An Empirical Study on Exchange Rate Volatility and it Impacts on Bilateral Export Growth: Evidence from Bangladesh

Shoaib Md Shoaib Ahmed

ASA University Bangladesh (ASAUB)

January 2009

An Empirical Study on Exchange Rate Volatility and it Impacts on Bilateral Export Growth: Evidence from Bangladesh

Presented By

Md Shoaib Ahmed
Senior Lecturer
Department of Business Administration
ASA University Bangladesh
Email: shoaib-ffl@hotmail.com

Abstract

This is an empirically study to investigate the exchange rate volatility and it impacts on bilateral exports growth: evidence from Bangladesh. The countries are considered to determine based on the bilateral relationship between Bangladesh and the other countries under a range of regional economic blocks such as North America, Western Europe, Eastern Europe, SAARC, ASEAN, and Asia-Pacific regions. To establish the empirical relationship between exchange rate volatility and impact on exports growth, cointegration and error correction techniques are used by considering the data from 2003 to 2008. From the investigation, the result shows that the exchange rate volatility has a negative and major effect both in short run and long run with important trading partners, which are Western European and North American countries. Similar pattern was also experienced in case of few countries such as Singapore, Japan, Malaysia and China where the volume of trade with Bangladesh is comparatively consistent and less volatile. The relationship between exchange rate volatility and growth of export for India and Pakistan is observed only in long run perspective. However, there is no empirical relationship being observed of exchange rate volatility and it impacts on export growth between Bangladesh and Iran and other s Gulf countries.

Key words: Bilateral, Cointegration, Exchange Rate, Volatility, Export growth, Regional integration and Gulf.

1. Introduction

Since the late 1970's, the exchange rate volatility and its impact on the volume of international trade has been studied intensively when the world economy shifted from fixed exchange rate to free floating exchange rate. The hypotheses say that if the exchange rate volatility is higher then it will generate uncertainty of the future profit from export trade. To diminish the uncertainty investors can go for currency hedge and minimize the uncertainty related to international trade in short time. In long run, exchange rate volatility may also affect the trade indirectly by influencing firm's investment decision. However, the commercial investors have limited possibilities of trading claims to future operational cash flows. Hence they are being forced to shift away to less risky markets. According to these arguments, traders are risk averse and hedging is expensive or impossible; therefore, exchange rate volatility will reduce risk adjusted profit from foreign trade. The high degree of volatility and uncertainty of exchange rate movements since the beginning of the generalized floating in 1973 have led policy makers and researchers to investigate the nature and extent of the impact of such movements on the volume of trade.

However, these studies deals with the exchange rate volatility and its effect on trade flows have yielded mixed results. On one hand, a number of studies have argued that exchange rate volatility will impose costs on risk averse market participants who will generally respond by favouring domestic to foreign trade at the margin. The arguments views traders as bearing undiversified exchange risk; if hedging is impractical or costly and traders are risk averse, risk attuned expected profits from trade would fall when exchange risk increases.

In Bangladesh free floating exchange rate was adopted since May 31, 2003. At the initial stage of the exchange rate, the fluctuation was very nominal. However, exports evolved largely in line with total world imports. Bangladesh's share in world imports was more or less stable after adopted the floating exchange rate. In 2003, total amount of export of Bangladesh was US$ 7101.03(million) and in 2008 the amount was US$ 16333.04 (million) therefore growth is almost 1.30 percent. On the other hand exchange rate was (US$1= Tk 57.90) in 2003 right after the adoption of floating exchange rate and in 2008 it was (US$ 1= Tk 67.90).

The objective of this paper is to investigate the exchange rate volatility and it effects on exports growth between Bangladesh and other leading trade partners during 2003-2008. The concept of the study is taken from one of the working paper of central bank of Pakistan prepared by K. Mustafa & M. Nishat (2006). The countries are selected from various regions to capture the varying impact of level and degrees of bilateral relationship between Bangladesh and other countries. Therefore regional countries included are SAARC (India and Pakistan), ASEAN (Singapore and Malaysia), Western European (UK, France, German, Italy and Belgium), and Asia-Pacific (Australia and New Zealand) and North America (US and Canada). The rest of the paper is organised such that second section describes the data description is provided in section three followed by discussion of results in section four. The summary and concluding remarks are given in section five.

2. Conceptual framework and literature review

Few theoretical and empirical papers have attempted to find out the relationship between the volatility of exchange rate and international trade. Most of the existing studies have focused on the effects of exchange rate regimes or volatility on trade by effectively assuming that the exchange rate process is driven by exogenous shocks and is unaffected by other endogenous variables (Wincoop, Obstfeld and Rogoff 2001). By definition this implies that the effect of trade on volatility is assumed inexistent rather than jointly estimated with the effect of volatility on trade (Frankel and Wei 1996). Since distance cannot be affected by volatility, the relationship suggests that greater distance between countries significantly increases bilateral exchange rate volatility through the effect of distance on the intensity of commercial relationships such as trade (Engel and Rogers 1996). Ignoring the causal effect of trade on volatility results in overestimates of the true impact of exchange rate volatility on trade. Most of the studies of the effect of exchange rate volatility on trade assume that the volume of trade has no impact on exchange rate volatility, thus assuming away an endogeneity problem (Broda, C. and Romalis, J. 2003).

The inconsistent results about the impact of exchange rate volatility on international trade are being observed in this study. Literatures supported the hypothesis that the volatility of exchange rate reduces the volume of international trade are included Cushman (1983, 1986, 1988); Akhtar and Hilton (1984); Kenen and Rodrick (1986); Thursby and Thursby (1987); De Grauwe (1988); Pere and Steinherr (1986); Koray and Lastrapes (1989); and Arize (1995). On the other hand, Hooper and Kohlhagen (1978), Gotur (1985), Bailey, Tavlas and Ulan (1987), and Asseery and Peel (1991) found no evidence about the impact of exchange rate volatility on trade.

Hooper and Kohlhagen (1978) was the first study to analyze systematically the effects of exchange rate uncertainty on the trade. They investigated bilateral and multilateral trade among developed countries during 1965-75. They measured exchange rate risk by standard error of nominal exchange rate fluctuations. They could not establish any significant impact of exchange rate volatility on the volume of trade. They measured the exchange rate risk volatility as the standard error of nominal exchange rate function. Later Cushman (1983) introduced the real exchange rate rather than nominal exchange rate and found negative relation among the exchange rate volatility and volume of trade. In another study Cushman (1986) introduced also the third country effect and argued that the recognition of third countries in the analytical framework implies that the effect of exchange rate variability on bilateral trade flows not only depend upon the exchange rate risk experienced by the country under consideration but also depend upon the correlation of the exchange rate fluctuations by other countries. Akhter and Hilton (1984) examined the bilateral trade between West Germany and US. They determined that the exchange rate volatility has a significant negative impact on the exports and imports of two countries. However, the volatility of exchange rate has been measured by the standard deviation of effective exchange rates.

Gotur (1985) rejected the result of Akhter and Hilton (1984). He added the countries in Akhter and Hilton (1984) models i.e. France, Japan, and UK is increasing the sample period and the measures of exchange rate risks. He did not observe any significant relation between exchange rate volatility and volume of trade on the bilateral trade flows. His result is identical to IMF (1984) study on this issue. Chowdhury (1993) investigated the impact of exchange rate volatility on the trade flows of the G-7 countries in context of a multivariate error-correction model. They found that the exchange rate volatility has a

significant negative impact on the volume of exports in each of the G-7 countries. Baak, Mahmood, and Vixathep (2002) investigated the impact of exchange rate volatility on exports in four East Asians countries (Hong Kong, South Korea, Singapore, and Thailand). Their results indicated that exchange rate volatility has negative impacts on exports in both the short run and long run periods.

The empirical evidences regard the impact of exchange rate volatility on export growth to developing countries are inconclusive as they have explained variation in exchange rate policies and level of growth Bahmani-Oskooee (1984, 1986); Coes (1981); and Rana (1983). Bahmani-Oskooee (1984, 1986) found that exchange rate has a significant impact on trade flows of selected developing countries even in periods when most of them had pegged exchange rates. Coes (1981) and Rana 1983) analysed this issue on the basis of Hooper-Kohlhagen (1978) study using annual data. Coes (1981) examines Brazilian exports (as a proportion of the total value added) in 9 primary and 13 manufacturing sectors for 1965-74. His result indicated that the significant reduction in exchange rate uncertainty in the Brazilian economy during the crawling peg period might have contributed as much as the changes in prices toward explain the greater openness of the economy after 1968. Rana (1983) study is the most thorough study in context of developing countries. He reached the same results regarding the import volumes of a number of Southeast Asian countries some of which are also included in the Bahamani-Oskooee (1984) sample. Rana (1983) estimated the import demand function for each country in the sample. He concluded that the increase in exchange rate risk has a significant negative impact on import volumes. He did not analyze export volumes in the same manner although they are likely to be of greater interest.

Kabir (1988) used the standard regression model to investigate the Bangladesh export demand function. He found evidence for income inelastic demand for exports. Ahmed, Haque and Ttalukder (1993) estimated an export demand function using co integration and error correction model. Their results are similar to Kabir (1988) result regarding to export demand function for Bangladesh Export. However, they concluded that the cost efficiency by lowering price might not boost up the export demand significantly. Bayes, Hossein and Rahman (1995) have hypothesized that Bangladesh export supply is a function of relative prices of its exports and the capacity output of the tradable sector. They have estimated the demand and supply models of exports with annual data and found that Bangladeshis export

is highly sensitive to the income growth of its trading partners and estimated that a 10% rise in a foreign income would raise the demand for Bangladeshi exports by 23%.

Mustafa, K. and Nishat, M (2006), found in their study that the volatility of exchange rate had a negative and significant effect both in the long run and short run with UK, US, Australia, Bangladesh, and Singapore where as the volume of trade with Pakistan is comparatively consistent and a lesser amount of volatile.

3. Empirical Models

After analyzing the previous research works on exchange rate volatility and it impacts on the international trade especially export growth it can be summarized that different studies have different results. The reason for different results is the researchers used different methodology, different sample period, and different estimation techniques. The econometric methodology used in these studies only the problems of the short run perspective that is why if result found any evidence regarding to the relationship between volatility and trade flows it is most likely medium or short run relationship.

Based on the above discussion the following equation is estimated:

$$X_t = \xi_0 + \xi_1 \dot{\iota}_t + \xi_2 p_t + \xi_3 \sigma_t + \varepsilon_t \qquad (1)$$

where X_t denotes real exports from Bangladesh to other countries selected in different regions, P_t is the real bilateral exchange rate reflecting the price competitiveness, $\dot{\iota}_t$ is the manufacturing production index of importing country which is the proxy for GDP, because the quarterly data on GDP is not available and σ_t is the exchange rate volatility. The sign of ξ_1 is expected to be positive and the sign of ξ_2 is also to be positive because higher exchange rate implies a lower relative price that increases export.

In order to ensure consistency in data, the exports of Bangladesh measured in local currency and to convert into real export, export unit index is being used, which is based on Bangladesh currency. Real exports of Bangladesh define as;

$$X_{tt} = Ln\left(\frac{EX_{it}}{EXUV_{it}} * 100\right) \qquad (2)$$

Where X_{it} is the real export of Bangladesh in domestic currency unit natural logarithm EX_{it} is the quarterly nominal exports of Bangladesh in domestic currency and $EXUV_{it}$ is the index of export unit of Bangladesh and *t* is the time period.

Industrial production index (i_t) is used as a proxy for GDP of importing country because unavailability of quarterly data on GDP. Many studies have been used the industrial production index as proxy variable e.g. Baum, Calagy and Ozkan (2002). The variable i_t is the natural logarithm of the industrial production index of an importing country. Bilateral trade between two countries depends upon the exchange rate and the relative price level of two trading countries. Hence the real exchange rate is calculated on the basis of these variables. The real exchange rate is

$$b_{it} = Ln\left(E_{it} x \frac{CPI_{ft}}{CPI_{it}}\right) \qquad (3)$$

Where b_{it} is the real quarterly exchange rate between in natural logarithm between Bangladesh and other trading countries. E_{it} is the nominal quarterly exchange rate: CPI_{it} and CPI_{ft} is the consumer price index number of Bangladesh and an importing country *f* respectively.

A range of studies provide the method how to measure the exchange rate risk. However, in this study the standard deviation of exchange rate risk is used which is also used by Akhtar and Hilton (1984) and Baum, Calagyan and Ozkan (2002). The exchange rate volatility define in natural logarithm

$$\sigma_{ijt} = Ln\left[\sqrt{\frac{1}{n-1}\sum_{k=1}^{n}\left(RER_{ik} - \overline{RER_i}\right)^2}\right] \qquad (4)$$

Where σ_{ijt} is the volatility of real exchange rate and RER_{ik} is the quarterly exchange rate of Bangladesh and $\overline{RER_i}$ is the quarterly average of real exchange rate. The researcher tests

real export (X_t) of Bangladesh with real exchange rate volatility (σ_t) with the mixture of the actual bilateral exchange rate (b_t) and industrial production index (i_t).

If X_t and σ_t are considered to be stochastic trends and if they follow a common long run equilibrium association, then X_t and σ_t should be cointegrated. Cointegration is a test for equilibrium between non-stationary variables integrated of same order. According to Engle and Granger (1987), cointegrated variables must have an ECM representation. The main reason for the popularity of cointegration analysis is that it provides a proper background for testing and estimating short run and long run relationships among economic variables. Furthermore, the ECM strategy provides an answer to the problem of spurious correlation. If X_t and σ_t are cointegrate, an ECM representation could have the following form.

$$\Delta X_t = \alpha_0 + \alpha_1 B_{t-1} + \sum_{i=0}^{n} \alpha_{2i} \Delta X_{t-1} + \sum_{i=0}^{n} \alpha_{3i} \Delta \sigma_{t-1} + \sum_{i=0}^{n} \alpha_4 \Delta i_{t-1} + \sum_{i=0}^{n} \alpha_5 \Delta p_i + e_t \quad (5)$$

Where B_{t-1} is an error correction term. In equation (1) ΔX_t, σ_t and e_t are stationary, at first difference implying that there right hand side must also be stationary. It is obvious that equation (1) composes a bi-variate vector autoregression (VAR) in first difference augmented by the error correction terms B_{t-1} indicating that ECM and cointegration are corresponding representations. According to Granger (1988) in a cointegrated system of two series uttered by an ECM representation, causality ought to run in at least one way. Within the ECM formulation of equation (1) X_t does not granger cause σ_t if $\alpha_1 = \alpha_3 = 0$.

4. Data

The data used in this study is quarterly covered from 2003 to 2008. The data for nominal exports (EX_{it}) is taken from various issues of Foreign Trade Statistic of Bangladesh issued by Bangladesh Bureau of Statistic from (03-08) and The World Bank Group. The data for export unit value of Bangladesh ($EXUV_{it}$), the industrial production index of importing country (i_t), consumer price index of Bangladesh (CPI_{it}) and consumer price index of importing country (CPI_{ft}) are taken from various issues of Bangladesh Bank and International Financial Statistics (IFS) of International Monetary Fund (IMF). The

nominal exchange rate data are taken from several issues of Economic Data published by Bangladesh Bank.

5. Empirical Results

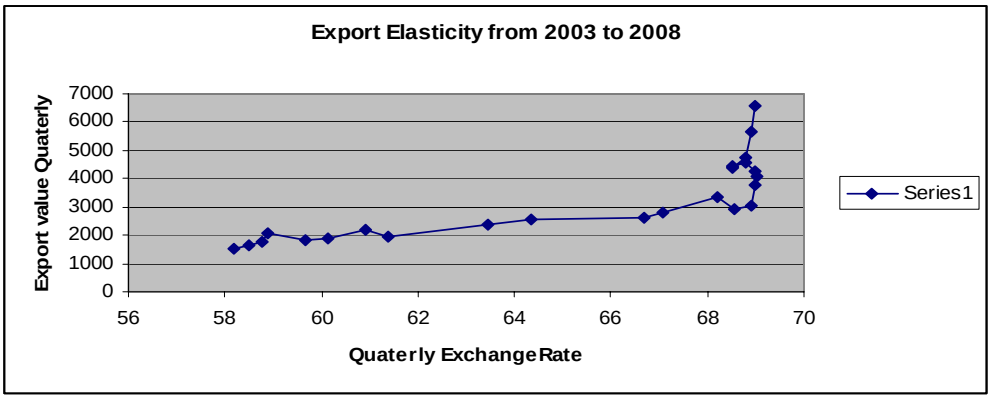
In table 1 represents the export of Bangladesh to Canada, USA, UK, France, German, Italy, Australia, New Zealand, Singapore, Malaysia, India, Pakistan, China, Iran, Belgium and Japan during the study period from 2003-04 to 2007-08 economic year. The data shows that a large portion of trade goes to the North American and Western European countries. The volume of exports gradually increasing in the countries such as New Zealand, Australia, India, Pakistan and Iran.

The empirical results presented in table 2 indicates that series of all four variables are each I(1) with constant and time trend in the data at the level. Subsequently Johanson (1988, 1991) cointegration test is employed. This test is more appropriate when more than two variables are used in the equation and it also can make use of I(0) variables. The null hypothesis is that there can be (*r)* cointegrating vectors among four variables system (X_t , σ_t , b_t and i_t) for all countries, which are considered in the study periods. The test statistics implies the presence of one cointegrating relationship for all four variables in all countries. The ADF statistics of at the level of all series are lower than the critical value which implies the presence of unit roots of all four variables i.e. each I(1). However, the results derived form first difference of the variables reject the null hypothesis of a unit root at least five percent level of significance.

The cointegrating vectors are given in table 3, which shows that for each country the impact of industrial production is positively related to the volume of exports except India and New Zealand. The expected sign of (i_t) is positive. It indicates that the higher the economic activity in importing country, the higher the demand for exports. However the negative sign shows that the higher economic activity in importing country leads to decrease in the volume of exports. This implies that Bangladeshi commodities are considered as inferior goods in India, Pakistan, Australia and New Zealand. The relation of real exchange rate to the volume of export is expected to be positive. It indicates that a higher real exchange rate implies a lower relative price, and as a result the volume of

exports increases. Empirical evidence shows that the positive signs for its relationship in case of North America, Western Europe, whereas negative signs are for SAARC and ASEAN countries. It implies that the demand for Bangladesh exports in these countries is inelastic.

Figure 1: Trend of Export Elasticity ($\overline{RER_i}$) of Bangladesh



The volatility of exchange rate has expected negative relationship with real export in all countries. It supports to the study of Cushman (1983, 1986, 1988); Akhtar and Hilton (1984); Kenen and Rodrick (1986); Thursby and Thursby (1987); De Grauwe (1988); Pere and Steiner (1986); Koray and Lastrapes (1989); and Arize (1995). The causal relationship between X_t and σ_t are presented in tables 5 within the ECMs form. At most three lags are used for each independent variable to preserve degree of freedom and AIC is used for model selection, whereas error correction terms B_{t-1} appearing as repressors' reflect long run dynamics or in other words the system converges to the long run equilibrium implied by cointegrating regression. The coefficient of B_{t-1} represents the response of the dependent variables in each period to departure from equilibrium. The coefficients on the lagged values of ΔX_t, $\Delta\sigma_t$, Δi_t, and Δb_t are short run parameters measuring the short run immediate impact of independent variable on ΔX_t. The results indicates that the error correction terms $t-1$ B are negative sign and statistically significant in case of New Zealand, Pakistan, India, and Singapore. It indicates that a measure of the average speed at which export volume adjusts to a change in equilibrium conditions. The absolute values of the error correction terms indicate that the movement of real export towards eliminating disequilibrium with in a quarter varies from one country to another. e.g. in case of New Zealnd only 26.6% of the adjustment occur in one quarter while 84.17% in Pakistan, 78% in India, 81% in Singapore, 87.% for USA and 46.6% in UK. However, the values are

statistically insignificant. The coefficient on the industrial manufacturing production (i_t) and real exchange rate on real export show how the average speed of export adjusts or it may differ. It depends on the adjustment in response to industrial production or real exchange rate.

The result is ambiguous on the subject of the relation ship between real exchange rate and exports demand and industrial production. The main concentration is to see the impact of exchange rate volatility on export of all countries, which have been taken in this study. It indicates the ambiguous results, e.g. in case of New Zealand and India the result shows negative and significant impact on real export. However the estimation of the other countries show the statistically insignificant result. The fact is that Bangladesh economy is Dollar based economy and its exports and imports depend on the value of US Dollar. That is why mutual exchange rate is less effect on real export. However the result regarding to US is negative and insignificant even Bangladesh economy is Dollar economy. It is an important empirical finding.

6. Conclusion

The impact on export growth in Bangladesh due to exchange rate volatility between trading countries and Bangladesh has been empirically examined. Each of the trading countries has been considered in this study under the regional economic blocks such as SAARC, ASEAN, European, North America and Asia-Pacific regions. Cointegration and Error Correction techniques are used to establish the empirical relationship between impact on exports growth in Bangladesh and exchange rate volatility, using yearly data from 2003 to 2007. The result indicates that the volatility of exchange rate has negative and significant effects both in the long run and short run with North America and Western Europe, and some countries in ASEAN, where the volume of trade with Bangladesh is moderately consistent and less volatile. The relationship between exports growth and exchange rate volatility between Bangladesh and India, Pakistan are studied only in long run perspective. However, countries like Iran and other Gulf countries no empirical relationship is observed between export growth and exchange rate volatility.

REFERENCES

Ahmed, M., Haque, N., and Talukder, S. I. (1993), "Estimating Export Demand Function for Bangladesh: An Application of Co-integration and Error Correction Modeling," The Bangladesh Development Studies, 21, 89-104.

Akhtar, M., and Hilton, R. S. (1984), "Effects of Exchange Rate Uncertainty on German and U.S. Trade," Federal Reserve Bank of New York Quarterly Review, 9, 7-16.

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

Asseery, A., and Peel, D. A. (1991), "The Effects of Exchange Rate Volatility on Exports," Economic Letters, 37, 173 -177.

Baak, S., Al-Mahmood, A., and Vixathep, S., (2002), "Exchange Rate Volatility and Exports from East Asian Countires to Japan and U.S.," (Manuscript). University of Japan.

Bahmani-Oskooee, M. (1984), "On the Effects of Effective Exchange Rates on Trade Flows," Indian Journal of Economics, 256, 57-67.

Bahmani-Oskooee, M., (1986), "The Determinants of Trade Flows: The Case of Development Countries," Journal of Development Economics, 20, 107-123.

Bailey, M. J., Tavlas, G. S., and Ulan, M. (1987), "The Impact of Exchange Rate Volatility on Export Growth: Some Theoretical Consideration and Empirical Results," Journal of Policy Modeling, 9, 225-243.

Baldwin, R. and Krugman, P. (1989), "Persistent Trade Effects of Large Exchange Rate Shocks," Quarterly Journal of Economics, 104, 635-665.

Baum, C. F., Mustafa, C., and Ozkan, N., (2001), "Exchange Rate Effects on the Volume of Trade Flows, An Empirical Analysis Employing High-Frequency Data, (Manuscript). Boston College.

Bayes. A. M., Hossain. I., and Rahman, M. (1995), "Independent Review of Bangladesh's Development External Sector, Centre for Policy Dialogue, Dhaka, Bangladesh.

Chowdhury, A. R. (1993), "Does Exchange Rate Volatility Depress Trade Flows? Evidence from Error-Correction Models," The Review of Economics and Statistics. 75, 700-706.

Coes, D. (1981), "The Crawling Peg and Exchange Rate Uncertainty," in J. Williamson (ed) New York: SDT. Martin's Press, 113-136.

Cushman, D. O. (1983), "The Effects of Real Exchange Rate Risk on International Trade," Journal of International Economics, 15, 45-63.

Cushman, D. O. (1986), "Has Exchange Risk Depressed International Trade? The Impact of Third Country Exchange Risk," Journal of International Money and Finance, 5, 361-379.

Cushman, D. O. (1988), "US Bilateral Trade Flows and Exchange Rate Risk During the Floating Period," Journal of International Economics, 25, 317-330.

DeGrauwe, P. (1988), "Exchange Rate Variability and the Slowdown in Growth of International Trade," IMF Staff Papers, 35, 63-84.

Dixit, A. (1989), "Hysteresis, Import Penetration, and Exchange Rate Pass-through," Quartely Journal of Economics, 104, 205-227.

Gotur, P. (1985), "Effects of Exchange Rate Volatility on Trade: Some further Evidence," IMF Staff Papers, 32, 475-512.

Hooper, P., and Kohlhagen, S. W. (1978), "The Effects of Exchange Rate Uncertainty on the Price and Volume of International Trade," Journal of International Economics, 8, 483-511.

Houthakkar, H. S., and Magee, S. (1969), "Income and Price Elasticities in World Trade," Review of Economics and Statistics 51, 111-125.

International Monetary Fund, (1984), "Exchange Rate Volatility and World Trade," IMF Occasional Papers No. 28'

Kabir, R. (1988). "Estimating Import and Export Demand Function: The case of Bangladesh," The Bangladesh Development Studies, 115-127.

Kenen, P. T., and Rodrick, D. (1986), "Measuring and Analyzing the Effects of Short Run Volatility in Real Exchange Rates," The Review of Economics and Statistics, 68, 311 315.

Koray, F., and Lastrapes, W. D. (1989), "Real Exchange Rate Volatility and U.S. Bilateral Trade: A VAR approach," The Review of Economics and Statistics, 71, 708- 712.

Kumar, R. and Dhawan, R. (1991), "Exchange Rate Volatility and Pakistan's Export to the Developed World, 1974-1985. World Development, 19, 1225-1240. 10

Mustafa, K. and Nishat, M. (2006), "Volatility of Exchange rate and Export Growth in Pakistan: The Structure and Interdependence in Regional Markets", Working paper of State Bank of Pakistan.

Pere, E., and Steinherr, A. (1989), "Exchange Rate Uncertainty and Foreign Trade," European Economic Review, 33, 1241-1264.

Rana, P. (1983), "The Impact of Generalized Floating on Trade Flows and Reserve Needs, Selected Asian Developing Countries," New York Garland Publishers.

Thursby, M. C., and Thursby, J. G. (1987), "Bilateral Trade Flows, Linders Hypothesis, and Exchange Risk," The Review of Economics and Statistics. 69, 488-495.

Warner, D. F., and Kreinin, M. E. (1983), "Determinants of International Flows," The Review of Economics and Statistics, 65, 96-104.

Appendix

Table 1
Country wise Total Export of Bangladesh
(Million in Taka)

Country	2003-2004	2004-2005	20052-2006	2006-2007	2007-2008
USA	114722.17	146842.95	185485.26	238448.74	125604.23
Canada	437097.68	532831.06	24965.15	31323.31	19164.45
UK	51131.91	57815.39	63658.75	81651.08	115680.67
France	32487.70	38786.58	42032.10	53754.83	76385.33
Italy	18291.25	2278.35	26013.69	35841.65	23697.33
Malaysia	477.62	727.43	928.61	1346.37	1890.41
India	3932.79	8677.51	13388.30	18861.86	15610.66
Pakistan	2620.72	3799.82	3843.29	5897.14	3350.48
Singapore	2487.75	5267.45	7087.84	8423.14	2483.76
Iran	1686.77	2969.58	2883.68	3613.44	4284.54
China	2392.66	4172.51	51488.78	7427.62	4328.97
Japan	6819.64	7567.53	7829.21	10083.51	3702.66
German	77965.49	83567.69	104758.54	134090	78620.21
Belgium	18280.42	19657.96	22288.28	32854.92	27169.33
New Zealand	129.12	160.44	175.34	219.06	242.34

Table 2

Johansen Co-Integration Tests for Exports

	Trace Statistic				Maximum Eigen Value			
H_0	$r = 0$	$r \leq 1$	$r \leq 2$	$r \leq 3$	$r = o$	$r \leq 1$	$r \leq 2$	$r \leq 3$
H_1	$r \geq 1$	$r \geq 2$	$r \geq 3$	$r = 4$	$r = 1$	$r = 2$	$r = 3$	$r = 4$
United State	81.99	49.79	33.04	8.98	33.80	23.39	18.84	0.13
United Kingdom	69.52	33.93	13.03	6.65	48.57	19.90	7.77	0.11
China	77.92	31.77	17.99	8.44	43.15	13.78	9.66	0.16
New Zealand	38.01	18.28 4	7.77	1.26	16.73	10.51	6.81	0.05
Singapore	29.28	21.26	12.08	4.89	38.02	10.18	8.59	0.08
India	33.22	42.68	23.45	14.01	54.54	22.23	11.44	0.23
Pakistan	42.84	15.70	6.74	0.53	34.14	11.96	6.71	0.02
Malaysia	28.77	24.82	20.66	5.127	38.95	24.13	13.53	0.14
Japan	25.10	19.63	12.35	2.39	18.34	9.72	5.38	0.05
Belgium	62.32	29.34	12.87	7.21	37.54	18.57	6.98	0.14
Canada	75.26	45.39	31.92	7.87	32.10	21.12	18.71	0.11
France	33.45	23.21	6.19	2.43	23.40	12.11	15.98	0.07
Germany	71.98	46.30	35.87	8.89	34.84	24.11	19.01	0.13
Italy	45.56	21.09	15.78	7.48	45.67	22.59	26.65	0.10

Table 3

Estimates of the Cointegration Vectors
Normalized Cointegrating Coefficients: 1 Cointegrating Equation

	C	IPI	REALER	SIGMA	TREND
India	-1.211113	0.02746	-1.293511	-0.609002	-0.020162
(SE)		(0.035)	(0.702)	(0.927)	(0.068)
Pakistan	-17.71808	0.05879	1.252341	-0.038710	-0.159720
(SE)		(0.007)	(0.798)	(0.034)	(0.021)
China	-16.58368	1.4251	1225.969	-18.25019	-62.02431
(SE)		(7.727)	(365.47)	(17.541)	(15.809)
Malaysia	-14.31675	0.00345	0.558717	-0.206157	-0.024084
(SE)		(0.001)	(0.145)	(0.093)	(0.007)
Singapore	-28.8446	- 0.01616	6.452053	-0.069974	0.005412
(SE)		(0.002)	(0.622)	(0.039)	(0.003)
UK	-32.42399	-0.13385	5.626857	-3.347687	-0.137836
(SE)		(0.943)	(47.356)	(22.920)	(0.903)
USA	-14.3317	0.0064	-0.4651	0.0059	-0.0311
(SE)		(0.005)	(0.378)	(0.045)	(0.005)
New Zealand	-123.6765	- 0.32763	-25.65472	-80.54113	0.198937
(SE)		(1.403)	(102.22)	(352.435)	(5.261)
Canada	-34.121	-0.2983	-0.41631	0.0049	-0.03010
(SE)		(0.983)	(0.31245)	(0.042)	(0.042)
France	-31.43219	-0.121349	4.87495	-3.14530	-0.11543
(SE)		(0.913)	(45.421)	(22.451)	(0.821)
Germany	-34.76589	-0.14543	6.7658	-3.63489	-0.14760
(SE)		(0.987)	(52.376)	(23.870)	(0.984)
Italy	-30.6745	0.11739	3.67432	-3.0123	-0.09429
(SE)		(0.921)	(45.789)	(20.829)	(0.794)
Belgium	-34.439	-0.5312	7.321	-3.74937	-0.15216
(SE)		(0.879)	(56.841)	(24.450)	(0.993)
Japan	-17.343	-0.45832	-21.4512	-2.40916	-0.10371
(SE)		(1.4576)	(98.345)	(0.6763)	(0.529)

Table 4
Regression Results for Error Correction Models

Variables	China	Pakistan	India	Malaysia	New Zealand	Singapore	UK	USA
Constant	985.23 (559.02) (2.23)	-0.220 (0.11) (-1.84)	-0.006 (0.078) (-0.087)	0.920 (0.043) (0.28)	0.080 (0.05) (1.44)	-0.007 (0.046) (-0.163)	0.025 (0.03) (0.84)	-0.011 (0.05) (-0.19
ΔR.Exp(-1)	-3.524** (2.11) (-2.61)	0.847 (0.26) (1.18)	-0.78 (0.27) (-2.82)	-0.499 (0.22) (-2.30)	-0.266 (0.28) (-0.94)	-0.81 (0.19) (-0.94)	-0.466 (0.16) (-2.80)	0.087 (0.29) (0.29)
ΔR.Exp(-2)	-3.335** (2.70) (-2.49)	-0.273 (0.18) (-1.55)	-0.312 (0.26) (-1.19)	-0.38 (0.24) (-1.58)	-0.112 (0.78) (-0.14)	-0.163 (0.166) (-0.97)	-0.166 (0.164) (-1.009)	-0.033 (0.226) (-0.14)
ΔR.Exp(-3)	-3.833 (2.457) (-1.51)	- 0.078 (0.16) (-0.48)		-0.106 (0.192) (-0.515)	-0.051 (0.28) (-0.17)			-0.264 (0.17) (-1.51)
ΔIPI(-1)	-129.32 (70.22) (-1.78)	0.029 (0.02) (1.82)	-0.022 (0.00) (-2.74)	-0.000 (0.000) -(1.02)	-0.011 (0.10) (-1.04)	-0.002 (0.00) (-0.71)	0.004 (0.00) (1.15)	-0.014 (0.025) (-0.544)
ΔIPI(-2)	-179.80 (93.02) (-1.325)	0.023 (0.01) (1.87)	-0.001 (0.00) (-1.44)	0.000 (0.004) (0.092)	-0.009 (0.10) (-0.77)	0.001 (0.0027) (0.572)	-0.00 (0.00) (-0.24)	0.02 (0.026) (0.75)
ΔIPI(-3)	-100.98 (56.61) (-1.47)	0.010 (0.01) (2.70)		0.001 (0.00) (0.72)	0.003 (0.019) (0.26)			0.073 (0.028) (1.81)
ΔR.ER(-1)	-4148** (2303.41) (-2.801)	0.402 (1.75) (0.23)	0.377 (0.21) (1.96)	0.000 (0.72) (0.014)	-0.656 (0.36) (-1.67)	1.976 (0.99) (1.12)	(1.80) (1.067) 1.22	0.476 (1.25) (0.36)
ΔR.ER(-2)	-3441.00 (1912.46) (-1.799)	0.045 (1.67) (0.09)	0.238 (0.19) (1.21)	0.006 (0.p55) (0.115)	-0.379 (0.37) (-1.02)	-2.91 (1.65) (-1.75)	-0.919 (0.976) (-0.94)	-1.235 (1.77) (-1.049)
ΔR.ER(-3)	-2637.96 (1556.42) (-1.739)			0.034 (0.040) (0.943)	-0.354 (0.37) (0.95)			0.76 (1.19) (0.63)
ΔSigma(-1)	-169.3** (70.70) (-2.39)	-0.0w1** (0.03) (-2.85)	0.093 (0.06) (1.53)	0.030 (0.004) (0.637)	-0.862 (1.61) (-0.53)	0.051 (0.089) (1.094)	-0.019** (0.040) (-2.407)	-0.011** (0.06) (-2.42)
ΔSigma(-2)	-51.25 (119.79) (-0.42)	0.016 (0.04) (0.28)	0.070 (0.06) (1.14)	0.0448 (0.047) (0.946)	-1.246 (1.5) (-0.83)	-0.021** (0.052) (-3.98)	-0.059 (0.46) (-1.27)	-0.005 (0.059) (-0.027)
ΔSigma(-3)	100.92** (5y.19) (-2.70)	0.075 (0.04) (1.96)		0.070 (0.04) (1.62)	-0.008 (1.65) (-0.06)			-0.016 (0.066) (-0.30)
Bt-1	-2.46** (1.59) (-2.54)	-0.807** (0.316) (-2.55)	-0.035** (0.009) (-3.64)	-0.002 (0.035) -0.64)	-0.027 (0.114) (-0.23)	-0.378** (0.218) (-2.73)	-0.014** (0.035) (-2.39)	-0.691** (0.38) (-2.88)
R2	0.77	0.71	0.305	0.47	0.37	0.367	0.47	0.60
Adjusted R2	0.47	0.49	0.265	0.13	0.14	0.13	0.22	0.40
AIC	11.49	0.224	1.754	0.603	16.14	-0.72	-0.1356	-0.21394