"Exchange Rate Volatility and International Trade Growth: Evidence from Bangladesh"

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Abstract

This is a study to investigate the exchange rate volatility and it impacts on international trade growth: evidence from Bangladesh. To establish the empirical relationship between exchange rate volatility and impact on international trade growth in Bangladesh, different quantitative techniques are used by considering the data from May 2003 to December 2008. In the analysis cointegration and error correction methods have been used to do the analysis the relationship between exchange rate volatility and international trade growth in Bangladesh. 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 Western European and North American countries. There is a negative and significant relationship has been observed between exchange rate volatility and the international trade growth.

Key words: Cointegration, Error Correction, Exchange Rate, Volatility, Export growth, Trade growth.

Introduction

The exchange rate volatility and its impact on the volume of international trade has been studied intensively during 1970'swhen the world economy shifted from fixed exchange rate to free floating exchange rate. The hypotheses may be 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 the run, exchange rate volatility may also affect 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 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, the studies dealt 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 view 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$^{st.}$ 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 adopting the floating exchange rate. In 2003, the total amount of export of Bangladesh was US$ 6548.44 million and in 2008 gradually it has increased to the amount of US$ 16333.04 million and the growth is almost 2.83 percent. On the other hand exchange rate was (US$1= Tk 50.31) in 1990 and in 2008 it was (US$ 1= Tk 68.50), which was increased by 1.36 percent in 18 years.

The objective of this paper is to investigate the exchange rate volatility and its effects on international trade growth in Bangladesh during May 2003-Dec 2008. The concept of the study is taken from one of the working papers of the central bank of Pakistan, prepared by K. Mustafa and M. Nishat (2006). They found a negative but significant relationship between exchange arte and international trade growth in Pakistan. The researcher tries to apply the similar kind of experiment in Bangladesh. To

investigate the relationship between exchange rate volatility and trade growth, cointegration and error correction methods are being used in this study

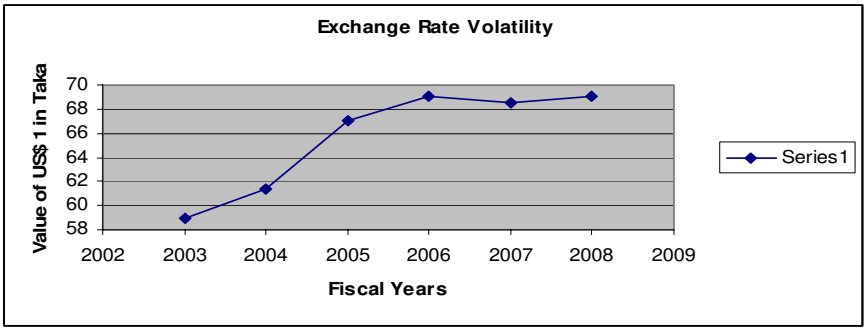
An Overview of International Trade in Bangladesh

Exchange Rate

More than a decade Bangladesh pursued a flexible exchange rate policy. Beforehand, the exchange rate of Taka used to be attuned from time to time to keep it competitive based on the rate of inflation and movement of exchange rates as well as trade weights with partner countries. In recent times, the Government has taken an audacious step in exchange rate management. Bangladesh stepped into introducing fully market based exchange rate since May 31, 2003. Introduction of free float exchange rate did not fetch in any major instability in the economy so far.

Although the US dollar linger stronger against Taka during the period of late 2003 through April 2004 but the situation after that did not aggravate and the value of Taka remained stable between May 2004 to August 2004. Since August 2004 Taka showed stability and from August 2004 to March 2005 Taka showed some resilience against US Dollar. Despite the rapid development of private sector with increasing credit flow; much higher growth in import of capital machinery and primary goods due to devastating flood and hike of the oil price in international market were mainly responsible for the fluctuation of exchange rate. Due to constant monitor and supervision by the central bank of Bangladesh and booster of greenback into foreign exchange market the exchange rate remained stable. On June 30, 2004 the official and interbank market exchange rate of Taka-Dollar remained firm, whereas, the value of Taka was 59.30 and 61.50 correspondingly. Even though, in open market the dollar was charged comparatively more than interbank market exchange rate. However, on June 30, 2004 the exchange rate of dollar was moving upward slightly from Tk. 61.00 to 62.20 in this market. The exchange rates of Taka per US Dollar during the last decade is presented in table 1 in appendix.

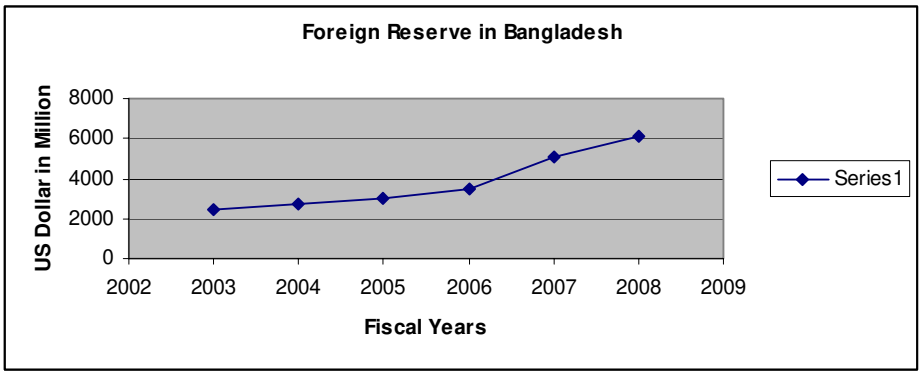
Figure 1: Exchange rate volatility from 2003 to 2008



Foreign Exchange Reserve

The development of export earring and significant raise of remittance from the expatriate of Bangladeshis and June 30, 1999 the foreign exchange reserve was US$ 1523 million, which was lower than the previous year by 12.42 percent but it was increased in next year by 5.17%more than the same date of previous year. After introducing the free floating exchange rate in Bangladesh on May 31, 2003 the reserved of foreign exchange was US$ 2470 million.

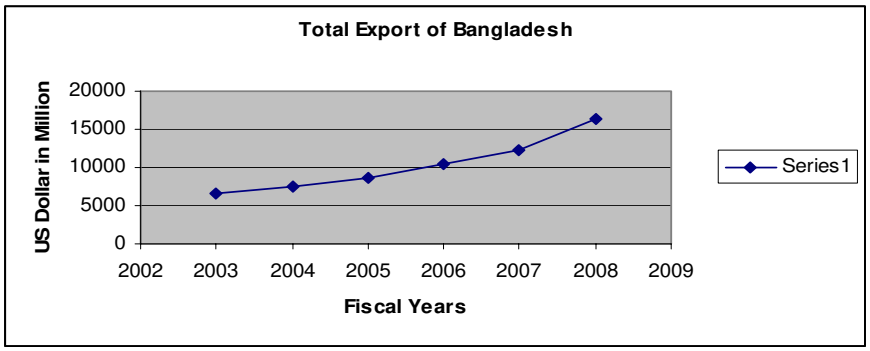
Figure 2: Total reserve of Foreign Currency from 2003 to 2008



Export

The study of the country wise export shows that USA is the major target market of Bangladesh to export merchandise. In 2004-05, Bangladesh exported largest volume of merchandise and commodities to US and held the top position in respect of importing Bangladeshi commodities. During this period, goods worth of US$ 2,412.05 million were exported to the US, which was 27.87 percent of the total export of the country. The major commodities exported to US were frozen food, home textile, knitwear and woven garments. According to the commodity wise Bangladesh exported 45.12 percent of woven garments, 14.28 percent of knitwear and 40.79 percent of shrimps of the total export to US in 2004-2005. After US, Bangladesh exported most of the commodities to Germany and UK respectively. The data of the country wise export is shown in table 2 in appendix.

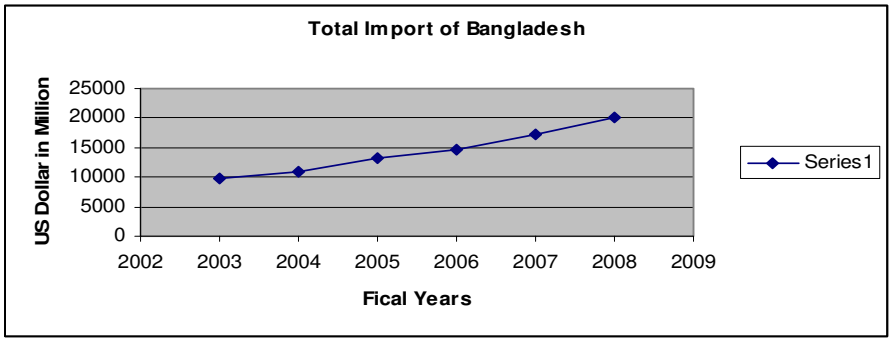
Figure 3: Total Export of Bangladesh from 2003 to 2008



Import

Bangladesh economy is more dependable on import as the largest portions of the products are coming from outside the country to full fill the domestic demand. However, apart from the basic commodities now a days Bangladesh imports the luxurious commodities as well to satisfied the social needs. It becomes visible from the country wise import analysis that in terms of the value of total imported commodities India occupied the first position in 2003-04, which was 14.69 percent of the total import. After that Bangladesh imported most of the goods from China and Singapore, which were 10.99 percent and 8.36 percent of total import respectively. In the appendix, table 4, the values of total import from different countries have been showed.

Figure 4: Total Import of Bangladesh from 2003 to 2008

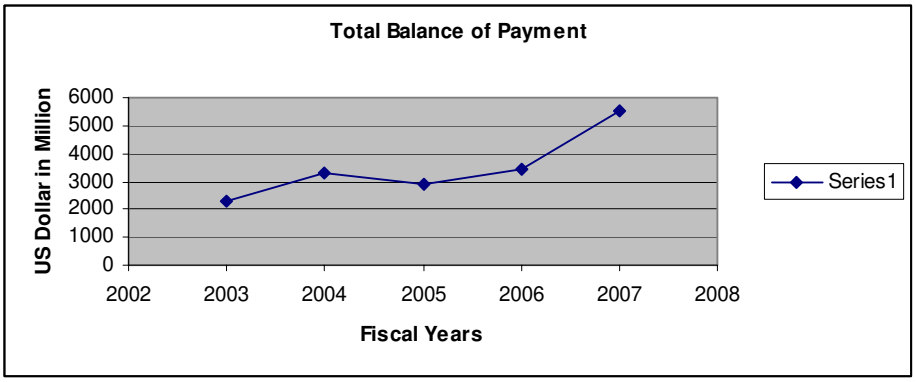


Balance of Payment

A country's balance of payments is commonly defined as the record f transactions between its residents and foreign residents over a specified period. Each transaction is recorded in accordance with the principles of double-entry bookkeeping, meaning that the amount involved is entered and each of the two sides of the balance-of-payments accounts by Koray, F., and Lastrapes, W. D. (1989). Sequent, the sums of the two sides of the complete balance-of-payments accounts should always be the same, and in this sense the balance of payments always balances. However, there is no bookkeeping requirement that the sums of the two sides of a selected number of balance-of-payments

accounts should be the same, and it happens that the (im) balances shown by certain combinations of accounts are of considerable interest to analysts and government officials by Cushman, D. O. (1988). It is these balances that are often referred to as "surpluses" or "deficits" in the balance of payments. The balance of payment of Bangladesh during the time period of 1990-00 to 2006-07 is shown in table 5 in appendix.

Figure 5: Total Balance of Payment from 2003 to 2007



Conceptual Framework

The inconsistent results about the impact of exchange rate volatility on international trade are observed. Studies that support the hypothesis that the volatility of exchange rate reduces the volume of international trade include 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) made 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) also introduced 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 in 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 enhanced 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 that 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 the 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 regarding the impact of exchange rate volatility on export growth to developing countries by Bahmani-Oskooee (1984, 1986); Coes (1981); and Rana (1983) inconclusive as they have explained variation in exchange rate policies and level of growth. 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 the greater openness of the economy after 1968.

Rana (1983) study is the most thorough study in the 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 cointegration and error correction model. Their results are similar to Kabir (1988) result regarding of

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 Bangladeshs' 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%.

Methodology

To investigate the exchange rate volatility and its impact on the international trade of Bangladesh, the econometric methodology used in these studies to find out the causal relationship between exchange rate volatility and international trade growth in Bangladesh. Based on the above discussion the following equation is estimated:

$$X_t = \xi_0 + \xi_1 i_t + \xi_2 B_t + \xi_3 \sigma_t + \varepsilon_t \qquad (1)$$

Where, X_t denotes real exports from Bangladesh, B_t is the real bilateral exchange rate reflecting the price competitiveness. 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. Trade growth between countries depends upon the exchange rate and the relative price level of two trading countries. i_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.

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

$$X_t = Log\left(\frac{EX_{it}}{EXU_{it}} * 100\right) \quad (2)$$

Where X_t 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 EXU_{it} is the index of export unit of Bangladesh and t is the time period. Hence the real exchange rate is calculated on the basis of these variables. The real exchange rate is;

$$r_{it} = Log\left(E_{it} * \frac{CPI_{ft}}{CPI_{it}}\right) \quad (3)$$

Where, r_{it} is the real quarterly exchange rate between in natural logarithm between Bangladeshi taka and US dollar. 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.

Cointegration is a test for equilibrium between non-stationary variables integrated of same order. So 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. 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. According to Engle and Granger (1987), cointegrated variables must have an error correction mechanism (ECM) representation. Furthermore, the ECM strategy provides an answer to the problem of spurious correlation. If X_t and σ_t are cointegrated, an ECM representation could have the following form.

$$\Delta X_t = \alpha_0 + \alpha_1 B_{t-1} + \sum_{i=0}^{n} \alpha_{2i} \Delta X_{t-1} + \sum_{i=0}^{n} \alpha_{3i} \Delta \sigma_{t-1} + \sum_{i=0}^{n} \alpha_4 \Delta i_{t-1} + \sum_{i=0}^{n} \alpha_5 \Delta p_i + e_t \quad (4)$$

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 auto regression (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 α□ *EMBED Equation.3* □□□ α□ *EMBED Equation.3* □□□.

Sources of Data

To do the analysis of the study the data has been used from May 2003 to Dec 2008. Total export and import of Bangladesh and country wise export and import data has been taken from various issues of Foreign Trade Statistic of Bangladesh issued by Bangladesh Bureau of Statistic (BBS). The exchange rate data has been gathered from Bangladesh Bank and The World Bank Group during that period.

The systematic and objective process for gathering, recording and analyzing data has been used in this model. It has been tried to identify the issues, avoiding distorting effect of personal bias to find out the result of the hypotheses. At the end of selection and evaluation of the course of action analysed based on the secondary data.

Empirical Analysis

The empirical results presented in table 1 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 , r_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 volatility of exchange rate has expected negative relationship with real export. 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 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 fact is that Bangladesh economy is Dollar based and its exports and imports depend on the value of US Dollar. That is why 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.

Concluding Remarks

The objective of the paper is to investigate the exchange rate volatility and its impact on the trade growth in Bangladesh. The cointegration and error correction models have been used to examine the causal relationship between exchange rate and international trade growth: evidence from Bangladesh. The empirical results suggest that exchange rate does not have a significant impact on international trade of Bangladesh for both short run and long run with other trading nations. Despite of exchange rate volatility the export of Bangladesh is gradually increasing and Bangladesh exports significant volume to US, which is noticeable. It can be concluded by saying that exchange rate volatility does not have a strong affect on the export or import of Bangladesh despite of the economy of Bangladesh is dollar based economy. However, the results also show that despite of increasing the exchange rate the import of Bangladesh has also increased enormously and most of the commodities are imported from India and China, which did not investigate in this study. The future research can be conducted to find out the factors and policy that are playing role for increasing the volume of import from India and China.

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Appendix

Table 1

Estimates of the Cointegration Vectors

Normalized Cointegrating Coefficients: 1 Cointegrating Equation

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

Table 2
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 (0.055) (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)	-0.071** (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** (59.19) (-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