	24.0	12.1
South Korea	76.4	88.9	63.7	82.2	86.1	71.0
Mexico	22.1	45.7	18.9	59.6	27.4	45.9
Nigeria	12.5	13.5	4.7	17.8	18.8	34.3
Pakistan	19.7	26.4	3.3	27.4	26.4	22.7
Philippines	31.3	54.8	16.5	55.3	34.1	45.4
Turkey	43.8	53.8	9.9	54.3	44.7	24.2
Vietnam	34.1	53.4	48.1	41.8	53.4	11.6

As described in the methodology section, we applied Poisson pseudo-maximum likelihood estimator. The PPML has the ability to cater the zero trade flows, and compared to several other variants, the Poison Pseudo-Maximum Likelihood with High Dimensional Fixed Effects (PPMLHDFE) implemented in Stata[6] is unbiased and efficient estimator (Silva, J. S., & Tenreyro, S. , 2021). However, for robustness check, we examined the impact of RTAs on trade using on the non-zero trade flows. The results are reported in Table 6 below.

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[6] The PPMLHDFE is implemented in Stata by Correia, S., Guimar˜aes, P., & Zylkin, T. (2019).

Table 6- Robustness check: only non-zero trade flows

	BRICS				Next Eleven			
	Exports		Imports		Exports		Imports	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(GDP_{it})$	0.568***		0.469***		0.294***		0.558***	
	(0.066)		(0.047)		(0.084)		(0.074)	
$\ln(GDP_{jt})$	0.467***		0.501***		0.513***		0.582***	
	(0.065)		(0.068)		(0.051)		(0.065)	
$\ln(Distance_{ij})$	-0.882***		-0.751***		-0.827***		-0.587***	
	(0.036)		(0.022)		(0.025)		(0.023)	
$Language_{ij}$	0.424***		0.228***		0.224***		-0.041	
	(0.057)		(0.039)		(0.062)		(0.039)	
$Contiguity_{ij}$	0.336***		0.094		0.916***		0.788***	
	(0.099)		(0.069)		(0.065)		(0.053)	
WTO_{ijt}	0.092	0.125**	0.065	0.194***	0.273***	0.023	0.136*	0.286**
	(0.057)	(0.057)	(0.043)	(0.074)	(0.070)	(0.165)	(0.079)	(0.132)
RTA_{ijt}	0.175***	**0.082****	0.243***	**0.169****	0.410***	**0.084****	0.114**	**0.205****
	(0.043)	**(0.037)**	(0.042)	**(0.046)**	(0.049)	**(0.026)**	(0.049)	**(0.023)**
$\alpha_i, \beta_j, \gamma_t$	Yes		Yes		Yes		Yes	
$\alpha_{it}, \beta_{jt}, \gamma_{ij}$		Yes		Yes		Yes		Yes
N	17,008	17,000	16,281	16,236	28,972	28,875	27,358	27,241

Notes: Dependent variable annual bilateral exports (imports) is taken in levels. α_i, β_j, and γ_t respectively denote exporter, importer, and time fixed effects; whereas α_{it}, β_{jt}, and γ_{ij} denote exporter-time, importer-time, and country-pair fixed effects. Coefficient values for the fixed effects are not reported for brevity. Robust standard errors are given in parentheses. Statistical significance is denoted as *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

It is worth mentioning that the number of observations in these estimations is smaller as compared to the full sample including zero trade flows, as given in Table 3. However, the findings corroborate with those earlier stated for the full sample. The trade effect of the RTAs is positive and statistically significant while it is more evident for imports as compared to exports of BRICS and the N-11 economies.

Conclusion and Policy Implications

The present study assesses the trade facilitating role of regional trade agreements (RTAs) of BRICS and the Next Eleven (N-11) economies using annual bilateral trade over the period 2000–2019. For empirical estimation, we applied structural gravity with Poisson pseudo maximum likelihood estimator. The findings show higher effect of the RTAs for imports compared to exports for both BRICS and the N-11 countries.

While the Next Eleven economies are catching up, there are some important differences between the trade of BRICS and the N-11. While the RTAs of BRICS countries mostly facilitate exports of metals, chemical products, plastic and rubber; the RTAs' role is more noticeable for the exports of animal products, cereals, fruits, vegetable, and leather in the N-11 economies. That shows the N-11 economies are mired into the exports of low value-added agriculture based, and labor-intensive light manufacturing such as textile and footwear. Therefore, the N-11 countries need to design their future regional trade agreements in a way to support particular sectors in order to diversify their export portfolios shifting towards high value exports. Furthermore, they need to reduce import duties on the input materials which goes in the production of these high-value-added exports.

Second, the findings show that the adjustment in the exporting process in response the entry of an FTA is affected by the governance quality prevailing in the source country. Most of the BRICS and the N-11 countries have lower governance quality, particularly in terms of political stability; whereas China, Vietnam, and Egypt have lower value for the indicator voice & accountability. In this context, Bangladesh, Egypt, Iran, Nigeria, and Pakistan particularly need to improve governance quality across all the six indicators to spur their export performance.

Based on the findings of our study, the current study has pertinent policy implications for designing appropriate trade policies for the specific sectors of BRICS and N-11 economies. The regional trade agreements have a significantly higher (lower) impact on the exports (imports) of N-11 countries than those of BRICS economies. These results suggest to apply differential strategies for affecting the export and import values (shares) of both the regional integration groups. Moreover, the impact of RTAs is quite heterogeneous across exporting values relating to various industries of the economics. Therefore, the policy-makers should carefully design industry-specific trade policies. In this case, a generalized policy is not recommended as each industry has its own dynamics and regional and industry-specific factors to be considered for promoting trade facilitation in these regional trade blocks. The current study has only focused on two RTAs in the context of BRICS and N-11 economies in explaining bilateral trade between the member countries. The future research can be directed to explore the impact of other RTAs on trade facilitation along with other control variables to further confirm our findings.

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Supplementary File-Appendix A

List of reporter countries included in the regression:

BRICS: Brazil, Russia, India, China, and South Africa
N-11: Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, Philippines, South Korea, Turkey, and Vietnam

List of partner countries included in the regression:

Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Costa Rica, Croatia, Cuba, Cyprus, Czech Republic, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Lao, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Russian Federation, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States of America, Uruguay, Uzbekistan, Vanuatu, Venezuela, Viet Nam, Yemen, Zambia, Zimbabwe.