DETERMINANTS OF BANGLADESH'S EXPORT FLOWS TO THE USA, 2003 – 2010: AN EMPIRICAL REVIEW

Determinan Ekspor Banglades ke Amerika Serikat, 2003-2010: Tinjauan Empiris

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ABSTRAK

Penelitian ini menganalisis dampak determinan fungsi ekspor Banglades ke Amerika Serikat selama periode nilai tukar mata uang mengambang bebas, khususnya menguji Hipotesis Linder dalam teori perdagangan internasional tahun 1961. Model tipe gravitasi diestimasi menggunakan data bulanan dari Mei 2003 hingga Mei 2010. Temuan studi ini mendukung Hipotesis Linder. Dari empat variabel, hanya satu variabel yang memiliki koefisien yang sangat nyata. Semua variabel memiliki tanda koefisien yang sama dengan yang dipostulasikan oleh Linder. Temuan studi ini sangat mendukung keabsahan Hipotesis Linder dalam teori perdagangan internasional.

Kata kunci : *Hipotesis Linder, nilai tukar mengambang, volatilitas nilai tukar, volume perdagangan*

ABSTRACT

This study investigates the impacts of the determinants of Bangladesh export functions on the export flows to the USA during the period of free and floating exchange rate regime in Bangladesh in order to review the Linder hypotheses postulated in the international trade theory in 1961. The gravity-type model was estimated using monthly data for the sample period May 2003 – May 2010. The findings of the study support Linder Hypotheses exactly. Among the coefficient estimates of four variables only one variable is found to be statistically highly significant. And the signs of all variable coefficients are exactly the same as postulated by Linder. Thus, the findings of this study are fully in support of the validation of the Linder's Hypotheses in international trade theory.

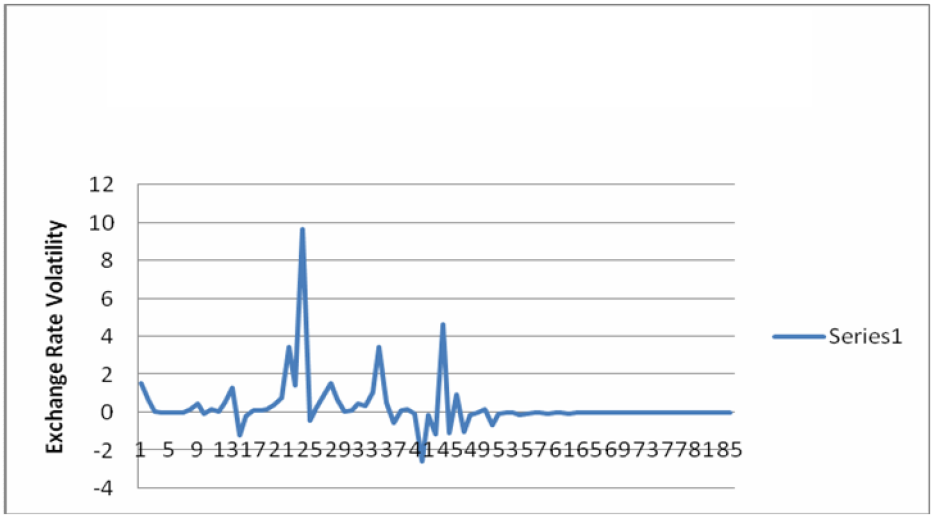
Key words : *Linder hypotheses, floating exchange rate, exchange rate volatility, trade volume*

INTRODUCTION

Motivated by the breakdown of the Bretton-Woods agreement in March 1973 that signaled the dawn of a new era for the global economy in which many

of the world's major trading nations embraced a regime of floating exchange rate determination (Aristotelous, 2001), Bangladesh also adopted the same policy in May 2003 (Rahman, 2003). Since then the exchange rate of Bangladesh's Taka against the US Dollar has been become remarkably volatile (see Figure 1). Researchers who mainly studied the impact of the exchange rate volatility on export earnings (see e.g. Arize et al., 2000; Doganlar, 2002; Siregar and Rajan, 2004, Zainal, 2004, among others) have generated mixed results that create a controversy regarding the desirability of floating exchange rates at which currencies are traded to the market forces of demand and supply. On the one hand, proponents of *laissez faire* economic doctrine welcomed the new transition and showed empirical evidence (see e.g. Franke 1991; Cote, 1994; Broll and Eckwert, 1999; Bailey *et al*., 1986; Koray and Lastrapu, 1989; Medhora, 1989) advancing that there has been no reason to support that exchange rate risk discourages trade, but many opposed this view (e.g. De Grauwe, 1992; Dellas and Zilberfarb, 1993; Sercu, 1992; Pozo, 1992; Arize, 1995; Asseery and Peel, 1991) owing to the risk involved in the volatile exchange rates that may discourage the risk-avert exporters to increase supply in the global market which would have an adverse effect on world trade.

Linder (1961) focused ~~s~~ rather on demand structures that constitute preferences for which per capita income can be used as a proxy variable. Linder's hypothesis states that per capita income of the importer-country is positively related to the exports of other trade partners (Markusen, 1986).



Source: The Present Study (2010)

Figure 1. Volatility of Bangladesh and the USA Exchange Rata (May 2003-May 2010)

The empirical literature on the determinants of global trade flows has mainly focused on the gravity model and the effect of exchange rate volatility of the trend of which is shown in the Figure 1. The gravity model, which is specified as $F_{ij} = G_{ij} (M_i * M_j) / D_{ij}$, where *F* stands for the value of foreign trade between two countries *i* and *j; G* stands for GDP of the respective trade partners; *M* stands for the income of the respective countries and *D* stands for the distance between two countries, has a long history of empirical and theoretical success (e.g. Deardroff, 1984; Anderson, 1984; Bergstrand, 1984). The linear transformation of the gravity model takes the log-linear form, which has been used in all the studies of international trade. This study has also used very similar log-linear model.

The main thrust of this paper is, however, to re-examine : (a) Per capita income is positively related to export volume (Linder hypotheses), and (b) Relative price variable is negatively related to export. In so doing, this study employs monthly aggregate data of Bangladesh export flows to the USA covering the period from May 2003 (when floating exchange rate was introduced in Bangladesh) to May 2010. For generating exchange rate volatility, Thusrby and Thursby (1987) as well as Bailey et al., (1987) method, which employed absolute percentage change of the exchange rate, has been followed. Section 2 provides the theoretical background of Linder hypotheses that conjecture on export volume. Section 3 and 4 depict the econometric model involved in this analysis and result discussion respectively. The final section presents the conclusion.

LINDER HYPOTHESES AND DETERMINANTS OF EXPORT VOLUME

As a matter of fact, Linder's hypotheses came into being before the breakdown of the Bretton-Woods Agreement on free and floating exchange rate which would be determined by the interaction of demand and supply of the currency market itself. Linder (1961) in reality shifted his focus of discussion from supply side to demand side of bilateral trade flows, which is said to be the breakdown of neoclassical theories of international trade where supply conditions are the most important factors of trade. Ethier (1973) extended those hypotheses publishing his treatise in 1973. Clark (1973) came out with similar results of that of validity of the Linder hypotheses. The arguments were further advanced by the theoretical consensus in economics literature which came from Artus (1983) and Brodsky (1984). In addition to them, Demers (1991), Franke (1991) and De Grauwe (1988) also confirm the conjectures of Linder that has been centered on the issue of risk aversion in bilateral global trade. The idea was further developed by Krugman (1979) to include transport cost and increasing returns to scale. In the presence of increasing returns to scale

specialization is promoted and excess production is exported (Helpman and Krugman, 1984).

Warner and Kreinin (1982) explore determining factors of international trade. Customarily, the study, as the present one, includes two independent variables such as real GDP (per capita basis) and relative prices. All variables are taken in logarithms, for which the parameters of the estimating equation are interpreted as elasticities. Relative prices could be taken as proxies of the ratios of the consumer price indices (CPIs) of the respective trade partners.

In terms of the relationship between the exchange rate volatility and foreign trade, considerably large numbers of studies reflect their experiences for which good surveys have been accomplished by Cote (1994) and McKenzie (1999) as well as in Zainal (2004). The results of all those studies are of three-fold: some are negative, some are positive and some produce mixed results of the Linder's hypotheses. The results of negative hypothesis mean that exchange rate volatilities act to the detriment of bilateral trade. On the other hand, by the findings of positive hypothesis they mean that exchange rate volatilities may lead to greater levels of international trade. The mixed results imply that some findings support both positive and negative hypotheses contemporaneously in the same study that uses disaggregated data. In this respect, McKenzie (1999, pp.72) rightly states:

> "The results of studies which have examined actual trade data in an attempt to establish the nature and magnitude of the relationship between volatility and trade flows are no less confusing. In general, the results of this empirical work have been insignificant or where significant, conflicting."

Yet, an increasing number of countries are embracing floating exchange rate measurements that are taken into accounts in recent studies among which Bangladesh is also a new case. Despite the ambiguity of the previous empirical studies, many new researches are being taken into account and this case of Bangladesh is also one of them.

MODEL SPECIFICATION

The objectives of the present study are to re-examine the Linder hypotheses through analyzing the influences of four pre-identified variables on the bilateral export flows of the aggregate commodities from Bangladesh to the USA. The gravity-type trade model specified in this study relies on the determinants of trade postulated by the international trade theories. Specifically, export demand has been taken as a function of per capita income, relative prices, nominal exchange rate and volatility of exchange rates similar to the

cases of previous studies such as Bredin et al. (2003), Caballero and Corbo (1989), Kumar and Dhawan (1991), McKenzie and Brooks (1997), Warner and Kreinin (1983). As the per capita income differs substantially between Bangladesh and the USA, this difference has been added to the model as another potential variable. Thus, the model stands as:

$$Ln\ X_t = \alpha_1 + \alpha_2 LnY_t + \alpha_3 Ln\ PR_t + \alpha_4 Ln\ ER_t + \alpha_5 Ln\ V_t + \alpha_6 Ln\ Z_t + \varepsilon_t \quad \text{.....(1)}$$

where,

X_t = Export volume at time t,

Y_t = Per Capita Income of the USA at time t (expected sign is +),

PR_t = Relative price at time t proxies as Bangladesh Consumer Price Index (CPI) divided by the USA's CPI (expected sign is -),

ER_t = Average nominal level of the Bangladesh - the USA exchange rate at time t (expected sign is +),

V_t = Exchange rate volatility at time t (expected sign is -). Here, exchange rate volatility is calculated by the formula of $V_t = |(e_t - e_{t-1})|/e_{t-1}$ where e is the spot exchange rate and t refers to the time. This method for calculating exchange rate volatility is used by Thursby and Thusrby (1987),

Z_t = Per Capita Income Difference between Bangladesh and the USA (expected sign is +),

ε_t = Disturbance term, and

$\alpha_1 .. \alpha_6$ = Parameters to be estimated.

DATA

The data for Bangladesh aggregate export volume, General CPI, Bangladesh-US exchange rate have been collected from Bangladesh Export Statistics, Bangladesh Economic Review and Statistical Year Book of Bangladesh published in different years in the past. The data for the per capita income and the CPI of the USA are collected from several documents of the US Bureau of Labor Statistics. These secondary data are then employed for calculating desired form of the variables incorporated in the model. As Bangladesh has adopted floating exchange rate in 2003, monthly data are incorporated into the estimation process in order to have a better empirical result. The descriptive statistics of the data employed in the study are as follows:

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
X	85	1180.00	445214.00	150817.01	104835.95
Y	85	17076.00	328653.00	219336.92	63147.22
PR	85	89.00	99.00	96.63	1.93
ER	85	59.00	7024.00	6027.85	1809.91
V	85	-255.00	967.00	30.74	136.42
Z	85	1300.00	3000.00	2018.44	505.54

RESULTS

This section reports the estimates for Bangladesh export function to the US and provides evidence on the impacts of different pre-identified variables on Bangladesh exports in the context of a highly simplified and generalized gravity-type model. The sample period runs from May 2003 to May 2010. The empirical estimates of the model are presented in Table 2.

Table 2. Regression Estimates for Bangladesh Export Function to the USA (2003:05-2010:05)

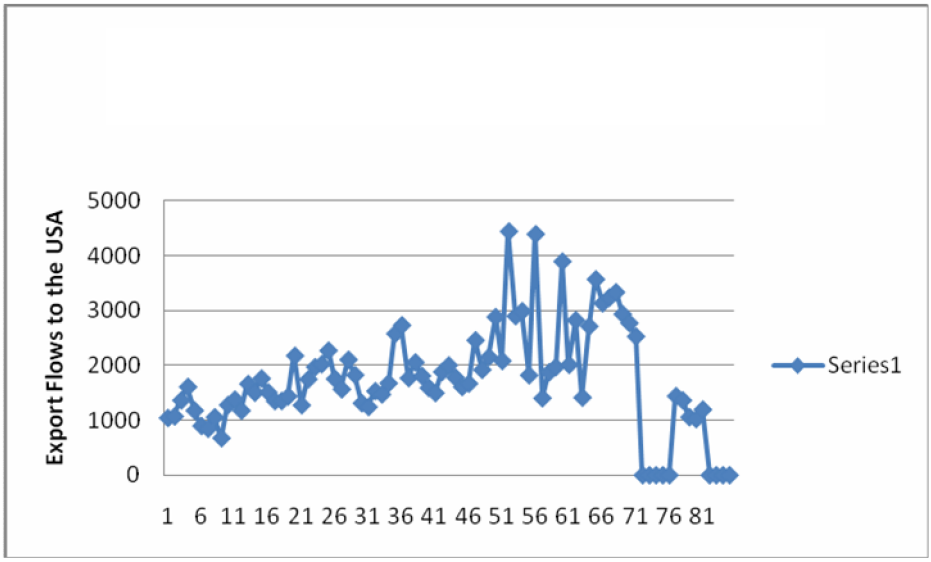
	Coefficient	*Std. Error*	*t-ratio*	*p-value*
const	-6,28864	2,86754	-2,1930	0,03121**
Y	0,0161367	0,0761093	0,2120	0,83263
PR	-1,23476	2,53096	-0,4879	0,62698
ER	2,36975	0,791908	2,9925	0,00368***
V	-0,0206698	0,0268684	-0,7693	0.4453
Z	0,497113	0,245229	2,0271	0,04598**

R-squared	0,415841	Adjusted R-squared	0,386633
F(4, 80)	14,23727	P-value(F)	8,08e-09
Durbin-Watson	1,625400		

It is not uncommon that the standard features of the gravity model work well in this study. The coefficient estimate of the relative prices is reasonable in terms of magnitudes but it does not influence significantly the export volume. This insignificance may result due to the relatively small sample size employed in the study. The coefficient estimate of per capita income of the importer-country is perfectly congruent with the Linder hypothesis that per capita income has a positive impact on the trade flow. This variable observed in the study is also not statistically significant. Similar result is obtained in the case of the nominal exchange rate variable that is positively significant to influence the trade volume. This is the only variable which shows highly statistically significance in influencing the export volume from Bangladesh to the USA during the period from May-2003 to May-2010. The empirical estimate for the model specified earlier in this study indicates that exchange rate volatility has a negative impact on Bangladesh export to the USA, but it is not statistically significant. This observation is in congruent with many other studies such as Arize et al. (2000), Arize (1995), and Pozo (1992) that find consistently strong evidence that exchange-rate variability depresses export flows. The finding of this study has also a perfect resemblance with Aristotelous (2001) that indicates exchange rate volatility has no statistically significant impact on export flows. Hence, this finding suggests that exchange rate volatility of Bangladesh export to the USA is not a statistically significant determinant of trade volume, but it influences negatively. This outcome, therefore, intuitively does not support the Bretton-Woods agreement that advocates for the *laissez faire* economy worldwide. The variable of per capita income- difference between Bangladesh and the USA appears to be statistically positively significant in influencing the trade flow which is consistent with the estimated result of per capita income of the US citizens.

A number of other test statistics reported at the bottom of the Table 2 which appears to determine the acceptability of the empirical estimates for the version of the model specified in the Equation 1. The adjusted R^2 for the model estimated is about 0.39, which compares better with adjusted R^2 values of other studies such as the value of that of is 0.37 in Aristotelous (2001). The *F*-statistics overwhelmingly support the rejection of the null hypothesis associated with the traditional *F*-test at the $p < .001$ level. The Durbin-Watson test statistics is 1.62 which falls within the acceptable range between 1.50 and 2.50 (Salvatore, 2008), and it supports that there is no autocorrelations regardless of the actual distribution of DW statistics (Kennedy, 1998).

Obviously, the result of this study is consistent with the export volume of Bangladesh. Though the trend of the trade flows to the USA during the period of floating exchange rate regime is significantly upward initially, it falls dramatically downward in the end period. The trend is presented in the following figure 2. This decline could be due to the current recession in the US economy for which per capita income of the USA has no statistically significant impact on the export flows.



Source: The Present Study (2010)

Figure 2. Trend line of Bangladesh Export Flows to the USA (May 2003-May 2010)

CONCLUSIONS AND RECOMMENDATIONS

This paper investigated the impacts of several determinants on Bangladesh exports to the USA during the free exchange rate regime in the context of generalized gravity model in order to review the Linder hypotheses incumbent on the bilateral trade flows. The gravity-type model was estimated using monthly data for the sample period May 2003 – May 2010. The empirical findings support the Linder's Hypotheses of international trade theory in full resemblance except their significance attributes. However, except the intercept and nominal exchange all other variables are found to be statistically insignificant, but the expected signs of all variables are perfectly congruent with the Linder theory.

As the finding of this study shows that only nominal exchange rate influences positively the export volume to the USA with a high statistical significance, the government of Bangladesh could take measure to sustain the present Taka-Dollar (US) currency exchange rate. Otherwise the volatility of exchange rate could affect the trade volume negatively as it appears in the estimated results of the study.

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