ORIGINAL RESEARCH:

Impact of foreign direct investment, trade openness, domestic demand and exchange rate on export performance in Bangladesh

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Abstract

The impact of foreign direct investment (FDI), trade openness, domestic demand, and exchange rate on the export performance of Bangladesh is examined over the period of 1980-2009 using the vector error correction (VEC) model under the time series framework. The stationarity of the variables is checked both at the intercept and intercept plus trend regression forms under the ADF and PP stationarity tests. The Johansen-Juselius procedure is applied to test the cointegration relationship between variables. The VEC model is implemented on the intercept, and intercept plus trend cases. The empirical results trace a long-run equilibrium relationship between the variables. FDI is found to be an important factor in explaining the changes in exports both in the short run and long run. However, the study does not trace any significant causal relationship for the cases of trade openness, domestic demand and exchange rate. It is concluded that Bangladesh should formulate FDI-led polices to enhance its exports.

JEL classification: C33, F21, O16, O57

Keywords: Bangladesh, Foreign direct investment, Domestic demand, Exchange rate, Export, Time series study, Trade openness, Vector error correction (VEC) model

Introduction

During the past two decades, the participation of developing economies in world exports has increased considerably from 26.56% in 1990 to 32.54% in 2000, leveling off at 39.89% in 2007, while the same has decreased for the industrialized economies from 72.11% in 1990 to 58.95% in 2007 (Figure 1). The share of developing economies in the world foreign direct investment (FDI) inflows has also grown substantially over the last three decades, increasing from a minimum of 13.83% in 1980 to 48.93% in 2009, whereas the same index has decreased for developed economies from its peak at 86.13% in 1980 to 50.79% in 2009 (Figure 2). Therefore, I attempted to investigate whether the developing economies have relied on the FDI-led exports growth model to increase their stake in exports and FDI.

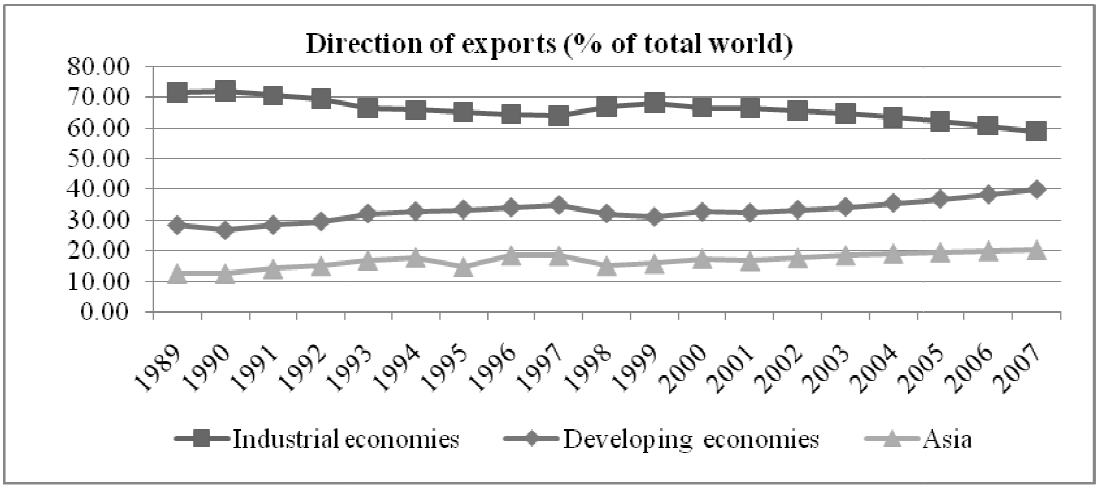

Figure 1: Direction of World Exports (1989-2007)

Source: author, using data of trade statistics year book, IMF 2007.

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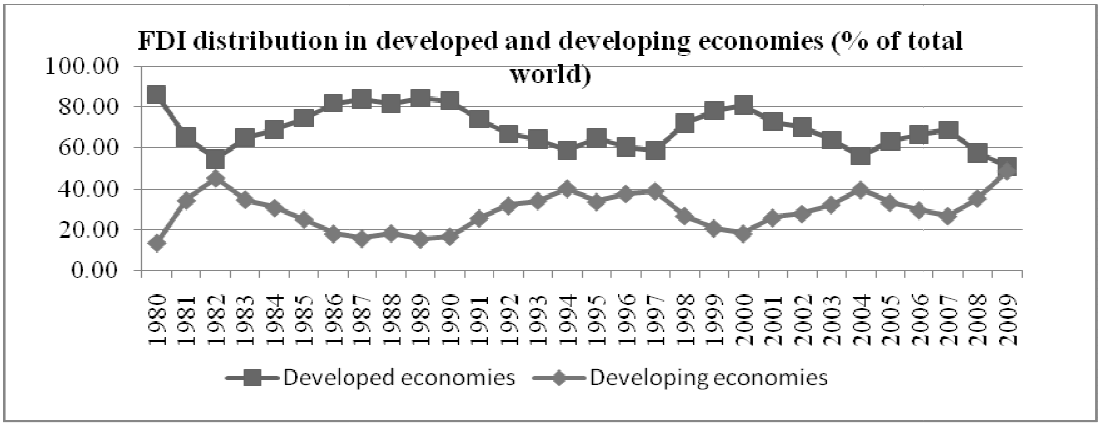

Figure 2: FDI Distribution between Developed and Developing Economies (1980-2009)
Source: author, using data from the WDI database, World Bank, 2010

Bangladesh, being a developing economy, has been no exception. Since the early 1980s, Bangladesh adopted the 'export-led growth' model by changing its import-substitution-led industrial growth model to resolve macroeconomic problems such as trade deficit, unemployment and a low foreign exchange reserve As a major vehicle of the export-led growth model, the government enacted the Foreign Private Investment (Promotion and Protection) Act in 1980 to provide a legal protection for FDI made in Bangladesh against state expropriation and nationalization. To boost export by attracting foreign capital, the government also established several Export Processing Zones (EPZs) in the 1980s to provide a congenial investment climate free from bureaucracy and institutional bottlenecks. Simultaneously, the government pursued greater trade liberalization policy by introducing various fiscal and non-fiscal incentives; these include an omission of tariff and non-tariff barriers in importing capital machinery, spare parts, raw and construction materials for the hundred percent export oriented industries; duty and tax free export facilities for the industries located in EPZs; cash incentives and export subsidies from five to twenty percent on the free on board (FOB) value of selected products; ten years tax exemptions for investment in EPZs, and five to seven years tax holiday for investment made other than EPZs. In addition, the government gradually lifted restrictions on repatriation of capital and profits, and unleashed almost all industrial sectors to foreigners investing independently or jointly with local partners (Adhikary 2011).These incentives together with a low labor cost structure and reasonable GDP growth rate (5% on average since 1990) have made Bangladesh a resilient and attractive investment destination for foreign investors since the late 1980s.

Figure 3 presents the decade-wise average performance of exports, FDI, trade openness, exchange rate and domestic demand in Bangladesh over the period of 1980-2009. It shows that the average exports (expressed as the value of exports over GDP) in Bangladesh increased from 5.24% in the 1980s to 16.99% in the 2000s, and the decade-wise average performance of FDI (expressed as a percentage of GDP) increased from 0.01% in the 1980s to 1.02% in the 2000s. Likewise, the average economic openness, measured by the trade over GDP, significantly increased during the previous three decades, from 19.23% in the 1980s to to 40.48% in the 2000s. On the other hand, the average domestic demand (measured by the government expenditure over GDP) has remained almost constant at 4.52% in the decades of the 1980s and the 1990s, although it increased slightly to 5.20% in the 2000s. Importantly, the relative strength of the domestic currency, Bangladeshi Taka (BDT), in terms of the US dollar decreased by almost two and a half times during the last three decades, from BDT 25.89 per dollar in the 1980s to BDT 62.33 in the 2000s. As a whole, the positive trend of FDI, exports, domestic demand, trade openness, and exchange rate confirms that Bangladesh has adopted an export-led growth model by encouraging FDI, opening up the domestic market, and devaluing its currency.

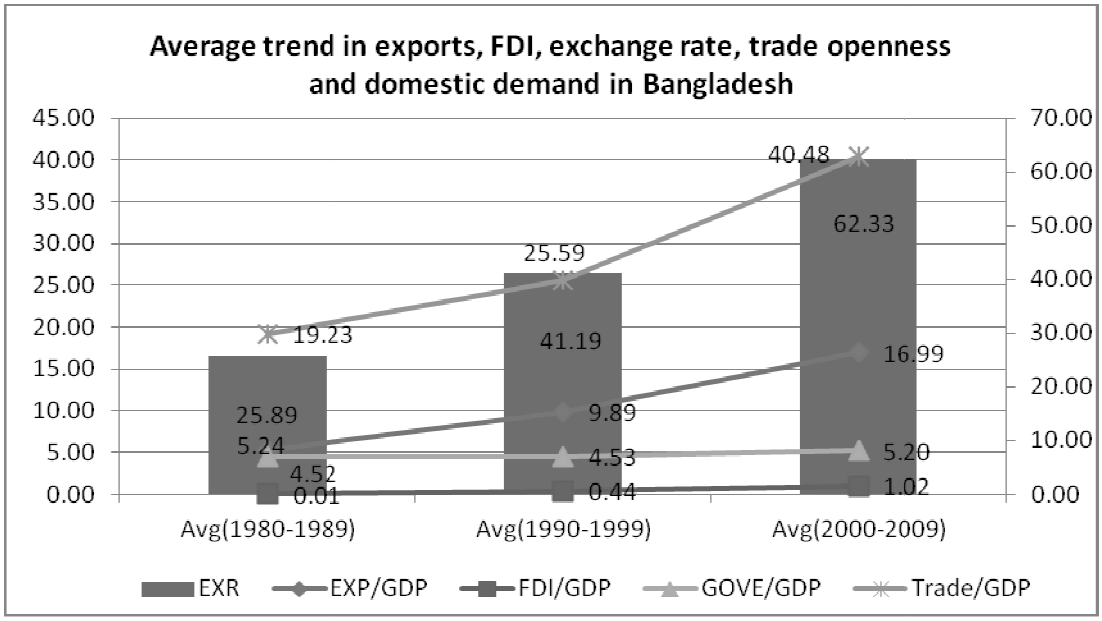

Figure 3: Decade-wise average trend in exports, FDI, exchange rate, trade openness, and domestic demand in Bangladesh. Source: author, using data from the WDI database, 2010

However, Figure 3 leaves two basic questions for investigation. First, is there a long-term equilibrium link between FDI, economic openness, exchange rate, domestic demand, and export performance in the context of Bangladesh? Second, is the link unidirectional or bi-directional? We have attempted to address these questions empirically.

The empirical work on the link between FDI, trade openness, exchange rate, domestic demand, and export is confounding. For instance, a positive relationship between trade openness and export performance was documented by Michealy et al. (1991), Weiss (1992), Santos-Paulino (2000), Ahmed (2000), Niemi (2001), and Babatunde (2009); while a negative link was reported by Agosin (1991), Greenaway and Sapsford (1994), Shafeuddin (1994), Moon (1997), Morrissey and Mold (2006). Likewise, a positive link between FDI and export was reported by Dritsaki et al. (2004), Sharma (2000), Liu et al. (2001), Xing (2006), Xuan and Xing (2008); whereas Sevensson (1996) documented a negative association between them. In addition, Petri and Plummer (1998) and Hsiao and Hsiao (2006) unveiled an insignificant relationship between them. Similarly, the relationship found between exchange rates and exports in empirical literature is controversial. For Instance, Bahmani- Oskooee and Ltaifa (1992), Arizi (1995), and Arize et al. (2000) reported a negative relationship between exchange rate volatility and exports performance; while Bailey et al. (1987), Assery and Peel (1991), and Abbott et al. (2001) did not trace any link between them; however, Wong and Tang (2007) documented a positive association. By the same token, ADB (2005) reported a negative association between exports and growth rate of domestic demand in the Southeast Asian countries, whereas Lai (2004) reported a short-run bilateral causal connection between them. Table 1 presents a summary of recent empirical studies that investigated the long-run relationship between FDI, trade openness, domestic demand, exchange rate, and exports using different estimation models. These studies also present conflicting results, as some authors traced a long-run equilibrium relationship in the variables, whereas others reported a very weak, or no relationship at all. Moreover, some authors documented a bi-directional causal relationship, whereas others reported unidirectional causality or no causal relationship in the variables of their studies.

Table 1: A Brief Summary of Recent Studies

Author(s) and Date	Variable Used	Country, Coverage and Method	Findings
Chimobi and Uchi, 2010	Gov't consumption, household consumption, real GDP, export	Nigeria; Annual data (1970-2005), VAR	• No long-run equilibrium relationship. • Export causes domestic demand • Bilateral causality between export and household consumption
Prasanna, 2010	Inward FDI, total manufactured exports, high technology manufactured exports, manufacturing value added	India ; Annual data (1991-92- 2006-07); OLS	FDI significantly influences exports
Martinez-Martin, 2010	FDI, exports, domestic income, world income and competitiveness.	Spain; Annual data (1993-2008); VECM	A positive Granger causality runs from FDI to exports in the long-run.
Duasa, 2009	Volume of exports and imports, REER, trade balance	Malaysia; Annual data (1999-2006); TAR & M-TAR	A long-run asymmetric cointegration exists between REER and exports.
Babatunde, 2009	Merchandise exports, REER, average tariff rate, exchange rate, imports of raw material	Sub-Saharan Africa; Annual Data (1980-2005); Panel fixed effect and random effect	REER stimulates exports
Njong, 2008	Real exports, real GDP, REER, import over total international trade, export over total international trade, lag exports, lag FDI stock	Cameroon; Annual data (1980-2003), AR(p)	FDI and REER significantly influence exports
Wong, 2008	GDP per capita, exports, private consumption, government consumption, Investment	ASEAN 5; Annual data (1960-1996), Error correction, Granger causality	• A long-run relationship exists between variables • Bidirectional Granger causality between exports and GDP; and private consumption and GDP per capita.
Mortaza &Das, 2007	FDI inflows, import and export over GDP, M2/GDP, literacy rate, domestic investment & inflation	Bangladesh, India, Pakistan, Sri Lanka, and Nepal; Annual Data (1980-2004); VAR , Panel fixed effect, and random effect	Unidirectional relationship between FDI, trade liberalization and economic growth for Bangladesh and Pakistan
Hsiao & Hsiao, 2006	Real FDI inflows, real GDP per capita, real exports	China, Korea, Hong Kong, Singapore, Taiwan, Malaysia, Thailand & the Philippines; Annual data (1986-2004); Panel VAR	Bidirectional causality between exports and GDP
Sahoo, 2006	FDI, world income growth, infrastructure index, domestic demand, exports, REER, GDP growth	Bangladesh, India, Pakistan, Sri Lanka, Nepal; annual data (1975-2003); Panel fixed effect	FDI positively influences exports.
Arize,1995	Log real exports, log REER, log real foreign income	USA; Monthly data (1971:2 – 1991:3); Error correction, ARCH, linear moment	• A long-run equilibrium relationship exists. • Exchange rates and exports are negatively associated

On a final note, empirical studies do not have consensus over the relationship between FDI, trade openness, domestic demand, exchange rate, and exports. In this respect, Chakrabarti (2001) and Hsiao and Hsiao (2006) report that these wide differences are primarily due to the authors' perspectives, sample selection, measurement of variables, inclusion of other

variables, econometric models, and analytical tools applied in their studies. Besides, the country-specific characteristics such as the degree of technological, economical, infrastructural, and institutional developments may be responsible for some of the controversial results. Thus, this paper aims at accumulating empirical knowledge by investigating the nexus between FDI, trade openness, domestic demand, exchange rate, and exports in the context of Bangladesh, which is a growing economy in South Asia.

Methodology

We have sought to trace the long-run equilibrium relationship between FDI, trade openness, domestic demand, exchange rate, and exports of Bangladesh over the period of 1980-2009 using a time series framework. In doing so, we have measured FDI as a percentage of GDP following Nath (2009), Asiedu (2002) and Tsai (1994). For the measurement of trade openness, a number of measures were used in empirical literature, including the trade volume over GDP, import over GDP, average tariff rate, total taxes on international trade, population densities, and so on. However, the data on tariffs and taxes on international trade was not available in the context of Bangladesh; and it was not logical to consider trade volume-related measures of openness for this study, as it uses exports as a dependent variable. Yanikkaya (2003) has argued that population density can be used as a measure of trade openness, as countries with higher densities tend to have more international contacts. Thus, I took the density of population (per square kilometer) as an indicator of trade openness, following Yanikkaya (2003), and Sachs and Warner (1995). Domestic demand was proxied by the government final consumption over GDP following Sahoo (2006). Considering the fact that Bangladesh conducts major exports in the US dollar, the exchange rate was indexed by Bangladeshi Taka (BDT) per US dollar. Finally, the export of goods and services as a percentage of GDP was the proxy to measure exports. All data was obtained from the database of World Development Indicators (World Bank) and the Direction of Trade Statistics (International Monetary Fund); and the sample covered thirty annual observations.

It is worthwhile to note that the data set of this study is not free from small sample bias, which may result in inefficient estimates of the parameters. One strategy to remove the small sample bias is to consider monthly, quarterly or semi-annual data. However, such forms of data for FDI were not available for Bangladesh before 1995. Also, Beck and Levine (2004) doubt that the use of quarterly data produces any better result than annual data. Therefore, I used annual observations from the year 1980 in order to cover the reform period of FDI, and I expected that thirty yearly observations would be reasonable for Bangladesh, which got independence in 1971.

The empirical estimation of the study proceeds as follows; it begins with checking the normality of distribution by invoking the Jarque–Bera test. Next, it proceeds to detect the presence of unit root under a univariate analysis by employing both the Augmented Dickey- Fuller (ADF) (following Dickey and Fuller 1981; Fuller 1996) and the Phillips-Perron (PP) tests (following Phillips 1986; Phillips and Perron 1988; Perron 1989). The advantage of the PP test over the ADF test is that the PP test takes into account the serial correlations by making corrections to the t-statistics of the coefficients of the lagged variables, not by adding the differenced term of the lagged variables (Miankhel et al. 2009). The unit root test was also conducted both at the intercept and intercept plus trend regression forms. In the event of stationarity of each variable at the level test, an Ordinary Least Square (OLS) regression would be run, as in equation 1, where EXPG = export of goods and services over GDP, FDIG = foreign direct investment as a percentage of GDP, PDEN = population density, GFCG = government final consumption over GDP; EXR represents the exchange rate of the domestic currency over the US dollar; the disturbance term (ε) is assumed to be independently and identically distributed; and the subscript (t) denotes time:

$$EXPG_t = \alpha + \beta FDIG_t + \Omega PDEN_t - \Psi GFCG_t + \zeta EXR_t + \varepsilon_t \qquad \text{equation (1)}$$

If the series is found stationary and integrated in the same order, the dynamic relation of the variables can be studied by employing the simple Vector Autoregressive (VAR) model, as given in equation 2 in a matrix form.

$$\begin{bmatrix} EXPG_t \\ FDIG_t \\ PDEN_t \\ GFCG_t \\ EXR_t \end{bmatrix} = \alpha_0 + \alpha_1 \begin{bmatrix} EXPG_{t-1} \\ FDIG_{t-1} \\ PDEN_{t-1} \\ GFCG_{t-1} \\ EXR_{t-1} \end{bmatrix} + \alpha_2 \begin{bmatrix} EXPG_{t-2} \\ FDIG_{t-2} \\ PDEN_{t-2} \\ GFCG_{t-2} \\ EXR_{t-2} \end{bmatrix} + \ldots + \alpha_n \begin{bmatrix} EXPG_{t-n} \\ FDIG_{t-n} \\ PDEN_{t-n} \\ GFCG_{t-n} \\ EXR_{t-n} \end{bmatrix} + \varepsilon_t \quad \text{equation (2)}$$

However, if the series is found not integrated in the same order, the dynamic relationship of the variables cannot be studied using a simple vector autoregressive (VAR) model, as this generates a spurious relationship. After confirming the stationarity of the variables, the study proceeds to trace the cointegration relationship between variables by applying the Johansen-Juselius procedure (following Johansen 1988; Johansen-Juselius 1990, 1992). It must be noted that in order to run the Johansen cointegration test, all the series under study must be integrated in the same order, either in a level or in a differenced form. This implies that the difference between two or more nonstationary series becomes stationary when they move together in the long run, even though they may drift apart in the short run. The maximum eigenvalue (λ_{max}) and the trace (λ_{trace}) tests are used to detect a cointegrating vector. These are computed as follows:

$$\lambda_{max} = -T \log(1- \hat{\lambda}_{r+1}) \quad \text{equation (3)}$$

Where the appropriate null is r = g cointegrating vectors with (g = 0, 1, 2, 3, ---), against the alternative that r ≤ g+1.

$$\lambda_{trace} = -T \sum_{i=r+1}^{k} \log(1-\hat{\lambda}_i) \quad \text{equation (4)}$$

Where the null is r = g, against the more general alternative r ≤1.

It must be noted that in the presence of one or more cointegrating vectors, the simple VAR method does not produce the desired results unless an error correction term is included in the model. Thus, a VEC model was implemented in this study as outlined in Granger (1988). Based on the base equation (1), the VEC model was specified as follows:

$$\Delta EXPG_t = \alpha + \lambda e_{t-1} + \sum_{i=1}^{n} bi\Delta EXPG_{t-i} + \sum_{i=1}^{m} ci\Delta FDIG_{t-i} + \sum_{i=1}^{o} di\Delta PDEN_{t-i} + \sum_{i=1}^{p} ei\Delta GFCG_{t-i} + \sum_{i=1}^{q} fi\Delta EXR_{t-i} + \varepsilon_t \quad \text{equation (5)}$$

In this specification, the parameter (λ) of the lagged error correction term (e_{t-1}) indicated the long run relationship in the variables being studied, and also the speed of adjustment from the short run to the long run equilibrium state. Importantly, the parameter of the error correction term needs to be negative and statistically significant in terms of its

associated t-value to confirm the long run equilibrium relationship in the variables. The appropriate lag-length of the variables was selected through the final prediction error (FPE) criterion (following Akaike 1969) to ensure that errors were white noise. This also overcomes the over/under parameterization problem which may induce bias and inefficiency in the estimates. The changes in FDI, trade openness, domestic demand, and exchange rate cause the changes in exports when ci's, di's, ei's and fi's are significant in terms of the F-test (Bahmani and Payesteh 1993). The stability of the VEC model was ensured through the test of inverse roots of the AR characteristic polynomial. Besides, impulse response analysis was performed by giving a shock of one standard deviation ($\pm$ 2 S.E. innovations) to FDI, domestic capital, exchange rate and trade openness to visualize the duration of their effects on the export performance of Bangladesh. Finally, a variance decomposition analysis was conducted to detect additional insights.

Results and Discussion

Table 2 presents the descriptive statistics of the variables under study. The Jarque-Bera test statistics failed to reject the null hypothesis of the normal distribution of each variable, which confirmed that the series was normally distributed. Besides, the numeric of kurtosis for each variable was below three (3), which indicated the normality of distribution. The figure for skewness of each variable was found to be mild and positively skewed, except for the PDEN, which was slightly negatively skewed. The standard deviation of the series was low when compared to the mean, which indicated a small coefficient of variation. In addition, the range of deviation between the maximum and minimum of each individual series was found to be reasonable in comparison to the mean. Finally, the mean over median ratio for each series was approximately one, except for the variable FDIG, which represented the normality of distribution. As a whole, the normality of distribution was ensured in the study**.**

Table 2: Descriptive statistics of the variables under study

	EXPG	FDIG	GFCG	EXR	PDEN
Mean	10.70737	0.489560	4.752917	43.13352	974.0180
Median	9.940950	0.147312	4.560223	40.24500	974.3702
Maximum	20.94193	1.466819	6.141041	69.03900	1247.350
Minimum	3.279997	-0.034744	4.136337	15.45400	694.4548
Std. Dev.	5.362085	0.547602	0.529910	16.13736	169.0222
Skewness	0.439155	0.569072	0.869562	0.184698	-0.019984
Kurtosis	1.918284	1.767174	2.769086	1.945019	1.783609
Jarque-Bera	2.426920	3.519043	3.847345	1.561797	1.851506
Probability	0.297167	0.172127	0.146070	0.457994	0.396233
Sum	321.2210	14.68681	142.5875	1294.006	29220.54
Sum Sq. Dev.	833.8068	8.696180	8.143347	7552.017	828486.3
Observations	30	30	30	30	30

Tables 3 and 4 display the results of the unit root test both at the intercept and the intercept plus trend regression forms for the level and the first difference series, respectively under the ADF and the PP tests. The ADF test statistics revealed that all the level series were nonstationary at their intercept and intercept plus trend regression forms, except for the PDEN series, which showed no unit root (in the case of the intercept plus trend) at the 5% level of significance. Likewise, the PP test statistics indicated nonstationarity in the level series, except for the GFCG series, which showed stationarity both at the intercept and intercept plus trend regression forms at the 5% and 1% level of significance, respectively. This was done by comparing the calculated ADF and PP test statistics with their respective Mackinnon (1996) critical values both at the 1% and 5% level of significance. Hence, the study proceeded to differencing the series to check their stationarity. At the first

differencing, both the ADF and PP tests clearly rejected the null hypothesis of unit root at the intercept and intercept plus trend cases both at the 1% and 5% level of significance. Clearly, all the series confirmed stationarity at the first differencing. Thus, it was concluded that they depict the same order of integration, i.e. I (1) behavior. As a result, the study employed the Johansen-Juselius cointegration test on the level series to detect the cointegration relationship in the variables.

Table 3: ADF Unit Root Test for Stationarity

	Level		First Difference	
	Intercept	Intercept plus Trend	Intercept	Intercept plus Trend
EXPG	1.015487	-2.528736	-6.429114***	-7.213010***
FDIG	-1.629711	-2.963173	-6.178839***	-6.024192***
GFCG	-1.186519	-2.239703	-8.420725***	-7.845780***
EXR	0.389952	-1.480079	-5.144659***	-5.098499***
PDEN	-0.263170	-3.662075**	-3.894389***	-3.692696**

Table 4: PP Unit Root Test for Stationarity

	Level		First Difference	
	Intercept	Intercept plus Trend	Intercept	Intercept plus Trend
EXPG	1.533520	-2.528736	-6.392610***	-7.270672***
FDIG	-1.505811	-2.953038	-6.193253***	-6.035065***
GFCG	-3.280270**	-6.152219***	-16.95955***	-17.41754***
EXR	-0.650537	-1.995489	-3.472748***	-3.349969**
PDEN	-2.468145	-2.136851	-3.091485**	-3.289305**

Note: The Mackinnon (1996) critical values are -3.699871 and -2.976263 at 1% and 5 % levels of significance, respectively. *** indicates significance at the 1% level and ** at the 5% level.

Table 5 summarizes the results of the Johansen co-integration test both in the intercept and intercept plus trend regression forms. In both cases, the trace test and the maximum eigenvalue test yielded one cointegrating equation at the 5% level of significance. Thus, it was concluded that the series were cointegrated and a long-run equilibrium relationship existed among them. As a result, the study proceeded to run the vector error correction model outlined in equation 5.

Table 5: Johansen Unrestricted Cointegration Rank Test (Trace and Max-eigenvalue)

	Intercept				Intercept plus trend			
	eigenvalue	Trace statistic	0.5% CV	Prob.**	eigenvalue	Trace statistic	0.5% CV	Prob.**
Trace test	0.791	82.710	69.818	0.0033*	0.893	114.441	88.803	0.0002*
Max-eigenvalue test	0.791	43.853	33.876	0.0024*	0.791	62.591	38.331	0.0000*

*denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values.

Table 6 portrays the results of the vector error correction model. To run the VEC model, the appropriate lag-length (lag 1) of the variables was selected through the FPE criterion, following Akaike, 1969. Table 6 reveals that a long run equilibrium relationship existed among the variables. This was observed through the estimated parameter (λ) of the error correction term ($e^{\wedge}_{t-1}$), which is negative as expected. In addition, FDI was found to have a significant short-term positive impact on the export performance of Bangladesh. Besides, a mild short-term negative relationship was found between trade openness and exports, as the parameter of trade openness is traced significant approximately at the 10% level of significance. Such negative relationship was probably due to the high imports demand of Bangladesh, which caused the trade balance of the country to be negative for most of the years since the 1980s. On the other hand, the numeric of adjusted R^2 shows a low explanatory power of the model, meaning that other explanatory variables not included in the study may have significant influence on exports. The low numeric of the F-statistic further indicates that there is not a strong feedback effect or the presence of Granger bi-directional causality between the variables. However, a unidirectional causality was traced between FDI and exports. As a whole, the VEC model shows that a long run equilibrium relationship exists between FDI, trade openness, domestic demand, exchange rate, and export performance of Bangladesh without having any noticeable bi-directional causal relationship. The stability of the VEC model was ensured through the test of inverse roots of the AR characteristic polynomial.

Table 6: Estimates of VEC Model

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	15.69342	9.154058	1.714368	0.0894
$e^{\wedge}_{t-1}$	-0.050018	0.054919	-0.910753	0.3645
ΔEXPG(-1)	-0.331052	0.202225	-1.637051	0.1046
ΔEXR(-1)	-0.080263	0.189708	-0.423090	0.6731
ΔFDIG(-1)	1.269648	0.582515	2.179598	0.0315
ΔGFCG(-1)	0.190388	0.541548	0.351562	0.7259
ΔPDEN(-1)	-0.778147	0.470700	-1.653171	0.1013
R-squared	0.333364	Mean dependent var		0.559707
Adjusted R-squared	0.142896	S.D. dependent var		0.984798
S.E. of regression	0.911725	Akaike AIC		2.865362
Sum squared resid	17.45610	Schwarz SC		3.198413
Log likelihood	-33.11506	F-statistic		1.750240

Figure 4 reports the impulse responses. It indicates how a one-time positive shock of one standard deviation (± 2 S. E. innovations) to the FDI, domestic demand, exchange rate, and trade openness impacts on the export performance of Bangladesh. It shows that the impulse response of FDI and exchange rate devaluation on exports is positive but diminishes as time goes on. However, the influence of FDI becomes slightly negative after the sixth period. On the other hand, the initial positive shock given to the domestic demand (GFCG) influences exports positively, but becomes negative soon from the second year. Following the negative trend, it becomes insignificant from the fifth year onwards. In contrast, the response of trade openness (PDEN) to exports unearths a negative influence over time.

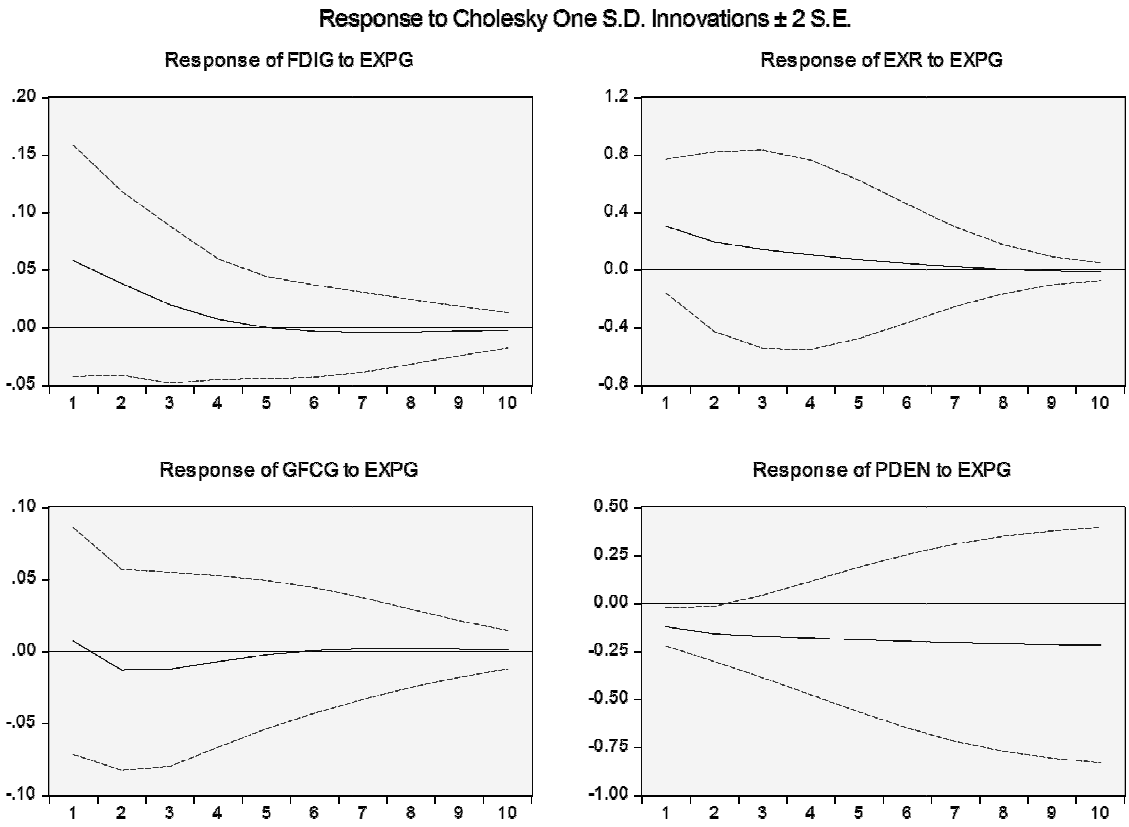

Figure 4: Impulse response of FDIG, EXR, GFCG, and PDEN on EXPG

Table 7 presents the output of the variance decomposition analysis of exports. Table 7 reveals that the variance of exports is mainly fed on itself during the first four years. Thereafter, it declines but remains influential. In the second year, the variance of exports is decomposed into its own variance (67%) followed by FDI (32.67%). However, in subsequent years, the share of FDI increases and reaches the maximum (51.98%) in the seventh year. Then its influence declines, although it remains as a top factor in explaining exports. On the other hand, the share of trade openness, exchange rate, and domestic demand increases gradually from the second year but remains insignificant within the limit of 4%. To conclude, the volatility of exports is mainly fed by its own variation followed by FDI.

Table 7: Variance Decomposition of Exports

Period	EXPG	FDIG	EXR	GFCG	PDEN
1	100.00	0.000	0.000	0.000	0.000
2	67.00	32.67	0.316	0.000	0.000
3	61.36	37.77	0.279	0.516	0.060
4	52.61	44.85	0.718	1.651	0.156
5	47.50	48.65	1.162	2.316	0.361
6	43.96	51.14	1.471	2.772	0.647
7	42.37	51.98	1.569	3.069	0.997
8	42.04	51.81	1.537	3.245	1.360
9	42.627	50.91	1.441	3.317	1.696
10	43.73	49.63	1.336	3.315	1.969

Conclusion

This study investigated the influence of FDI, trade openness, domestic demand, and exchange rate on the export performance of Bangladesh over the period of 1980-2009 by applying a vector error correction model. The results of the ADF and PP unit root tests indicate that all variables in the study were integrated in order one. The test statistics (trace and eigenvalue) of the Johansen cointegration test conducted on the intercept and intercept plus trend regression forms indicate the presence of a cointegration relationship among the variables. In addition, the negative parameter of the error correction term confirms that a long run equilibrium relationship existed among the variables. Besides, a strong short-term causal flow (unidirectional) is evidenced between FDI and exports. In addition to that, trade openness demonstrated a very mild short-term influence on exports, as the coefficient of the trade openness was significant at the 10% level. However, the study did not find any significant relationships between domestic demand, exchange rate, and exports. Moreover, the low value of the F-statistics does not indicate any short-term feedback relationship in the system. Precisely, the VEC model traced a long run equilibrium relationship in the variables under study without having any significant short-term causal flows between them, except for the FDI.

Furthermore, the impulse response function revealed a positive but diminishing influence of FDI and exchange rate on the export performance of Bangladesh. On the contrary, a mild negative influence was found for domestic demand at its initial years, which became insignificant after the fourth year. However, trade openness revealed a negative influence on exports over time. Finally, the variance decomposition analysis revealed that the variance of exports was primarily caused by its own variance followed by the volume of FDI. It is to be noted that the role of FDI in explaining the volatility of exports was more influential from the fifth year onwards. On the other hand, the role of domestic demand, exchange rate, and trade openness was found to be very minimal in causing the changes in exports.

The policy implications of this study can be summarized in the following points. First, a long term link exists in the nexus of FDI, domestic capital, exchange rate, trade openness, and exports performance of Bangladesh. This link indicates that the government of Bangladesh should utilize the above factors carefully on a long run perspective to capitalize on the benefits of the nexus properly. Second, FDI is probably an important factor in explaining the changes in exports. Thus, an FDI-led growth policy can be advocated to increase the country's overall exports and the rates of GDP growth as well. Third, trade openness tends to create an adverse impact on exports. Hence, the government should manage trade policies effectively. In fact, Bangladesh is a highly import-oriented economy with an unfavorable trade balance. Notably, three-fourths of its exports belong to a single sector – the readymade garments (RMG). Unfortunately, the net value addition of the RMG sector is limited to within 15 to 20%. Thus, an appropriate trade policy that would neither influence higher import costs nor create an adverse effect on exports is sine qua non for Bangladesh. Fourth, the VEC based Granger causality test did not reveal any short-term causal relationship between variables under study, except for the FDI. This also implies that the government of Bangladesh should design export and FDI policies in a way that they become complementary to one another.

In the end, it must be said that this study is not free from limitations. For instance, the study used a single indicator for trade openness, domestic demand and exchange rate. Multiple indicators of the explanatory variables along with different measures of exports may generate different conclusions. Nonetheless, this study adopted the latest technique to gauge the link in the variables being studied, which may provide an important basis for future research on Bangladesh.

References

Abbott, Andrew., Adrian C Darnell, Lynne Evans. 2001. "The Influence of Exchange Rate Variability on UK Exports". *Applied Economic Letters* 8(1):47-49.

Adhikary, Bishnu Kumar. 2011. "FDI, Trade Openness, Capital Formation, and Economic Growth in Bangladesh: A Linkage Analysis". *International Journal of Business and Management* 6(1): 16-28.

Agosín, Manuel R. 1991. "Trade Policy Reform and Economic Performance: A Review of the Issues and Some Preliminary Evidence". *UNCTAD Discussion Papers,* No.41. UNCTAD, Geneva.

Ahmed, Nasiruddin. 2000. "Export Responses to Trade Liberalization in Bangladesh: A Cointegration Analysis". *Applied Economics* 32(8): 1077-1084.

Akaike, Hirotogu. (1969). Fitting Autoregressive Models for Prediction". *Annals of the Institute of Statistical Mathematics,* 21(1): 243-247.

Arize, Augustine C. 1995. " The Effects of Exchange Rate Volatility on U.S. Exports: An Empirical Investigation". *Southern Economic Journal* 62(1): 34-43.

Arize, Augustine C., Thomas Osang, Daniel J. Slottje.2000. "Exchange-Rate Volatility and Foreign Trade: Evidence from Thirteen LDC's". *Journal of Business and Economic Statistics* 18(1):10-17.

Asseery, A., and David A. Peel. 2001. "The effects of Exchange Rate Variability on Exports" Some New Estimates". *Economics Letters* 37(2):173-177.

Asian Development Bank (ADB).2005. *Asian Development Outlook*, ADB, Manila.

Asiedu, Elizabeth. 2002. "On the Determinants of Foreign Direct Investment to Developing counties: Is Africa different? *World Development* 30(1): 107-119.

Babatunde, Musibau Adetunji. 2009. "Can Trade Liberalization Stimulate Export Performance in Sub-Saharan Africa?" *Journal of International and Global Economic Studies* 2(1): 68-92.

Bahmani-Oskooee, Mohsen., and Nabil Latifa. 1992. "Effects of Exchange Rate Risk on Exports: Cross Country Analysis". *World Development* 20(8):1173-1181.

Bahmani-Oskooee, Mohsen., and Sayeed Payesteh. 1993. "Budget Deficits and the Value of the dollar: An Application of Cointegration and Error-correction modeling. *Journal of Macroeconomics* 15(4): 661-677.

Bailey, Martin J., George S. Tavlas, and Michael Ulan. 1987. "The Impact of Exchange Rate Volatility on Export Growth: Some Theoretical Considerations and empirical Results". *Journal of policy Modeling* 9(1):225-243.

Chakrabarti, Avik. 2001. "The Determinants of Foreign Direct Investment: Sensitivity analyses of Cross-Country Regressions". *Kyklos* 54(1): 89-113.

Chimobi, Omoke Philip., and Ugwuanyi Charles Uche. 2010. "Export, Domestic Demand and Economic Growth in Nigeria: Granger Causality Analysis". *European Journal of Social Sciences* 13(2): 211-218.

Dickey, David A., and Wayne A Fuller. 1981. "Likelihood Ratio Statistics for Autoregressive Time series with a Unit Root". *Econometrica* 49(4): 1057-1072.

Dritsaki, M., Dritsaki C., and Adamopoulos A. 2004. "A Causal Relationship between Trade, Foreign Direct Investment, and Economic Growth for Greece" *American Journal of Applied Science* 1(3): 230-235.

Duasa, Jarita. 2009. "Asymmetric Cointegration Relationship between Real Exchange Rate and Trade Variables: the case of Malaysia". *MPRA Paper,* No. 14535. http://mpra.ub.uni-muenchen.de/14535.

Fuller, Wayne A. 1996. *Introduction to Statistical Time Series*, New York: John Wiley and Sons.

Granger, Clive W. J. 1988. "Some Recent Developments in a Concept of Causality". *Journal of Econometrics* 39(1-2): 199-211.

Greenaway, David., and David Sapsford. 1994, "What Does Liberalization Do for Exports and Growth". *Review of World Economics* 130(1): 152-174.

Hsiao, Frank S.T., and Hsiao Mei-Chu W. 2006. " FDI Exports, and GDP in East and South East Asia- Panel Data Versus Time-series Causality Analysis". *Journal of Asian Economies* 17:1082-1106.

Johansen, Soren. 1988. "Statistical Analysis of Cointegration Vectors". *Journal of Economic Dynamics and Control* 12(2-3): 231-254.

Johansen, Soren., and Katarina Juselius. 1990. "Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money". *Oxford Bulletin of Statistics* 52(2):169-210.

———.1992. "Testing Structural Hypothesis in Multivariate Cointegration Analysis of the PPP and VIP for U.K." *Journal of Econometrics* 53(1-3): 211-244.

Lai, Y.W.2004. "The Role of Domestic Demand in the Economic Growth in Malaysia: A Cointegration Analysis". *International Economic Journal* 18: 337-352.

Liu, Xiaming., Chengang Wang, and Yinggi Wei. 2001. "Causal Links between Foreign Direct Investment and Trade in China". *China Economic Review* 12: 190–202.

Mackinnon, James G. 1996. "Numerical Distribution Functions for Unit Root and Cointegration Tests". *Journal of Applied Econometrics* 11(6): 601-618.

Miankhel, Adil Khan., Shandre Mugan Thangavelu, Kaliappa Kalirajan.2009. "Foreign direct Investment, Exports, and Economic Growth in South Asia and Selected Emerging Countries: A Multivariate VAR Analysis". *CCAS Working Paper*, No. 23. August, Doshia University.

Moon, Bruce E. 1997. "Exports, Outward-oriented Development, and Economic Growth". *Department of International Relations*, Leigh University, Bethlehem, PA.

Morrissey, Oliver., and Andrew Mold. 2006. "Explaining Africa's Export Performance-Taking a New Look". https://www.gtap.agecon.purdue.edu/resources/download /2643.pdf

Mortaza, M. Golam.,and Narayan Chandra Das. 2007. "Foreign Direct Investment, Trade Liberalization and Economic Growth: Empirical Evidence From South Asia and Implications for Bangladesh". *Working Paper Series,* No. 0712, Policy Analysis Unit, Bangladesh Bank. Bangladesh.

Michaely, Michael, Demetris Papageorgiou, and Armeane M Choksi. 1991. *Liberalizing Foreign Trade: Lessons of Experience in the Developing World*. Oxford, U.K.: Blackwell.

Nath, Hiranya K. 2009. "Trade, Foreign Direct Investment and Growth: Evidence from Transition Economies". *Comparative Economic Studies* 51:20-50.

Niemi, Jyrki. 2001. "The Effects of Trade Liberalization on ASEAN Agricultural Commodity Exports to the EU". *77th EAAE Seminar*, No. 325, August 17-18.

Njong, Aloysius Mom. 2008. "Investigating the Effects of Foreign Direct Investment on Export Growth in Cameroon". *UNECA Ad-hoc Expert Group Meeting Paper*, Addis Ababa, Ethiopia (November 24-25).

Perron, Pierre. (1989). "The Great Crash, the Oil Price Shock and the Unit Root Hypothesis". *Econometrica* 57(6): 1361-1401.

Petri, Peter A., Michael G Plummer, and Jeffrey H Bergstrand.1988. "The Determinants of Foreign Direct Investment: A Survey with Applications to the United States". Pp 233-250 in *Economic Development and Cooperation in the Pacific Basin: Trade Investment and Environmental Issues*-,ed.- Hiro Lee, and David W. Roland-Holst. New York: Cambridge University Press.

Phillips, Peter C.B. 1986. "Understanding Spurious Regression in Econometrics". *Journal of Econometrics* 33: 311-340.

Phillips, Peter C.B., and Pierre Perron.1988. "Testing for a Unit Root in Time series Regressions". *Biometrika* 75(2): 335-346.

Prasanna, N. 2010. "Impact of Foreign Direct Investment on Export Performance in India". *Journal of Social Science* 24(1):65-71

Sachs, Jeffrey D., and Andrew Warner. 1995. "Economic Reform and the Process of Global Integration. *Brookings paper on economic Activity* 26(1): 1-118.

Sahoo, Pravakar. 2006. "Foreign Direct Investment in South Asia: Policy, Trends, Impact and Determinants". *ADB Institute Discussion Paper,* No. 56.

Santos-Paulino, Amelia U. 2000. "Trade Liberalization and Export Performance in Selected Developing Countries". *Studies in Economics*, No. 0012, Department of Economics, University of Kent, Canterbury.

Shafaeddin, Mehdi. 1994. "The impact of Trade Liberalization on Export and GDP in Least Developed Countries," *UNCTAD Discussion Papers,* No. 85, UNCTAD, Geneva.

Sharma, Kalyan Raj. 2000. "Export Growth in India: Has FDI Played a Role?" Economic Growth Center Working Paper , No. 816, Yale University, Connecticut.

Svensson, Roger. 1996. "Effects of Overseas Production on Home Country Exports: Evidence Based on Swedish Mutlinationals". *Review of world Economics* 132(2): 304-329.

Tsai, Pan-Long. 1994. "Determinants of Foreign Direct Investment and its Impact on Economic Growth". *Journal of Economic Development* 19(1):137-163.

Weiss, John. 1992. "Export Response to Trade Reforms: Recent Mexican Experience". *Development Policy Review* 10(1): 43-60.

Wong, Koi Nyen., and Tuck Cheong Tang. 2007. " Exchange Rate Variability and the Export Demand for Malaysia's Semiconductors: An Empirical Study. Monash University Discussion Paper, No. 13/07, Australia.

Wong, Hock-Tsen. 2008. "Exports and Domestic Demand: Some Empirical Evidence in ASEAN 5. *Labuan bulletin of international Business and Finance* 6: 39-55.

Yanikkaya, Halit. 2003. "Trade Openness and Economic Growth: A Cross-country Empirical Investigation". *Journal of Development Economies* 72: 57-89.

Xing, Yuqing. 2006. "Why is China So Attractive to FDI? The Role of Exchange Rates". *China Economic Review* 17(2):198-209.

Xuan, Nguyen Thanh, and Yuqing Xing. 2008. "Foreign Direct Investment and Exports". *Economies of Transition* 16(2): 183-197.