

An analysis of prime determinants and constraints of Bangladesh's export market: Stochastic frontier gravity model approach

Md Tariq Hassan

Abstract

This paper adopts the stochastic frontier gravity model approach, using panel data to investigate the prime determinants and constraints of Bangladesh's export industry, and its potential to improve its trading position in relation to its top 40 trading partners. The study finds that, for Bangladesh, gross domestic product (GDP), population, distance, average tariff, trade agreements and exchange rates are the prime determinants of export volume. While GDP, population, trade agreements and exchange-rate depreciation positively affect exports, the distance between Bangladesh and its partner countries and tariff levels negatively impact trade. The study also finds that socio-political-institutional, 'behind-the-border' constraints, such as customs procedures, port inefficiencies and corruption, are restricting trade. The results show that there are huge variations in export levels, even among countries within the same trading blocs, suggesting that a high level of untapped export potential can be realised by removing the behind-the-border constraints and by integrating more efficiently with the international market.

1. Introduction

The role of trade in the development process of any country is well established, which is particularly important for developing economies. There is evidence that, for countries with an outward-oriented economy, there is a strong correlation between export growth rates and the growth of gross domestic product (GDP) (Thirlwall, 2011, p. 502). Perhaps favourable export performance can be the single most important contributing factor for maintaining a consistent growth rate. As an emerging economy from the South Asian region, Bangladesh has been able to maintain steady and impressive growth rates of GDP (around 6 per cent over the last decade), while its export to GDP ratio rose from 0.13 in 2001 to 0.21 in 2011 (WITS 2016).

Despite this positive trend, the country's export sector can be highly vulnerable to external economic shocks, such as global recession, because both the export market and the export products lack diversity. Textiles and garments account for almost 80 per cent of the total export (Bangladesh Bank 2016), and the major export destinations are concentrated in the European Union (EU), particularly in Western Europe and in the North American region. During the last ten years, Bangladesh's top ten export destinations were the United States (US), Germany, United Kingdom, France, Spain, Netherland, Italy, Belgium, Canada and Hong Kong. The skewed nature of Bangladesh's export market makes it highly susceptible to the economic cycle of these countries. Therefore, it is important to diversify the export market, both in terms of destinations and products, to reach the potential level of export in aggregate terms.

Against this background, this study aims to analyse Bangladesh's export potential with its top forty trading partners in the post global financial crisis (GFC) period, 2008–2011, using the stochastic frontier gravity model approach with panel data. At the same time, through an efficiency analysis, this paper examines the impact of different socio-political-institutional 'behind-the-border' constraints in Bangladesh that restrict the export market from reaching its potential level. This bears significant policy implications, ranging from identifying the impact of behind-the-border constraints on exports, finding the efficiency loss in the current system and analysing the impact of trade policy reforms, if any. This will also help the policymakers to have a better insight into

export promotion and diversification activities by identifying the currently untapped export potential.

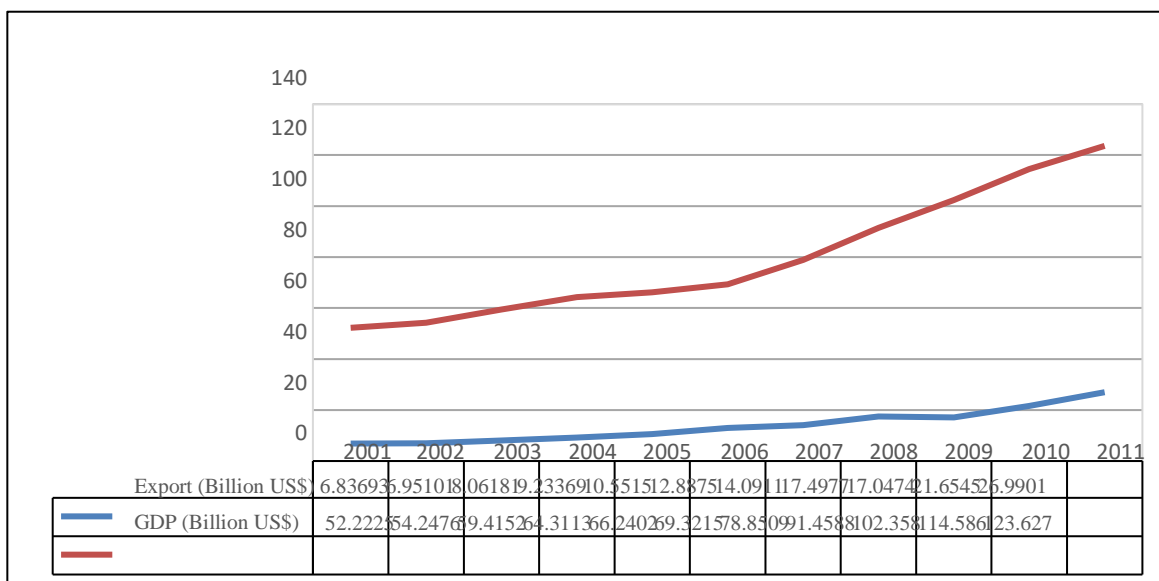
The organisation of the paper is as follows: the next section gives a brief overview of Bangladesh’s export performance in the recent years, followed by a discussion of the gravity model theoretical framework in the context of trade performance analysis. The following section then discusses the empirical model used in this paper along with the methodology and data sources. Finally, estimation results from the model and its implications are discussed before conclusions are presented.

2. Overview of Bangladesh’s export performance

As part of its structural adjustment program, Bangladesh, since 1990, has gradually liberalised its trade policy and moved away from its import substitution policy to pursue an export-led growth strategy. Since then, Bangladesh has significantly reduced tariff and non-tariff barriers; allowed duty-free importation of capital machineries; introduced tax rebates and duty drawback for exported goods; and adopted a flexible exchange rate policy (Hossain & Alauddin, 2005). As a result, in the post liberalisation period, total exports continuously grew and the export–GDP ratio increased. However, the increase in the export sector is highly concentrated in the ready-made garments (RMG) sector, with little diversity. In the post-GFC period, export slightly decreased in 2009 compared to 2008, but then bounced back in the following years.

The value of Bangladesh’s exports rose from USD 6.84 billion in 2001 to almost USD 27 billion in 2011 (Figure 1), with almost 80 per cent of exports coming from the RMG sector.

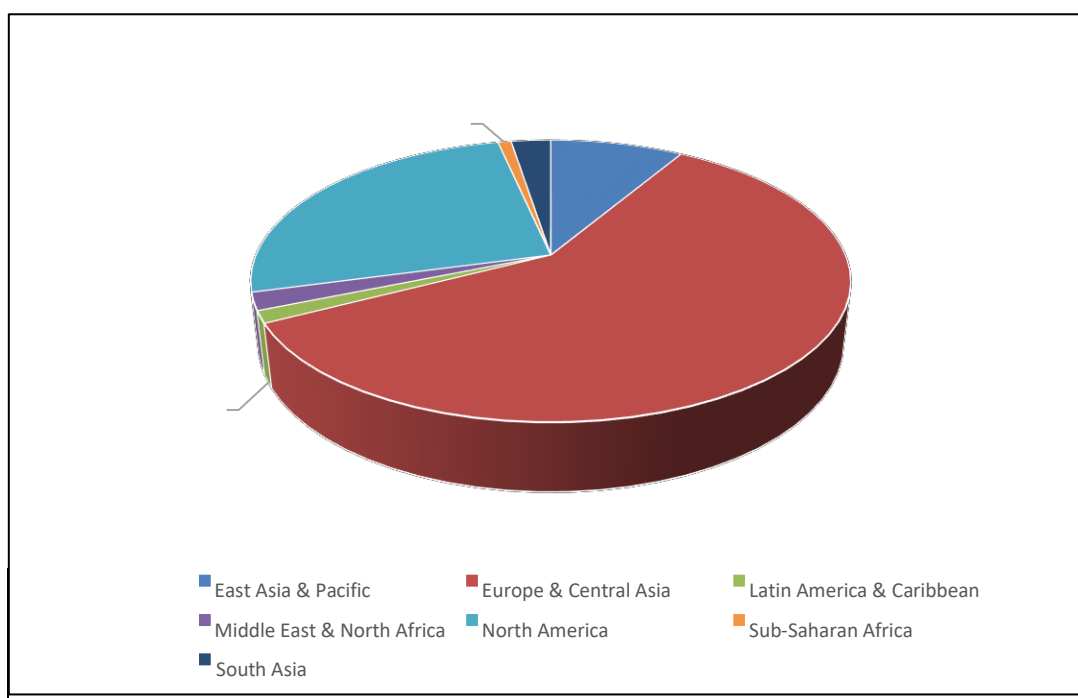
Figure 1: GDP and total export of Bangladesh (2001–2011)



Source: World Integrated Trade Solution (2012).

Europe & Central Asia, and North America remain Bangladesh’s major export destinations, followed by the East Asia & Pacific and South Asia regions (Figure 2). Among these countries, the US has the greatest export share, with 21 per cent in 2011.

Figure 2: Destination wise export share of Bangladesh 2011



Source: World Integrated Trade Solution (2012).

3. Literature review, theoretical framework and methodology

This section of the paper will discuss the theoretical framework, based on the gravity and stochastic frontier gravity models that have been used in the literature to analyse the international trade flows and trade potentials.

3.1 Gravity model

Since it was first introduced by Tinbergen (1962), the gravity model has been used extensively in empirical studies to describe bilateral trade flows between countries. The basic idea of the model is similar to that of Newton's Law of Gravitation and states that the volume of trade between two countries is proportional to their masses, often represented by their respective GDPs as proxy for physical mass and is inversely proportional to their geographical distance, which captures the economic distance or transaction costs for trade between the two countries. This basic model can be described mathematically as follows:

$$\text{Trade}_{ij} = \alpha \text{GDP}_i \text{GDP}_j / \text{Distance}_{ij} \quad (1)$$

The above equation can be transformed in linear form for regression by taking the log of both sides of the equation. Linneman (1966) first extended the above gravity model by including other important explanatory variables, such as population and complementarity.

Although the gravity model has successfully explained many empirical studies on trade flows, it has been criticised for its lack of theoretical background. Following these criticisms, Anderson (1979) provided a theoretical basis for the gravity equation based on a constant elasticity of substitution demand function, where goods were differentiated by country of origin. Later, Bergstrand (1985) introduced price generalisation, allowing goods from different countries of origin to be compared, and showed that the model can

be derived following a trade model based on monopolistic competition. More recently, Anderson and van Wincoop (2003) explained the model with international borders as barriers.

The basic gravity model can be expanded by including other trade explanatory variables to analyse the bilateral trade flow. Bergstrand (1985) used exchange rates in his study to explain variations of international trade. Based on literature and trade theories, any other trade explanatory variables can be included in the model. For example, variables such as average tariff rate, or dummy variables indicating the existence of a trade agreement, common border or common language, can be included in the basic model to explain the relationship between the two trading countries. Thus, a representative equation in the context of the augmented gravity model for export could be as follows:

$$\begin{aligned} \ln \text{EXP}_{ij} = & \beta_0 + \beta_1 \ln \text{GDP}_{BDj} + \beta_2 \ln \text{GDP}_{PTi} + \beta_3 \ln \text{POP}_{BDj} + \beta_4 \ln \text{POP}_{PTi} \\ & + \beta_5 \ln \text{DIST}_{ij} + \beta_6 \text{AVGTAR}_i + \beta_7 \ln \text{XRT}_{ij} + \beta_8 \text{DTA}_{ij} + \beta_9 \text{DEU}_i \\ & + \beta_{10} \text{DNA}_i + \beta_{11} \text{DTREND}_{t+} \varepsilon_{ij} \end{aligned} \quad (2)$$

All the variables are defined in the latter section of the paper, except ε_{ij} . Here, ε_{ij} is the error term that accounts for both statistical errors and other factors influencing the export that has not been captured in the model. This standard gravity model estimates the mean effects of determinants of trade and can capture the observable resistance to trade (e.g. distance), and official barriers to trade (e.g. tariffs), but fails to capture other subjective barriers that are difficult to quantify, such as country-specific, socio-political-institutional, behind-the-border constraints (Armstrong, 2007; Kalirajan, 2007). With these omitted, unobservable barriers to trade, the assumption that the error term ε_{ij} is normally distributed will be violated and will lead to heteroskedasticity (Kalirajan & Finlay, 2005).

3.2 The stochastic frontier gravity model

The stochastic frontier approach was developed by Aigner, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1977), and was first used in production economics to measure production efficiency. This approach advocates that the production process can be influenced by two distinct, economically distinguishable, disturbances (Aigner et al., 1977) and, therefore, the error term should represent two components: the production inefficiency component and other random disturbances. To address the shortcomings of the conventional gravity model in trade flow analysis, the stochastic frontier approach of production economics can be applied to have more precise estimation, as suggested by Kalirajan (2007). This approach is an improvement over the conventional gravity model in the sense that it separates the error term into two components: the non-negative error term, or the inefficiency components that represents all behind-the-border constraints; and the random error term, which captures the effect of all other omitted variables and measurement errors. Thus, drawing on Kalirajan (2007), the general form of the stochastic frontier gravity equation for exports can be estimated as follows:

$$\text{EXPORT}_{ij} = \ln f(Z_i; \beta) \exp(-u_i + v_i) \quad (3)$$

In linear form this can be written as,

$$\ln \text{EXPORT}_{ij} = \ln f(Z_i; \beta) - u_{ij} + v_{ij} \quad (4)$$

Here EXPORT_{ij} represents the actual export from country i to j , Z_i represents the determinants of potential bilateral trade and β represents unknown parameters. The error term in equation (4) is now decomposed into u_{ij} and v_{ij} , as compared to the single error term, ε_{ij} , in equation (2). Now the single-sided error term, u_{ij} , represents the inefficiency

terms, or the behind-the-border constraints, and the term v_{ij} represents the random error term. If u_{ij} takes a value other than zero, then the behind-the-border constraints are restricting the export from reaching the potential trade frontier.

3.3 Measuring export potential and efficiency

Ideally, export potential would refer to the level of export achieved at the frontier where there is free and frictionless trade between two countries. But in reality, this is not possible. Therefore, the export potential of a country would be the maximum achievable level of exports with the given level of trade determinants and the least level of restrictions in the current system (Drysdale, Huang & Kalirajan, 2000; Kalirajan, 2000; Armstrong, 2007). In other words, potential trade is not the level of trade with ideal free trade conditions; rather, it is the closest possible level of trade under the least possible restrictions between any two countries. The gap between the actual export and the potential export indicates the efficiency loss in the system, which can be estimated by the stochastic frontier model (Kalirajan & Finlay, 2005). It is noteworthy that this gap may result not only from the core determinants of export, but also from various socio-political-institutional behind-the-border factors that facilitate trade-related activities in both countries. Drawing on this argument, the achieved export efficiency of a country can be measured by the following equation in the stochastic frontier model:

$$\text{Technical efficiency, } TE_i = \ln f(Z_i; \beta) \exp(-u_i + v_i) / \ln f(Z_i; \beta) \exp(v_i) = \exp(-u_i) \quad (5)$$

and the potential export can be measured by:

$$\text{Potential Export} = \text{Actual Export} / \exp(-u_i) \quad (6)$$

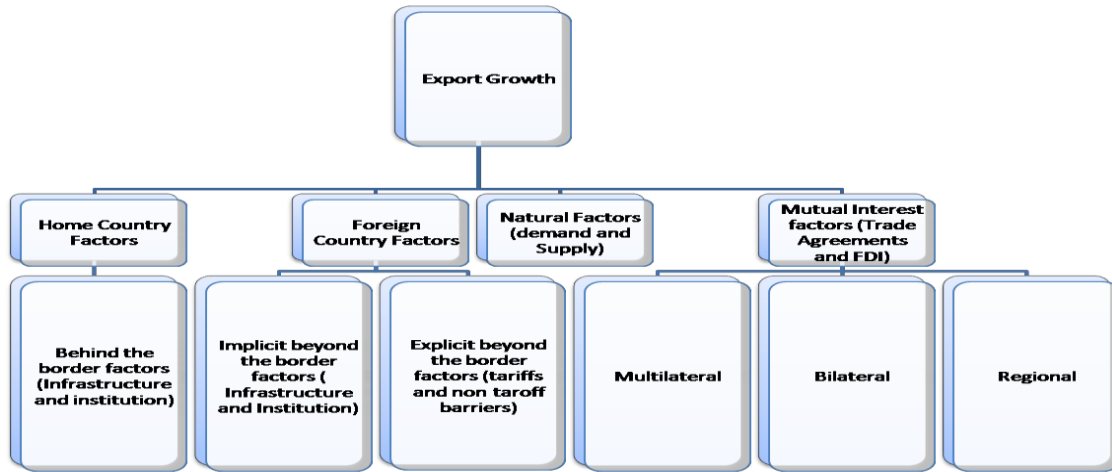
This also has strong policy implications. The policy makers can implement necessary reforms after identification of these constraining factors, and thus reduce the export gap.

3.4 Methodology

This study used panel data and the stochastic frontier gravity model to examine Bangladesh's export flow to its 40 largest trading partner countries for the period 2008–2011. The panel data methodology has distinct econometric advantages since it can address the relevant relationships among variables over time, and can monitor unobservable individual effects between the trading partner pairs. In addition, panel data can handle more variability and reduce the multi-collinearity among the independent variables in the regression (Baltagi, 1995).

Drawing on Kalirajan and Anbumozhi (2014; Figure 3), analytically it can be said that the flow of goods between any two countries broadly depends on natural factors, such as demand and supply (proxied by GDP and population size) and geographical distance (proxied by transportation cost); home country factors related to infrastructure and institutions (behind-the-border constraints such as internal connectivity, customs procedures, port efficiency, corruption); foreign country factors (implicit beyond-the-border and explicit beyond-the-border factors, such as tariffs or non-tariff barriers) and, finally, mutual interest factors, such as trade agreements and foreign direct investments (FDI).

Figure 3: Determinants of export flow for methodological framework



Source: Kalirajan and Anbumozhi (2014).

To capture the influence of all of the factors mentioned above on Bangladesh's export flow, relevant core variables and dummy variables have been added in the empirical model of this paper. In addition, location-specific dummies are also included because historically Bangladesh tends to export more to the European and North American countries.

3.5 Data

This study uses panel data of Bangladesh's top 40 trading partners, based on the yearly aggregate export value for the period 2008–2011. Availability of data for all the required explanatory variables was the primary reason for choosing this period. Country wise export data has been collected from the World Integrated Trade Solution (WITS) database of the World Bank. In the study GDP data has been used as a proxy to income, and population data has been used as a proxy to market size. GDP, population size and the official exchange rate (OER) of Bangladesh and its trading partners were obtained from the United Nations Conference on Trade and Development (UNCTAD) statistics database (UNCTAD, 2015). The exchange rate between Bangladesh and the partner countries were then calculated in terms of Bangladesh currency per unit of foreign currency using this OER.

The geographical distance data between Bangladesh and its trading partners were obtained from the French Research Centre CEPII database. The average tariff data was sourced from the World Trade Organization (WTO) tariff database. It should be noted that tariff data was not available for all countries in each period. In those cases, the average tariff rate of the previous three years was used as an approximate proxy to fill that data gap. The data on the various multilateral and bilateral trade agreements which were already in force was used, which was collected from WTO website.

3.6 Model specification

The stochastic frontier gravity model has been used in this study to estimate the results. The empirical model used to measure Bangladesh's potential exports and efficiency with its top 40 trading partners are as follows:

$$\begin{aligned}
 \ln EXP_{ij} = & \beta_0 + \beta_1 \ln GDP_{BDj} + \beta_2 \ln GDP_{PTi} + \beta_3 \ln POP_{BDj} + \beta_4 \ln POP_{PTi} \\
 & + \beta_5 \ln DIST_{ij} + \beta_6 AVGTAR_i + \beta_7 \ln XRT_{ij} + \beta_8 DTA_{ij} + \beta_9 DEU_i \\
 & + \beta_{10} DNA_i + \beta_{11} DTREND_t - U_{ij} + V_{ij}
 \end{aligned}$$

where the independent variables are defined as follows:

$\ln EXP_{ij}$ = log of value of total export from Bangladesh to partner country i measured in USD (thousands)

$\ln GDP_{BDj}$ = log of value of GDP of Bangladesh measured in USD (thousands)

$\ln GDP_{PTi}$ = log of value of GDP of partner country i measured in USD (thousands)

$\ln POP_{BDj}$ = log of value of Bangladesh's population measured in thousands

$\ln POP_{PTi}$ = log of value of partner country i 's population measured in thousands

$\ln DIST_{ij}$ = log of distance between Bangladesh and partner country i in kilometres

$AVGTAR_i$ = The average tariff rate imposed by the partner country i in percentage

$\ln XRT_{ij}$ = the log of value of exchange rate of Bangladesh currency per unit of partner trading country i 's currency

DTA_{ij} = dummy variable which takes the value 1 if Bangladesh has any kind of trade agreement currently in force between partner country i , otherwise takes the value 0

DEU_i = dummy variable which takes the value 1 if partner country i is a member of European Union (EU), otherwise takes the value 0

DNA_i = dummy variable which takes the value 1 if partner country i is from North America, otherwise takes the value 0

$DTREND_t$ = time trend variable

U_{ij} = the truncated non-negative single-sided error term that represents the joint effects of the economic distance factor or behind-the-border constraints in Bangladesh, which hampers exports from reaching potential; alternatively, $\exp(u_{ij})$ indicates the ratio of actual to potential exports of Bangladesh to a trading partner country i

V_{ij} = the normally distributed $N(0, \sigma^2)$ random error term, which is iid, and which captures the effect of omitted variables in the model on the independent variable

β_0 = country-specific intercept term

$\beta_{i(i=1,2,3...11)}$ = parameters to be estimated by the model

According to the gravity model theory, the signs for GDP_{BDj} , GDP_{PTi} , POP_{BDj} and POP_{PTi} are expected to be positive since GDP and population size are respectively used as proxies for income and market size. The sign for $DIST_{ij}$ is expected to be negative since distance is a proxy for economic distance. Also, the sign for $AVGTAR_i$ is expected to be negative since tariff restricts free flow of trade, whereas the sign for XRT_{ij} is expected to be positive because, according to standard economic theory, a depreciation in the home currency is expected to increase the country's exports, and hence improve the trade balance. The sign for the dummy variable DTA_{ij} is expected to be positive as trade agreements should be favourable for exports. Finally, the signs for the dummy variables DEU_i and DNA_i are expected to be positive since many countries of the EU, as well as the US, Canada and Mexico, are Bangladesh's major export destinations.

4. Estimation and results

The software Frontier 4.1 was used to estimate the above model. The error correction model was estimated here and the description of the estimation process is detailed in Coelli (1996). Only the final maximum likelihood estimates from the three-step estimation process are reported in Table I below.

Table I: Maximum likelihood estimation of the stochastic frontier gravity equation for Bangladesh's exports to top forty trading partner countries, 2008–2011

Variable	Coefficient estimates
Constant	-26.643 (23.1626)
GDPBD _j	1.624* (0.3524)
GDPPT _i	0.6765* (0.0749)
POPBD _j	-0.0263 (2.3351)
POPPT _i	0.8508 (0.1165)
DIST _{ij}	-0.651** (0.2678)
AVGTAR _i	-0.0402** (0.0183)
XRT _{ij}	0.1376* (.0358)
DTA _{ij}	0.4908** (0.1972)
DEU _i	0.1164* (0.1811)
DNA _i	-0.6148 (0.3660)
DTREND _t	1.0362* (0.3939)
Sigma-squared(σ^2)	7.5711* (2.8268)
gamma	0.9949* (0.0021)
mu	-5.4890* (1.9190)
eta	0.0069 (0.0177)
Log likelihood function	46.7829

Notes: * and ** respectively show the level of significance at 1% and 5% and the figures in parentheses are the standard deviations

Result from the above table show that estimates for the coefficients GDPBD_j, GDPPT_i, DIST_{ij}, AVGTAR_i, XRT_{ij}, DTA_{ij}, DEU_i and DTREND_t are all statistically significant, being at least at the 5 per cent level. Moreover, all these coefficients have the expected signs that conform to the gravity model theory. The positive and significant coefficients for GDPBD_j and GDPPT_i imply that exports from Bangladesh will increase with the partner countries by 1.62 per cent and 0.67 per cent, respectively, if the GDP of Bangladesh and GDP of its partner countries all increase by 1 per cent. Similarly, the coefficient of the exchange rate variable, XRT_{ij}, suggests that if the Bangladeshi currency depreciates then exports will increase, and coefficient of DTA_{ij} suggests that Bangladesh exports more to a trading partner country if there is a trade agreement in force.

On the other hand, the significant negative coefficients for distance variable DIST_{ij} and

tariff variable AVGTAR_i suggest that the greater the distance between the two countries, and the higher the tariff rate, the less they are likely to trade. The positive coefficients for dummy variable DEU_i indicates that exports from Bangladesh are likely to increase if the importing country is a member of the EU, which is expected since EU countries are major export destinations for Bangladesh and there are 14 countries from this region in the dataset. However, the coefficient for another region-based dummy variable DNA_i is neither statistically significant nor bears the expected sign. One possible reason might be that there are only three countries in the dataset from the North American region. Another deviation from the standard expectation of gravity theory is that none of the coefficients for the variables POPBD_j and POPPT_i are statistically significant, which means the size of the economy of Bangladesh and the trading partner does not have any significant impact on export volume.

The result also shows that sigma-squared (σ^2), which measures the mean total variation over time in the model, is significant, suggesting that potential exports over the time period varied significantly. This variation might be due to random factors or to particular characteristics that exist between Bangladesh and the trading partner country. In addition, the gamma coefficient further explains the nature of the variation by measuring the ratio of variation due to country-specific socio-political-institutional factors or, in simple terms, due to the behind-the-border constraints to the total variation. In this case, the gamma coefficient is 0.9949, which is very large and significant at the 1 per cent level. This implies that behind-the-border constraints have a significant influence and are driving a large proportion of the mean total variation in this case, and therefore the stochastic frontier analysis will give meaningful and valid results in this study. On the other hand, the eta coefficient is found to be insignificant, which means that the constraining impact on the potential export remains constant over time without any improvement.

Analysis of Bangladesh's export performance

The estimated result of Bangladesh's export performance, measured in terms of technical efficiency for the period 2008–2011 with its top forty trading partners, is presented below in Table 2.

Table 2: Country and trading bloc-wise Bangladesh's technical efficiency of export (per cent) with top forty trading partners, 2008–2011

Country/trading blocs	Technical efficiency (TE) for export (%)				
	2008	2009	2010	2011	Mean efficiency
EU	46.23	46.40	46.57	46.75	46.49
Germany	87.76	87.84	87.91	87.99	87.87
UK	79.80	79.92	80.04	80.16	79.98
France	52.04	52.28	52.51	52.74	52.39
Netherlands	93.22	93.27	93.31	93.36	93.29
Italy	35.03	35.28	35.54	35.79	35.41
Belgium	82.14	82.25	82.36	82.47	82.31
Spain	32.11	32.36	32.62	32.87	32.49
Sweden	55.50	55.72	55.94	56.17	55.83
Denmark	66.14	66.32	66.51	66.69	66.41
Finland	7.03	7.16	7.29	7.42	7.22
Ireland	39.47	39.72	39.98	40.23	39.85
Austria	7.02	7.15	7.28	7.42	7.22
Portugal	13.34	13.53	13.72	13.91	13.62
Poland	35.34	35.59	35.85	36.10	35.72
Greece	7.46	7.60	7.73	7.87	7.67
NAFTA	60.04	60.16	60.28	60.40	60.22
USA	86.95	87.04	87.12	87.20	87.08
Canada	82.00	82.11	82.22	82.33	82.16

Mexico	11.17	11.34	11.51	11.68	11.43
ASEAN	28.81	29.00	29.20	29.39	29.10
Singapore	60.74	60.95	61.16	61.36	61.05
Thailand	6.78	6.91	7.04	7.17	6.97
Vietnam	47.64	47.88	48.12	48.36	48.00
Malaysia	14.01	14.20	14.39	14.59	14.30
Indonesia	14.87	15.07	15.27	15.47	15.17
East Asia	46.72	46.88	47.05	47.22	46.97
Hong Kong	89.31	89.38	89.44	89.51	89.41
Japan	39.54	39.79	40.04	40.29	39.91
Korea	52.38	52.61	52.84	53.08	52.73
China	5.64	5.75	5.87	5.98	5.81
EFTA	41.25	41.50	41.75	42.00	41.63
Norway	41.18	41.43	41.68	41.93	41.55
Switzerland	41.32	41.57	41.82	42.07	41.70
SAARC					
Pakistan	85.25	85.34	85.43	85.52	85.38
India	42.61	42.86	43.11	43.36	42.98
Others	56.99	57.16	57.32	57.49	57.24
Australia	42.81	43.06	43.31	43.56	43.19
UAE	36.68	36.93	37.19	37.44	37.06
Iran	90.81	90.87	90.92	90.98	90.89
Turkey	90.55	90.61	90.67	90.73	90.64
Syria	86.01	86.10	86.18	86.27	86.14
Russia	20.12	20.34	20.56	20.79	20.45
Saudi Arabia	43.82	44.07	44.32	44.56	44.19
Sudan	83.35	83.45	83.55	83.65	83.50
Brazil	18.76	18.98	19.20	19.42	19.09
All	48.19	48.37	48.54	48.71	48.45

It is noteworthy that the mean technical efficiency (TE) over this period, among these countries, was 48.45 per cent and remained almost constant, without any significant improvement in the behind-the-border constraints. The insignificant eta term supports this result. Mean TE among the trading blocs in 2012 is slightly higher than the mean TE over the entire period. Among the trading blocs, export flow is most efficient in the SAARC bloc, with the highest TE score of 64.18 per cent, followed by the NAFTA bloc, with an efficiency score of 60.22 per cent, which is mostly attributed to the high TEs of USA and Canada. Interestingly, the geographical distance factor did not play a role here since Bangladesh has been maintaining good economic ties with these two countries over a long period.

Another important finding is that in the EU trading bloc, which is the largest trading bloc for Bangladesh, the efficiency parameter varies greatly. In this bloc, the TE is as high 87.87 per cent with Germany, and as low as 7.22 per cent with Finland and Austria, and 6.67 per cent Greece, and an overall mean efficiency of 46.49 per cent. Similarly, in the ASEAN region, the TE score is very low for Thailand (6.97 per cent), Malaysia (14.30 per cent) and Indonesia (15.17 per cent), despite having trade agreements, compared to Singapore (61.05 per cent), with which Bangladesh has no trade agreements. In general, the TE score is below 50 per cent, suggesting that there is a large gap between actual exports and potential exports.

The table below (Table 3), shows the results of the calculations for the country-specific export gaps, which could be achieved if there were no behind-the-border constraints.

Table 3: Country and trading bloc-wise Bangladesh's export potential and export gap in thousand USD with its top forty trading partners, 2008–2011

Country/trading blocs	Mean actual export (Thousand USD)	Mean potential export (Thousand USD)	Mean export gap (Thousand USD)
EU	627,241.11	1,114,493.30	487,252.19
Germany	2,660,559.37	3,026,956.13	366,396.76
UK	1707,310.12	2,133,896.69	426,586.57
France	1,178,348.02	2,246,827.80	1,068,479.78
Netherlands	955,330.02	1,024,027.40	68,697.38
Italy	721,127.35	2,033,192.83	1,312,065.48
Belgium	524,075.09	636,511.87	112,436.78
Spain	733,291.66	2,252,211.95	1,518,920.29
Sweden	272,613.20	487,777.85	215,164.65
Denmark	245,912.04	369,850.69	123,938.66
Finland	31,505.32	434,204.75	402,699.43
Ireland	132,429.56	331,726.69	199,297.13
Austria	41,155.33	568,115.42	526,960.10
Portugal	47,490.24	347,302.33	299,812.09
Poland	119,856.50	333,758.15	213,901.65
Greece	37,612.88	491,038.96	453,426.08
NAFTA	1,709,674.14	2,191,925.48	482,251.34
USA	4,286,159.12	4,921,569.55	635,410.42
Canada	759,281.47	923,820.63	164,539.16
Mexico	83,581.84	730,386.27	646,804.44
ASEAN	51,208.91	241,489.86	190,280.94
Singapore	111,613.77	182,702.16	71,088.38
Thailand	30,053.18	429,742.80	399,689.62
Vietnam	39,032.14	81,146.82	42,114.68
Malaysia	45,976.95	320,597.35	274,620.41
Indonesia	29,368.52	193,260.15	163,891.64
East Asia	214,254.42	1,231,665.85	1,017,411.43
Hong Kong	165,740.55	185,335.06	19,594.52
Japan	339,712.64	848,717.38	509,004.75
Korea	138,253.07	261,843.55	123,590.48
China	213,311.43	3630,767.41	3,417,455.99
EFTA	73,659.34	176,503.27	102,843.93
Norway	58,375.00	140,089.41	81,714.41
Switzerland	88,943.68	212,917.13	123,973.45
SAARC	206,639.30	434,012.32	227,373.03
Pakistan	80,002.45	93,693.13	13,690.68
India	333,276.15	774,331.52	441,055.37
Others	132,155.82	269,440.07	137,284.25
Australia	154,139.20	355,580.16	201,440.96
UAE	100,479.03	270,512.48	170,033.45
Iran	72,224.97	79,444.02	7,219.06
Turkey	523,410.53	577,332.19	53,921.66
Syria	27,076.57	31,428.40	4,351.83
Russia	73,574.98	358,255.81	284,680.83
Saudi Arabia	99,453.80	224,844.99	125,391.19

Sudan	49,177.11	58,894.73	9,717.62
Brazil	89,866.23	468,667.87	378,801.64

Notes: Potential export has been measured by equation (6) and the gap is the difference between actual and potential export.

These results highlight that, although there is an export gap in every country included in the sample, there are huge deviations of actual export volumes and potential level of exports amongst these countries. In the EU region, France, Italy and Spain show the greatest potential. This suggests that, although Bangladesh has been trading with these countries for quite some time, the level of export is nowhere near its potential. Countries with large markets, like China, India, Russia and Brazil, and highly developed economies like USA and Australia, also bear very high export potential.

5. Conclusion

Since 1990 Bangladesh has been pursuing an export-led growth strategy in its journey to become a middle-income country. Although the success of the country so far in this regard is notable, the export sector is highly vulnerable to external shocks due to the lack of diversity in its export portfolio, in terms of both products and destinations. Also, as a developing country, it is believed that the potential export performance is affected by several socio-political-institutional behind-the-border constraints. By applying a stochastic frontier gravity model, this study examined the core variables that affect Bangladesh's export industry; the extent that behind-the-border constraints are responsible for its export performance; and the potential level of exports that can be achieved given the existing trade barriers, after controlling for the behind-the-border constraints.

The results show that export levels are positively affected by the GDP of Bangladesh and its trading partners, exchange rates and trade agreements. On the other hand, distance and tariffs have a negative impact on exports. The study also revealed that behind-the-border constraints play a significant role in restricting exports to reach their potential level. It also shows that there was virtually no improvement in these conditions during the study period. This has a significant policy implication, suggesting that either no visible policy measures were taken to improve the behind-the-border constraints, or if any measures were taken, they were ineffective.

Therefore, as a matter of priority, Bangladesh needs to take effective measures to reduce the impact of behind-the-border constraints by improving its customs procedures, port inefficiencies, internal connectivity, corruption index and other trade-related socio-political-institutional factors. The study shows that Bangladesh has huge scope for realizing the untapped export potential by integrating more efficiently with the international market. It has also revealed that there exists a huge variation in exports with some countries even in the same trading blocs, despite trade agreements being established. This gives food for thought for the policy makers to develop trading partner-specific strategies in diversifying Bangladesh's export portfolio and expanding its export volume.

There are a few limitations of the study. First, it could not identify the specific behind-the-border reasons that impact the export flow due to unavailability of data. Second, it used the average tariff instead of weighted average tariff and, third, it did not take into account the terms of trade effect due to price changes in the empirical model. Therefore, further research should be undertaken to address these limitations.

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