Volume 5 Issue 1, January-June 2016
PP. 28-43

Revisiting the Marshall-Lerner Condition in the Bangladesh Economy: A Cointegration Approach

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Abstract

Exchange rates are important macroeconomic policy variables. In formulating exchange rate policies, one of the major concerns of the policy makers is the responsiveness of trade flows to relative price changes. The Marshall - Lerner condition shows that if absolute value of price elasticity of export and import demand is greater than unity, devaluation will improve trade balance. Using the Johansen and Johansen and Juselius Cointegration method we test the Marshall - Lerner condition for Bangladesh for the period 1985-2014. Estimated results show that Marshall - Lerner condition holds for Bangladesh in the long run. Export is current export price inelastic which is consistent with earlier studies. Export is also lag export price inelastic. To get the benefit of currency devaluation, export demand might be made price elastic by increasing the export base, including new products in the export basket, maintaining quality, searching new markets for exports, improving infrastructure facilities for smooth production and supply of exports.

Keywords: Devaluation, elasticity, cointegration, trade deficit.

JEL Classification: F31, F32

1. Introduction

The exchange rate is an important macroeconomic policy variable. Changes in the exchange rate influences export, import and thus trade balance, remittances, foreign exchange reserve and inflation of the economy. In formulating exchange rate policies, one of the major concerns of the policy makers is the responsiveness of trade flows to relative price changes. For small open economies it is basically the sum of export and import elasticity that indicates whether devaluation has favorable effects on trade balance. Economies may face crisis due to wrong or bad choice of exchange rate policies (e.g. Asian crisis in 1997).

1 The authors are Deputy General Manager and Deputy Director, respectively, of the Monetary Policy Department of Bangladesh Bank. Views expressed in this paper are authors own and they do not necessarily reflect the views of Bangladesh Bank. The authors are thankful to Biru Paksha Paul, Md. Akhtaruzzaman, Khawaja A. Mamun, Anupam Das and Aasha Amin for their valuable suggestions. Comments are most welcome to: luthfe.begum@bb.org.bd.

Real exchange rate index is an indicator of the country's trade competitiveness. Depreciation of exchange rate makes the country's product relatively cheaper than the product of other countries and hence the demand for the country's export may increase (Reinhart, 1995) Depreciation increases the prices of goods imported by the country which can reduce the import payment. Since independence up until 1979 Bangladesh followed a fix exchange rate regime. Bangladesh adopted a highly regulated financial, fiscal and industrial policy with inward oriented import substituting trade. During this period exchange rates were overvalued and the country encountered a high trade deficit. Bangladesh shifted from the inward looking regime towards a market-oriented regime. Since the 1980's most trade and industrial policies (under NIP) aimed at higher growth in the export sector.

From the early 1990's, a huge reduction in tariff rates, withdrawal of quantitative restrictions and exchange rate convertibility in the current account created a momentum in the trade sector. As a result, trade openness (export plus import as % of GDP) of the country gradually increased from 13.5% to 16.8 % and 50.5 % in FY1981, FY1991 and FY2011 respectively. Younus et al. (2006) stated that between 1972 and 2002 the Taka was devalued about 130 times to reduce the balance of payments deficit in Bangladesh. In May 2003, Bangladesh introduced the floating exchange rate regime to determine the exchange rate by market forces aiming to accelerate exports, reduce extra pressure on imports thereby improving the trade balance.

It is revealed from the data (Table: 7 and 8; appendix A) that the growth of export is more than double than the growth of import during the period 1980-2015. The composition of total export earnings showed that 69.0 percent of total export earnings came from readymade garments (excluding export by EPZ), followed by 3.0 percent from leather and footwear, 3.0 percent from raw jute and jute goods and remaining 25 percent from others in FY15. Category-wise import payment showed that of the total import payments 44 percent went to raw materials and intermediate goods followed by 14.0 percent for capital machinery, 13 percent for foodgrains and other food and remaining 31 percent for others in FY15.

Empirical evidence from (Figure: 1; appendix B) shows that exchange rate devalued over the period, trade balance as a percent of total trade also declined during the period but the contribution of depreciation on the net export is not clear. Alfred Marshall and Abba Lerner showed that if the absolute value of price elasticity of export and import demand is greater than unity, devaluation will improve trade balance. There is no consensus about the effect of devaluation on trade balance i.e. existence of Marshall -Lerner condition. Different countries showed differing results (Bahmani- Oskooee, 1986). There are few studies (Younus and Chowdhury 2014, Murad 2012, Alam 2010, Aziz.N 2008) on the effect of devaluation of exchange rate on trade balance and existence of Marshall–Lerner condition in the economy of Bangladesh using different variables, varying time period and various methods. The results of these studies are inconclusive as few studies showed that depreciation of Bangladesh currency is effective to make the Bangladeshi product

competitive in the world market in the long run, while others found no causal relationship between currency depreciation and export earnings. The depreciation of real exchange rates, moreover, are not effective in improving the trade balance of Bangladesh in the long run.

Thus the objective of the study is to re-examine the validity of Marshall-Lerner condition in the economy of Bangladesh using annual data from 1985 to 2014 i.e. in the era of a liberalized economy. We organized the research paper as follows: section-2 describes the elasticity approach and Marshall-

Lerner condition, Section-3 reviews the literature, Data and Methodology is shown in section-4, Section-5 investigates empirical results and findings; finally, a conclusion is made in the section-6.

2. The elasticity approach and the Marshall-Lerner condition

Modern literature on devaluation begins with the elasticity approach. The formal development of this approach was in the hand of Alfred Marshall and Abba Lerner. Joan Robinson (1937) later extended it within the Marshallian partial equilibrium framework which is now popularly known as the Marshall-Lerner condition (Metzler, 1949).

According to the elasticity approach, devaluation affects balance of payments in three ways: firstly, the decrease in the amount of imported goods because of the increase in the prices of these goods; secondly increase in export because of the decrease in the prices of exported goods; and thirdly lower revenue from one exported good because of devaluation. Net results of these three impacts depend on export and import elasticity. If the sum of the export and import elasticity is bigger than 1 (one) the impact will be positive. Existing literature has found that the elasticity of exports and imports with respect to the exchange rate is very low in the short run, that is the Marshall-Lerner condition cannot be fulfilled. However, elasticity is high in the long run and the sum of the elasticity may be higher than 1 (one). Thus, devaluation will increase the trade deficit in the short run. The reason is that devaluation makes import more expensive and the value of export cheaper in the short run in terms of foreign currency revenues and has less impact on the increase in export and the decrease in import. In other words, economic entities need a certain time period in order to adapt themselves to new prices. However, the expected impacts of devaluation can be seen after a while and balance of trade will recover.

In recent studies, it is asserted that the impacts of changes in foreign exchange rates on balance of trade cannot be explained with elasticity which is calculated by seeing only the changes in the prices and quantities of goods and so income effect should be added to the model. This study is based on the export and import functions which were used in the 'Long-Run Price Elasticities and the Marshall–Lerner Condition revisited' study of Mohsen Bahmani-Oskooee and Farhang Niroomand in 1998 (Bahmani-Oskooee and Niroomand, 1998: 102). According to this model;

Import demand function:

$$LnM_t = \alpha + \beta Ln\left(\frac{PM}{PD}\right)_t + \gamma\, LnY_t + \varepsilon_t \quad \text{..... (1)}$$

$$\text{Where } \beta < 0, \quad \gamma > 0$$

In this function: M – import, PM – price of import, PD – domestic price level, Y – domestic income, ε_t – error term. Natural logarithms of all variables in the model were taken. The increases in import price levels with respect to domestic price levels decrease import and price elasticity of import is expected to be negative ($\beta < 0$). According to Keynesian Theory, it is expected that increase in domestic income raises import, hence income elasticity is expected to be positive ($\gamma > 0$). However, in literature since the increase in domestic income raises import-substituting production, income elasticity will be negative.

Export demand function:

$$LnM_t = \alpha' + \beta' Ln\left(\frac{PX}{PXW}\right)_t + \gamma'\, LnY_t + \varepsilon'_t \quad \text{..... (2)}$$

$$\text{Where } \beta' < 0, \quad \gamma' > 0$$

In this function: X – export, PX – price of export, PXW – world export price levels, YW – world income level and ε'_t – error term. Natural logarithms of all variables in the model were taken. The increases in export prices with respect to world export price levels create the expectation of a decrease in export. So β' should be smaller than 0 ($\beta' < 0$). When world income level increases it is expected that the export of the country will increase so γ' is expected to be higher than 0 ($\gamma' > 0$).

3. Literature Review

Jamilov's (2012) examination showed that a real devaluation of Manat carried a significant positive effect on the balance of trade in the long run in Azerbaijan's economy and robustness test with prices of exports and imports showed that the trade balance improved in the medium-long run. Caporale et al. (2012) investigation, linking the balance of payments to the real exchange rate and relative income, showed that in Kenya there exists a well-defined cointegrating relationship and that the M-L condition was satisfied in the long run although the convergence process was relatively slow. Joel Hinaunye Eita (2013) examination showed that in Namibia, imports and exports responded significantly to a change in the exchange rate and suggested that the Marshall-Lerner condition did hold. Ritesh Pandey (2013) found that the Marshall Lerner condition was true for the Indian Economy. Hakan TURKAY's (2014) investigation found that the elasticity of exports and imports demand was higher than 1 in Turkey's economy that is, the Marshall-Lerner condition was satisfied. He also found that in the short run there was no statistically significant relationship between the variables but currency adjustments (devaluation) may be effective in reducing current account deficit in the long run. Syeda Shehr Bano et al. (2014) evaluated the impact of currency devaluation on trade balance in Pakistan. Their examination showed that the Marshall-Lerner condition was satisfied for Pakistan's Economy.

Hossain (2000) estimated price and income elasticity of demand for both export and import of Bangladesh for the period 1976 to 1996. He used export price index, import price index, foreign income, home country income as explanatory variables. The estimation showed that export and import demand were price inelastic but income elastic. His estimation showed that though the export and import were not price elastic, the sum of the price elasticity of demand for both export and import was still high enough to satisfy Marshall-Lerner condition both in the long and short run. Before estimation he had claimed that earlier studies were based on historic data that included the 70's data when Bangladesh's export was dominated by few low price elastic primary products. The export trade of Bangladesh was dominated by non-traditional exports after the 80s. As these exports were price elastic, devaluation might have been effective in raising exports earnings from those. But his estimation also failed to show that export demand is price elastic. Nusrat Aziz (2008) using annual data from 1972- 2005 of Bangladesh examined the response of the balance of trade to the real effective exchange rate of Bangladesh using REER, home country income and world real industrial production index (as proxy for trade partner income) as explanatory variables. The results demonstrated an unexpected fall in exports earning and rise in imports cost immediately after devaluation for Bangladesh.

Thus the balance of trade deteriorates immediately after depreciation and then starts improving from the second period and eventually goes to the baseline. The combined results support the Marshall-Lerner condition through the J-curve idea. Rafayet Alam (2010) tested vector autoregressive model using annual data from 1977-2005 to see whether there is any contribution of real exchange rate depreciation of Taka to export earnings of Bangladesh. Findings shows no causality runs from real depreciation of taka to export earning of Bangladesh. S.M. Woahid Murad (2012) estimated trade elasticity using bilateral data between Bangladesh and its major trading partner data covering 1973-2009. The study unveils that the Marshall - Lerner condition holds only in case of the United States. As such, the depreciation of real exchange rate may not be effective in improving the trade balance of Bangladesh in the long run. Dr. Sayera and Maidul (2014) showed short-run and long-run relationship between trade balance, RER, and domestic income using monthly data for the sample period from June 2003 to June, 2014. Their findings imply that depreciation of Bangladesh currency is effective to make the Bangladeshi product competitive in the world market (i.e. growth in exports) in the long run and short run as well. The impact on the trade balance is although insensitive initially become significant after 5th period and remain significant after that. Unlike earlier studies we used the ratio of export and import price index to estimate price elasticity of export and import demand. Hossain (2000) argued that owing to time series include 70's data price elasticity for export and import became inelastic? We employed annual data from 1985 to 2014 when trade policy started to liberalize and the economy shifted toward export led growth strategy. Exchange rate policy also gradually moved from a fixed to flexible regime. Export earning is dominated by non-traditional goods i.e. readymade garments.

4. Methodology and Data

This study used the same model developed by Bahmani - Oskooee and Niroomand (1998). Bangladesh's export volume (ex), import volume (im), export price index (px), import price index (pm), domestic price level (dm), world export price level (pxw), gross domestic income (y) and world income (yw) are used in order to test the elasticity approach.

The study employed annual data from 1985-2014. We have taken data from 1985 because since then a somewhat market based exchange rate policy was put in place. Since then depreciation/appreciation were made on the basis of the REER index calculated by Bangladesh Bank. Bangladesh's data were collected from Bangladesh Bank's publications and Economic Review published by the Ministry of Finance. World income, world export price index and world GDP deflator are taken from UNDATA website. Sources of the UNDATA are IFS published by IMF. All variables used in the model are in real terms i.e these are deflated by CPI of Bangladesh and world CPI. All the variables are taken in log linear form. Before estimating the model to see the nature of the data we plot the variables (annexure 1). Then we perform unit root test for all the variable entered into export demand and import demand models. We use the Philliph Parron (1988) test because this test is serial correlated and heteroskedasticity adjusted so gives good results for unit root test. Unit root test shows that all the variable have unit root at level but stationary at first difference i.e the variables are cointegrated of order one I(1).

If the variables are I(1), they may have long run relationship. To establish whether there is a long run equilibrium relation among the variables of import and export demand functions we employed Johansen (1988) and Johasen and Juselius (1990) cointegration analysis. The main notation behind the cointegration analysis is that if a linear combination of a set of nonstationary variables is stationary, those variables are said to be cointegrated. Johansen and Joan Juselius technique basically provides two test statistics (λ-max and λ-trace). In order to perform cointegration test we determine lag length through an unrestricted Vector Auto Regression model. All the criteria (AIC, SBC, HQ) shows that export demand function and import demand function has one lag length. From table 1, 2 and 3 both test statistics show that both export demand function and import demand function has one cointegration relation.

5. Empirical Results and Findings

Estimation results of VEC model show that (Table: 4) price elasticity of export is negative as expected and statistically significant. If domestic export price increase more than the world export price then export will decline. Coefficient of export is 0.27 i.e. export is price inelastic which is consistent with earlier studies. Income elasticity of export is positive as expected and statistically significant. Coefficient of income elasticity is 0.80 i.e. export is income inelastic. The sign of the error correction term is negative and significant with a value of 0.17 i.e. any deviation from long run equilibrium will be disappeared in time and long run balance will be regained. There is a time lag between current export and export

price. The settlement of current export is made on the basis of export price at which the export L/C was opened. So, to examine whether the export demand is sensitive to lag export price in the short run, we run a regression of export volume with lag export price. We did not find any significant relation between lag export price and export volume i.e. export demand is not sensitive to lag export price in the short run (Table: 5).

Estimation results of import demand function show that import price elasticity is negative as expected and statistically significant. A rise in import price compared to the domestic price will decline import. Coefficient of import price is 2.01 i.e. import is price elastic. After withdrawal of restrictions on import under trade liberalization and stopping import of food grains due to self- sufficiency in production of food grains, import demand becomes price elastic. Income elasticity of import is negative but insignificant. There is a trend in import demand function whose value is very negligible but statistically significant. The sign of ECM is negative and statistically significant. The value of ECM is 0.10. Any deviation from long run equilibrium will disappear and the long run equilibrium will be regained. The sum of the absolute value of price elasticity of export and import demand is 2.28 (0.27+2.01); which is more than unity i.e. the Marshall-Lerner condition holds in Bangladesh in the long run. Empirical results show that Marshall-Lerner condition does not hold in short run. This finding is consistent with the findings of most of the earlier studies. The estimated results also show that despite price inelastic export demand devaluation improves trade balance in Bangladesh.

Above 80 percent of our total export earnings (including export by EPZ, Annual Report FY14, Bangladesh Bank) come from readymade garments (RMG); which is price insensitive. Demand of RMG does not depend on price rather it depends on timely shipment, maintaining quality, compliance of worker rights etc. (Ahmed 2013, Younus and Yamagata 2012, Mlachila and Yang 2004). Moreover, Bangladesh exports lower end RMG which are price and income inelastic. For these reasons growth rates of our exports of RMG were unaffected during the global recession (15% in FY07, 17% in FY08 and 10% in FY09). Over the period our export increased mainly due to export subsidy, cash incentives, quota and GSP facility. During this time trade balance declined mainly due to economic policies and reform measures undertook towards export led growth strategy (e.g. reducing/withdrawal of credit ceiling on private borrowing and investment, removal of tariff and non- tariff barriers under NIP). Hossain (2000) showed that the share of export earnings by non-traditional items increased from 22 percent in 1980 to 83 percent in 1993 (p-148). He claimed that this follows the fact that with trade liberalization, the composition of export trade usually changes from low price elastic primary products to high price elastic manufactured products (p-158). From the mid eighties i.e. since trade liberalization Bangladesh's RMG (manufacturing products) has been dominating total exports which is price inelastic. Now RMG can be seen as a traditional item in the export basket. We have to include new non-traditional items in the export basket of Bangladeshi products to make it price elastic.

6. Policy Recommendations

Similar to many other developed and developing countries the Marshall-Lerner condition holds in Bangladesh well. This in turn supports the hypothesis that devaluation can improve the trade balance in the long run. To realize the benefit of devaluation, Bangladesh needs to export goods that are price elastic. In order to do that, the export base must be expanded by producing new products including ship building, light engineering, electronics, IT products, processed foods and flowers. In addition, the country should improve the quality and diversity of traditional export items such as jute and jute goods and leather products. It is essential to look for new export markets. Initiatives to develop backward linkage industries for garments sector (e.g. textile, yarn and accessories) should be undertaken. Pragmatic policy formulation and implementation to develop infrastructure (gas, electricity, road, port etc.) to smoothen the production and supply of exports are needed on a priority basis.

Appendix A

Table 1: Unit Root Test

Variables	Level (PP test statistics)		First difference (PP test statistics)		Order of Integration
	With trend	Without trend	With trend	Without trend	
LNEX	1.22 (0.99)	2.04 (0.56)	6.39 (0.00)	6.64 (0.00)	I(1)
LNIM	2.14 (0.99)	3.22 (0.99)	6.50 (0.00)	11.4 (0.00)	I(1)
LNPM_PD	1.30 (0.17)		3.04 (0.04)	3.36 (0.07)	I(1)
LNPX_PXW	0.51 (0.87)	2.34 (0.40)	4.72 (0.00)	4.84 (0.00)	I(1)
LNY	1.36 (0.99)	0.83 (0.95)	4.72 (0.00)	4.98 (0.00)	I(1)
LNYW	1.61 (0.46)	2.28 (0.43)	4.02 (0.00)	4.18 (0.01)	I(1)

Note: Figures in the parenthesis indicate probability. All variables have unit root at level but stationary at first difference

Source: Statistics Department of Bangladesh Bank, UNDATA website and Export Promotion Bureau, Year-1992, 1999, 2015

If the variables are I(1), they may have long run relationship. To establish whether there is a long run equilibrium relation among the variables of import and export demand functions we employed Johansen (1988) and Johansen and Juselius (1990) cointegration analysis. The main notation behind the cointegration analysis is that if a linear combination of a set of nonstationary variables is stationary, those variables are said to be cointegrated. Johansen and Joan Juselius technique basically provides two test statistics (λ-max and λ-trace). In order to perform cointegration test we determine lag length through an unrestricted Vector Auto Regression model. All the criteria (AIC, SBC, HQ) shows that export demand function and import demand function has one lag length.

Table: 2 Co-integration Test for Export

Null Hypothesis	Alternative Hypothesis	Test Statistics	5-percent Critical Value	Prob.	Conclusion
Trace Test					
r = 0	r> 0	32.64	29.8	0.0229	One
r ≤ 1	r> 1	9.69	15.49	0.305	Cointegration
r ≤ 2	r> 3	1.58	3.84	0.2084	Relation
Maximum Eigen value Test					
r = 0	r> 0	22.9	21.13	0.0275	One
r =1	r=2	8.11	14.26	0.3675	Cointegration
r = 2	r=3	1.58	3.84	0.2084	Relation

Source: Statistics Department of Bangladesh Bank, UNDATA website and Export Promotion Bureau. Year-1992, 1999, 2015

Table: 3 Co-integration Test for Import

Null Hypothesis	Alternative Hypothesis	Test Statistics	5-percent Critical Value	Prob.	Conclusion
Trace Test					
r = 0	r> 0	50.96	42.91	0.0065	One
r ≤ 1	r> 1	25.09	25.87	0.0623	Cointegration
r ≤ 2	r> 3	6.13	12.52	0.4441	Relation
Maximum Eigen value Test					
r = 0	r> 0	25.88	25.82	0.0492	One
r =1	r=2	18.96	19.39	0.0576	Cointegration
r = 2	r=3	6.13	12.52	0.4441	Relation

Source: Statistics Department of Bangladesh Bank, UNDATA website and Export Promotion Bureau. Year-1992, 1999, 2015

Table: 4 Cointegration Equation for Export Function

Normalized Co-integration Co-efficient: Export Demand Function		
LEX	LPX_PXW	LYW
1.00	-0.27 (1.75)	0.80 (9.77)
Short-run Dynamics and Speed of Adjustment Co-efficient		
ECM	D(LPX_PXW)	D(LYW)
-0.1704 (-1.80)	-0.21 (-1.18)	0.93 (4.05)

Source: Statistics Department of Bangladesh Bank, UNDATA website and Export Promotion Bureau. Year-1992, 1999, 2015

Table: 5 Cointegration Equation for Import Function

Normalized Co-integration Co-efficient: Import Demand Function			
LIM	LPM_PD	LY	Trend
1.00	-2.01 (3.21)	-1.34 (1.15)	0.08 (-5.75)
Short-run Dynamics and Speed of Adjustment Co-efficient			
ECM	D(LPX_PXW)	D(LYW)	
-0.1018 (-2.57)	-0.0829 (-4.62)	-0.0313 (-1.89)	

Source: Statistics Department of Bangladesh Bank, UNDATA website and Export Promotion Bureau. Year-1992, 1999, 2015

Table: 6(a) Short run effect of export price on export demand

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C DPX_PXW	6.975389	1.929976	3.614236	0.0012
DYW	-0.444383	14.73570	-0.030157	0.9762
	-14.45004	6.019581	-2.400506	0.0235

Source: Statistics Department of Bangladesh Bank, UNDATA website and Export Promotion Bureau

Table: 6(b) Short run effect of lag export price on lag export demand

Variable	Coefficient	Std. Error	t-Statistic	Prob.
	6.911072	2.034991	3.396118	0.0022
C DPX1	3.292217	14.78670	0.222647	0.8255
DYW	-13.86532	6.151655	-2.253918	0.0329

Source: Statistics Department of Bangladesh Bank, UNDATA website and Export Promotion Bureau. Year-1992, 1999, 2015

Table: 7 Composition of Exports of Bangladesh

(Taka in Crore)

Financial Year	Ready-made Garments (all sorts)	Fish & Leather	Raw jute & Jute goods	Garments, Fish, Leather and Jute allied	Total Exports
FY80	1 (0%)	188 (16%)	772 (67%)	961 (83%)	1151
FY85	276 (11%)	457 (18%)	1362 (54%)	2095 (83%)	2521
FY90	1949 (39%)	1091 (22%)	1384 (28%)	4424 (88%)	5004
FY95	7438 (57%)	2197 (17%)	1621 (12%)	11256 (86%)	13130
FY00	15724 (63%)	2573 (10%)	1501 (6%)	19798 (79%)	24923
FY05	33333 (66%)	4184 (8%)	2241 (4%)	39758 (78%)	50835
FY10	67248 (66%)	5639 (6%)	4984 (5%)	77871 (76%)	102148
FY15	156039 (69%)	7078 (3%)	6208 (3%)	169325 (75%)	226522

Source: Statistics Department of Bangladesh Bank and Export Promotion Bureau *Excluding export by EPZ. Year-1990,1999, 2015

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Source: Statistics Department of Bangladesh Bank and Export Promotion Bureau *Excluding export by EPZ. Year-1990,1999, 2015

Table: 8 Composition of Imports of Bangladesh

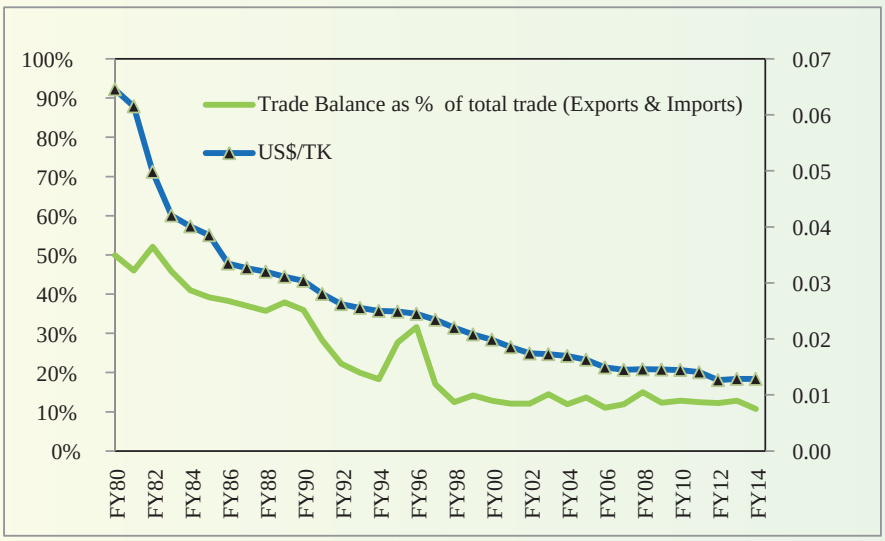
(Taka in Crore)

Financial Year	Foods	POL, Chem, Phar, Ferti	Raw Materials	Capital Machinery, Iron & Steel	Total	Total Imports
FY80	1083 (31%)	945 (27%)	268 (8%)	281 (8%)	2577 (73%)	3546
FY85	1687 (25%)	1295 (19%)	400 (6%)	863 (13%)	4245 (62%)	6874
FY90	2018 (16%)	1793 (14%)	1848 (15%)	1861 (15%)	7520 (60%)	12480
FY95	3513 (15%)	2797 (12%)	5830 (25%)	1624 (7%)	13764 (59%)	23455
FY00	7476 (18%)	5448 (13%)	9277 (22%)	3556 (8%)	25757 (61%)	42131
FY05	7476 (9%)	15321 (19%)	17951 (22%)	11069 (14%)	51817 (64%)	80895
FY10	22359 (14%)	30079 (18%)	38068 (23%)	21084 (13%)	111590 (68%)	164241
FY15	39645 (13%)	55086 (18%)	81407 (26%)	42828 (14%)	226323 (70%)	314209

Source: Statistics Department of Bangladesh Bank and Export Promotion Bureau. Year-1990, 1999, 2015

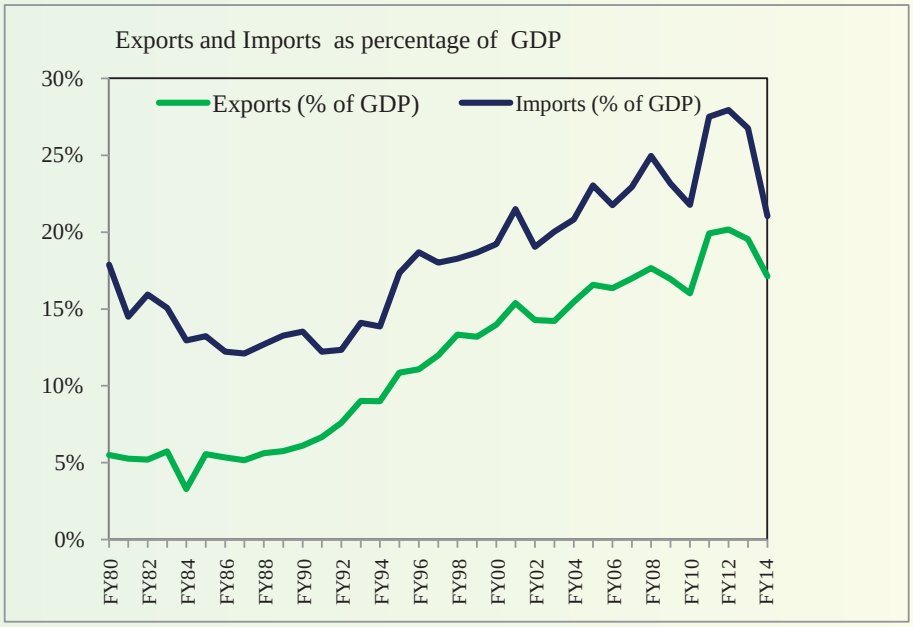
Appendix-B

Figure: 1 Pattern of trade balance and US Dollar per taka



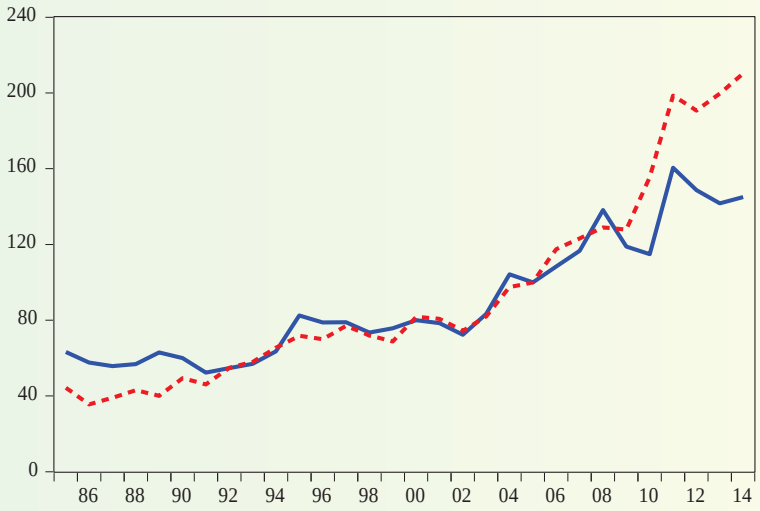
Source: Bangladesh Bank and Export Promotion Bureau Year-1990,1999, 2015

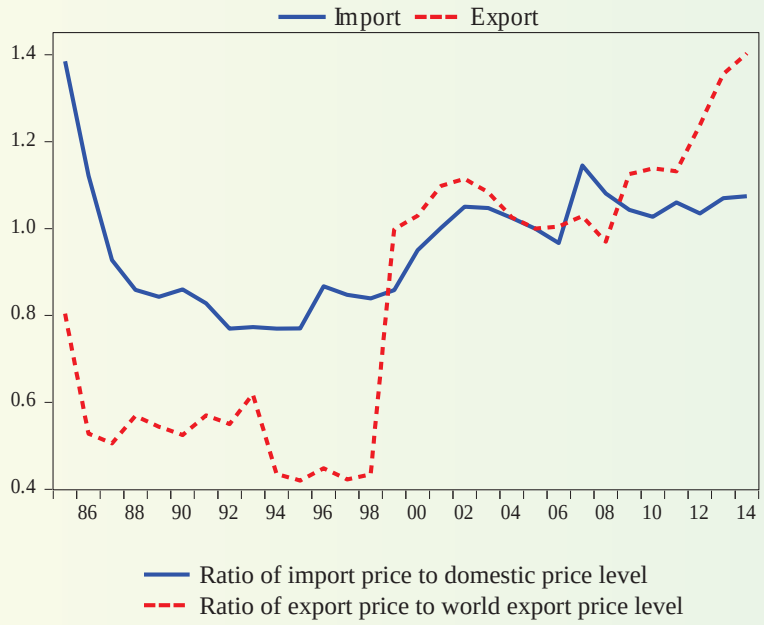
Figure : 2 Patterns of exports and imports as percentages of GDP

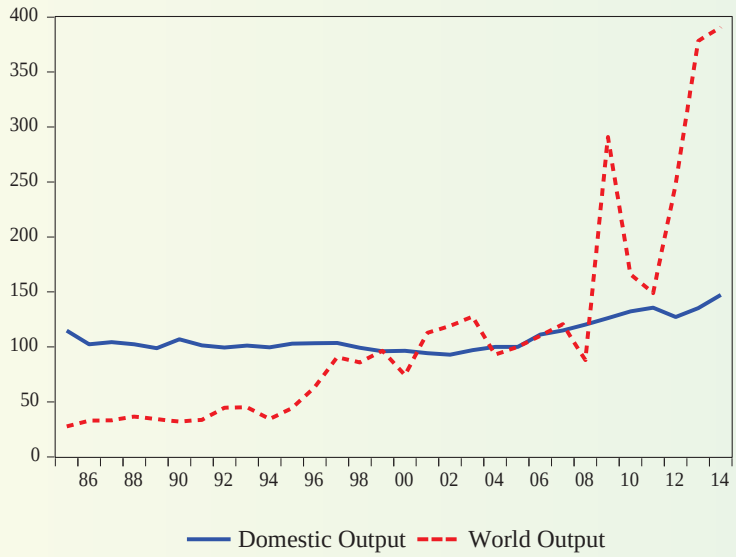


Source: Bangladesh Bank and Export Promotion Bureau Year-1990,1999, 2015

Figure : 3 Plot of Variables used in the Models







Source: Statistics Department of Bangladesh Bank, UNDATA website and Export Promotion Bureau. Year-1992, 1999, 2015

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