EXCHANGE RATE FLUCTUATIONS AND INTERNATIONAL TRADE TRANSACTIONS

DIKE, CHRISTOPHER KEMAKOLAM (PhD.)
Department of Economics
Madonna University, OKija
Anambra State
Nigeria

Abstract
This paper develops a partial equilibrium model in a simple extraction framework to identify the channels through which the fluctuation of exchange rate affects international trade. The major result evidence from the theoretical model is that an increase in the variance of the general economic shock in the exchange rate process reduces the volume of exports. Developing countries may increase their profit from international trade than increase accessibility to foreign exchange markets. The validity of the theoretical result is further investigated empirically for seven developed and four developing economies using the GARCH approach. The empirical evidence in the validity trade relationship provides mixed results across developed and developing economies. In the case of developing economies, the empirical results offer unequivocal support for the view that fluctuation of real exchange rates has negative effect on the volume of export, which the relationship is found to the ambiguous among developed countries.

Keywords: Exchange rates, Volatility, International trade and Development

INTRODUCTION
Trade liberalization and capital flows in the last four decades in Nigeria as occasioned by the IMF conditionalities has brought about enormous increase in the scale of cross-border financial transactions as well as exchange rate movements. Currency crises in emerging market economies like Nigeria are special examples of high exchange rate volatility. In addition, the transition to a market-based system often involves major adjustments in the international value of these economies’ currencies.

Most often it is expected that flexible exchange rate increases the level of exchange rate uncertainty and thereby causing problems in international trade. Changes in exchange rates can benefit as well as hurt. Exchange rate is simply the price of one country's currency expressed in another country's currency. In other words, it is the rate at which one currency can be exchanged for another. For example, the exchange rate between the U.S. dollar and the Nigerian Naira is U.S. $1 is equal to ₦310. This implies that the rate at which the US$1 can exchange for the Nigerian ₦ is 1:310. It should be noted that these exchange rates change on a daily basis and this leads to exchange rate volatility. The change in the exchange rate can, in the short run, affect the demand for and supply of commodities and the competitiveness of international trade transactions.

When the U.S. dollar for instance strengthens or gains in value, it causes importers or traders from another country (say Nigeria) to pay more for U.S. commodities. A stronger U.S. dollar increases prices for importing (foreign) countries, leading to unfavourable balanced of trade. On the other hand a weak U.S dollar decreases the cost of and increases the demand for U.S. commodities which also causes domestic prices to increase. This could seriously affect the profitability of an enterprise, especially in cases where profit margins are already thin. However, when the U.S. dollar is strong, U.S. businesses and consumers can purchase foreign goods and services at cheaper exchange rate (e.g. U.S. $1 = ₦310). In general, while a strong U.S. currency makes our goods and services less competitive abroad and at home which could negatively, influence trader's profitability, it also makes imported goods from abroad cheaper, arid our commodities (locally produced) less competitive in the domestic market. This encourages imports and discourages exports. On the other hand, when the U.S. dollar weakens or decreases in value, foreigners pay less for the U.S. dollar, and U.S. consumers and businesses pay more for a unit of foreign currency. This has the opposite effect of a strengthened U.S. dollar; a weak U.S. dollar decreases the cost of and increases die demand for U.S.
commodities which causes domestic prices and profits to increase. However, a weakened dollar means U.S. importers most now pay more for a unit of foreign currency, which increases prices to U.S. consumers for imported goods and services. This is turn could cause U.S. demand for foreign goods and services to decrease. In this situation, locally-produced commodities stand a better chance of competing with foreign imports. In general, while a weak U.S. currency makes our goods more competitive abroad and at home, which could positively influence a trade's profitability, it also makes goods imported from abroad more expensive, and our commodities more competitive in the domestic market since it discourages imports.

The exchange rate fluctuation has been the outcome of the breakdown of the Bretton Woods Agreement. An attempt to revive the fixed exchange rates failed, and by March 1973 the major currencies began to float against each other. Since the collapse of the Bretton Woods system, IMF members have been free to choose any form of exchange arrangement they wish (except pegging their currency to gold). This is the main cause of the exchange rate volatility.

As a result of price stickiness and its low reaction to exchange rate movements low exchange rate countries are able to benefit from international arbitrage. Arbitrage implies that producers and consumers decide to buy abroad because of a lower price. A first condition for international arbitrage is that transport costs are not excessively high, as this would undo all possible gains. However, today for most goods, transport costs account only for a small share in the final good’s price as international logistics chains are organized in a highly efficient way.

The paper explains the concept of fluctuating currency exchange rates, in relation to strong or weak foreign currency. It considers factors that determine the exchange rate, considers the potential implications of a weak U.S. dollar and other countries in general, and makes a few suggestions regarding what international trader transactions can do to protect themselves from currency fluctuations. The exchange rate is important because it allows for the conversion of one country's currency into that of another, thereby facilitating international trade. In general, the price difference between similar goods determines which goods are traded and where they are shipped or sourced. Hence, the exchange rate is a significant factor influencing the competitiveness of agricultural commodities, the profitability of farming enterprises and other trading facilities.

International trade shapes our everyday lives and the world we live in. Nearly every time we make a purchase, we are participating in the global economy. Most international trade consists of the purchase and sale of industrial equipment, consumer goods, oil and agricultural products. Services such as banking, insurance, transportation, telecommunications, engineering and tourism accounted for one-fifth of world exports in 2000. With the increase in volume, trade has become very important to the economic well being of many countries. In early 1960, the United States bought less than $1 billion of foreign cars and parts. By 2001, this figure had increased to more than $189 billion. Financial ties between United States and the rest of the world has grown significantly over time.

**REVIEW OF RELATED LITERATURE**

In the views of Abrams (1980) World trade has grown rapidly since the breakdown of the Bretton Woods system of fixed exchange rates in early 1973. It is important to note that world trade has continued to grow irrespective of the increase in exchange rate variability permitted by the 1973 shift from fixed to floating exchange rates. The model was based on a model of macroeconomic determinants of trade among developed countries. The model included some variables that measured the effects of the exchange rate uncertainty resulting from exchange rate variability.

Broda and Romalis (2004) developed a model of international trade in which trade depresses real exchange rate volatility and exchange rate volatility impacts trade in products differently according to their degree of differentiation. They used disaggregated trade data for a large number of countries for the period 1970-1997 and find strong results supporting the prediction that trade dampens exchange rate volatility. Their model exhibits the role of trade in determining bilateral real exchange rate volatilities, and the differences in the impact of real exchange rate volatility on trade in different types of goods. In the model it was found that exchange rate volatility only affects trade in differentiated products.
Anson et al (2014) in their work linked daily fluctuations in real international postal flows to daily movements in nominal exchange rates. The essence of this linkage is to test for consumer and producer international arbitrage in the market for goods delivered by the international postal network. They made use of high-frequency international exchange data set to assess the question of international consumer arbitrage in the online market. They showed that Postal flows form an integral part of international trade and this allows consumers to face low transport costs. Combining daily postal flows with daily exchange rate movements, they find that exchange rate movements do indeed matter for bilateral trade flows in the short run.

Lunnemann and Winter (2006) assuming price stickiness in the context of exchange rate movements mainly focused on internet prices shows that for a subset of products in Germany, Italy, the United Kingdom, France, and the United States, the median average price change spans from 25 to 68 days. They also point out that price decreases seem to be more frequent in the internet businesses, rather than the traditional brick-and-mortar businesses. In their seminal contribution, Gopinath and Rigobon (2008) use monthly data on at-the-dock import and export prices for the United States and show that the trade-weighted average price duration in dollars is 12.26 months for imports and 13.77 months for exports.

The main empirical findings of the study by IMF (2004) shows that exchange rate fluctuations have increased in times of currency and balance of payments crises during the 1980s and 1990s. It also notes that an exchange rate regime that is classified as “pegged” does not necessarily have lower overall exchange rate volatility than an arrangement that permits some degree of exchange rate flexibility. Pegging to an anchor currency leaves a country exposed to fluctuations against other currencies, and a peg that becomes misaligned can subsequently generate exchange market pressures and large, discrete changes in currency values, and hence volatility. Furthermore it finds that there is also a negative relationship between exchange rate volatility and trade, such a negative relationship is not large enough to reasonably cause a change in the relationship between linking bilateral trade and its determinants. These results suggest that exchange rate volatility is not a major policy concern. This does not necessarily rule out the possibility that a large exchange rate volatility could affect an economy through other channels.

In their work Hayakawa and Kimura (2008) investigated the relationship between exchange rate volatility and trade, focusing on East Asia. Using simulation analysis they show that the introduction of a basket currency or a common currency would have a larger positive impact on international trade than free trade.

Tenreyro (2007) used an estimation approach to simultaneously address all biases identified in previous literature, in particular the reverse causality problem. She found no significant impact of nominal exchange rate volatility on trade flows. Baum and Caglayan (2010) also conclude that exchange rate volatility does not have an impact on the level of trade, but there exists a robust positive link to the volatility of bilateral trade flows. Bryne et al. (2008) consider the impact of exchange rate volatility on the volume of bilateral US trade (both exports and imports) using sectoral data. They found that separating trade into differentiated goods and homogeneous goods results in the most appropriate sectoral division.

Nicita, A (2013) contributes to the relationship between exchange rates and international trade by investigating the effect of exchange rate volatility and misalignment on international trade. The paper investigates the extent to which exchange rate affects international trade and trade policy. The analysis which is based on the econometric estimation of fixed effects models utilizing a bilateral data set of trade flows, exchange rates and trade policy for about 100 countries for a period of 10 years. The study finds evidence supporting the argument that trade policy is used to compensate for the effect of an overvalued currency. However, the policy response seems to be largely restricted to anti-dumping interventions.

In their study, Sercu, P and Uppal, R. (1998) examine the fact that exchange rate volatility leads to decline in trade. This they did by developing a stochastic general equilibrium economy with international commodity markets. They argue that both trade and exchange rate are endogenous quantities and relating them to one another may lead to unnecessary misplacements.
International trade occurs because individuals, businesses and governments in one country want to buy goods and services produced in another country. Trade provides people with a greater variety of goods and services to choose from. Often, these goods are available at prices lower than those in the domestic economy.

Exchange rate responds directly to all sorts of events, both tangible and intangible goods. At the centre of this complex market are the same forces of demand and supply that determine the prices of goods and services in any free market. This shows that exchange is the price of one currency in relation to the other. If at any given rate, the demand for a currency is greater than its supply, its price will rise. On the hand, if the supply exceeds demand, the price will fall. The supply of a nation's currency is influenced by that nation's monetary authority, (usually its central bank), consistent with the amount of spending taking place in the economy. Government and central banks closely monitor economic activity to keep money supply at a level appropriate to achieve their economic goals.

Exchange rate is determined by the supply and demand of services and goods traded between countries. Various agencies monitor the rate and intervene when needed, in order to counter disorderly market conditions. Intervention involves buying and selling foreign currency, coming from the exchange stabilization fund (ESF) of the treasury, to support the foreign currency price against another currency. Conversely, the Central Bank/Federal Reserve will sell or buy foreign currency to increase the strength of the local/foreign currency as the case may apply.

The most important factor that determines exchange rate in any trading situation is the balance of payments, which is an accounting record of all international transactions for a particular country during a specified time period. Any transaction that causes money to flow in or out of a country is included in the balance of payments.

**METHODOLOGY**

The method of data analysis used for this work is GARCH approach. The generalized autoregressive conditional heteroskedasticity (GARCH) approach is used to measure conditional variance of the bilateral real exchange rates. This is with a view to determining the correction between the selection of developed countries and developing countries on the higher volume of trade, the variance of which the correlation coefficient will express the degree of existing relationship. The theoretical model presented in this section identifies channels through which fluctuation of exchange rates affects flow of exports of a country. The empirical investigation deals on the fluctuation - trade relationship across developed and developing economies. The generalized autoregressive conditional heteroskedasticity (GARCH) approach is used. The sample of developed economies consists of seven selected OECD countries; U.S., Japan, Canada, Germany, France, UK and the Netherlands, while for developing economies, the economies are; Indonesia, Malaysia, Thailand and Korea. Exchange rates of these East Asian countries were fluctuated most during the 1997 financial crisis.

**THE GARCH MODEL**

The export supply function of country i to country j can be written as

\[ X_{ij} = f(Y_j, \text{RER}_{ij}, h_t) \]

where; \( X_{ij} \) is the real export of country i to country j,
\( Y_j \) is the real income of country j,
\( \text{RER}_{ij} \) is the bilateral real exchange rate between two currencies of country i and j, and finally, \( h_t \) is fluctuation (volatility) of real exchange rates.

The exchange rate fluctuation is measured using the GARCH approach that provides a way of formalizing the fact that large changes in the exchange rates tend to be followed by large changes, and small by small. This allows for prediction of the range of future movements of exchange rate.

Equations (1) to (3) below represent GARCH (p,q) specification for this study.

\[ \text{DLRER}_t = \gamma_0 + \gamma_1 \text{DLRER}_{t-1} + \epsilon_t \quad \ldots \ldots \quad (1) \]

\[ \epsilon_t \sim N(0, h_t) \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldOTS
variance equation. The GARCH procedure captures the time-varying conditional variance as a parameter generated from a time series model of the conditional mean and variance of the exchange rate. This methodology is commonly used to produce a measure of exchange rate fluctuation to examine the relationship between exchange rate fluctuation and trade flows.

The selection of developed countries is based on the higher volume of trade (sum of exports and imports) of the developing countries. Quarterly data ranging from 2006 to 2016: In both cases, the major trade partners of each country are identified on the basis of the volume of total exports and imports of the exporting economy from chapter three above, the equation (1) to (3) are jointly estimated for quarterly data from 2006 to 2016: The order (p,q) for the best fitting time series GARCH model as defined by equations (1) to (3) is determined on the basis of AIC (Akaike's information criteria) criteria.

Table 1 shows the order of the GARCH and ARCH terms. Panel A of the table contains the orders for the selected OECD countries, while figures in panel B are the orders for developing countries.

### Table 1: Order of GARCH and ARCH Terms (p,q)

<table>
<thead>
<tr>
<th>Trade Partners</th>
<th>US</th>
<th>Japan</th>
<th>Canada</th>
<th>Germany</th>
<th>France</th>
<th>UK</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. US</td>
<td>-</td>
<td>2, 1</td>
<td>1, 2</td>
<td>1, 1</td>
<td>1, 1</td>
<td>1,</td>
<td>1, 2</td>
</tr>
<tr>
<td>2. Japan</td>
<td>2,</td>
<td>1</td>
<td>-</td>
<td>1, 1</td>
<td>2, 1</td>
<td>1,</td>
<td>2, 1</td>
</tr>
<tr>
<td>3. Canada</td>
<td>2,</td>
<td>2</td>
<td>1, 1</td>
<td>1, 2</td>
<td>1, 1</td>
<td>1,</td>
<td>1</td>
</tr>
<tr>
<td>4. Germany</td>
<td>1,</td>
<td>1, 1</td>
<td>-</td>
<td>1, 2</td>
<td>-</td>
<td>1,</td>
<td>1</td>
</tr>
<tr>
<td>5. France</td>
<td>1,</td>
<td>1, 1</td>
<td>1, 1</td>
<td>1, 1</td>
<td>-</td>
<td>1,</td>
<td>1</td>
</tr>
<tr>
<td>6. UK</td>
<td>1,</td>
<td>2</td>
<td>1, 1</td>
<td>1, 1</td>
<td>1, 1</td>
<td>-</td>
<td>1, 1</td>
</tr>
<tr>
<td>7. Netherlands</td>
<td>1,</td>
<td>1, 1</td>
<td>1, 2</td>
<td>1, 1</td>
<td>1, 1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Panel B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Indonesia</td>
<td>1,</td>
<td>1, 2</td>
<td>1, 1</td>
<td>2, 2</td>
<td>1, 1</td>
<td>1,</td>
<td>2, 2</td>
</tr>
<tr>
<td>9. Malaysia</td>
<td>1,</td>
<td>1, 2</td>
<td>1, 1</td>
<td>1, 1</td>
<td>1, 2</td>
<td>1,</td>
<td>1</td>
</tr>
<tr>
<td>10. Thailand</td>
<td>2,</td>
<td>1</td>
<td>1, 1</td>
<td>2, 2</td>
<td>1, 1</td>
<td>1,</td>
<td>1, 1</td>
</tr>
<tr>
<td>11. Korea</td>
<td>1,</td>
<td>2, 1</td>
<td>1, 1</td>
<td>2, 1</td>
<td>1, 1</td>
<td>1,</td>
<td>1, 2</td>
</tr>
</tbody>
</table>

The conditional variance of real exchange rates of seven OECD countries estimated by GARCH approach are shown in 1 to 7 of panel A. It is evident from the Panel A of Table 1 that the conditional variance of bilateral real exchange rates between any currencies of the European Monetary Union (EMU) members countries with the currency of the country outside the EMU follows a similar pattern. The variation in the real exchange rates among the currencies of the EMU member countries was consistent before the introduction of a common currency in 2006. The variation between the first and second quarter of 2006 was very low in all cases; thereafter, it began to increase over time. Among the EMU countries, the patterns seem similar. However, the variations in real exchange rates series outside the EMU countries are different. The variance of real exchange rates of the US dollar with the Canadian dollar fluctuates markedly compared to any other real exchange rates series.

The conditional variances of the real exchange rates of four East Asian countries with the currencies of their major trade partners are shown in Panel B of Table 1. This depicts the variance of bilateral real exchange rates of Indonesian rupiah with the currency of each of the seven OECD countries. In all cases, the variation was very low before the East Asian financial crisis of 1997, particularly for the real exchange rates between rupiah and the US dollars. This was because of the fact that the currency was pegged with the US dollar before the financial crisis. The fluctuation in the variance was high during the financial crisis period for any bilateral real exchange rates series. The variance of ringgit with the currency of the member countries of the EMU follows similar patterns, along with a sharp deviation during the adoption of common currency by the EMU member countries. The variation of the real exchange rates was identified as greatest in the case of yen, since most currencies of the East Asian countries were not pegged with yen as they were with the US dollar.
Log (X_{ij}, t) = 80 + 81 \log Y_{jt, t} + 82 \text{RER}_{ij, t} + 83 \text{ht} + \epsilon ....(4) 
\zeta

Where:

- \( X_{ij, t} \) = Real export by country i to country j at time t.
- \( Y_{jt, t} \) = Income of country j at time t.
- \( \text{RER}_{ij, t} \) = Real exchange rates between the currencies of country i and country j at time t.
- \( \text{ht} \) = Fluctuation of RER (determined by GARCH approach) and
- \( U_t \) = The error term.

Real export volume for each country is measured by dividing the export proceeds in US dollars by the export price in US dollar of the respective country. The fluctuation coefficient 83 estimated from equation (4) is shown in Table 2 for each pair of countries with developed economies. Countries in column 1 of the table are the exporting countries, while countries in rows are their major trade partners.

### Analysis of Data

**Table 2:** Estimated Fluctuation of Exchange Rate Coefficients of Selected OECD Countries Using GARCH Approach (2006: 2016)

<table>
<thead>
<tr>
<th>Exporting Countries</th>
<th>US</th>
<th>Japan</th>
<th>Canada</th>
<th>Germany</th>
<th>France</th>
<th>UK</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. US</td>
<td>-</td>
<td>14.10</td>
<td>-30.66</td>
<td>-6.06</td>
<td>1.10</td>
<td>0.76</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>(1.47)</td>
<td>(0.21)</td>
<td>(0.89)</td>
<td>(1.03)</td>
<td>(0.27)</td>
<td>(0.19)</td>
<td></td>
</tr>
<tr>
<td>2. Japan</td>
<td>-11.12</td>
<td>-27.96</td>
<td>-0.32</td>
<td>-0.49</td>
<td>-24.44</td>
<td>-0.23</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.38)</td>
<td>(-1.30)</td>
<td>(-0.87)</td>
<td>(-1.51)</td>
<td>(-1.28)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Canada</td>
<td>-93.87</td>
<td>82.94*</td>
<td>-</td>
<td>-19.93*</td>
<td>-2.48</td>
<td>-2.13</td>
<td>-5.15</td>
</tr>
<tr>
<td></td>
<td>(-3.13)</td>
<td>(0.97)</td>
<td>(-0.87)</td>
<td>(-1.72)</td>
<td>(0.90)</td>
<td>(1.62)</td>
<td></td>
</tr>
<tr>
<td>4. Germany</td>
<td>-4.05</td>
<td>-0.25</td>
<td>25.22*</td>
<td>-</td>
<td>1.32</td>
<td>-</td>
<td>12.37*</td>
</tr>
<tr>
<td></td>
<td>(-0.97)</td>
<td>(2.99)</td>
<td>(0.87)</td>
<td>(2.21)</td>
<td>(0.44)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. France</td>
<td>-0.07</td>
<td>0.70</td>
<td>-2.28</td>
<td>0.72</td>
<td>-</td>
<td>3.23*</td>
<td>-2.56</td>
</tr>
<tr>
<td></td>
<td>(-0.09)</td>
<td>(2.99)</td>
<td>(0.92)</td>
<td>(0.72)</td>
<td>(0.44)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. UK</td>
<td>-0.61</td>
<td>18.63</td>
<td>0.73</td>
<td>-2.69</td>
<td>0.60</td>
<td>-</td>
<td>1.93</td>
</tr>
<tr>
<td></td>
<td>(-0.53)</td>
<td>(0.08)</td>
<td>(0.39)</td>
<td>(0.53)</td>
<td>(0.45)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Netherlands</td>
<td>-1.60</td>
<td>0.23</td>
<td>9.87</td>
<td>225.65</td>
<td>3.91</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-0.32)</td>
<td>(1.58)</td>
<td>(1.42)</td>
<td>(1.61)</td>
<td>(2.67)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Figures in the parenthesis are t-statistics

* Significant at the 5% level

The fluctuation coefficients for each of the developing countries are shown in Table 3. Column 1 of the table represents four exporting countries, while their major trade partners are provided in rows. Moreover, for both groups of countries, the estimated results of equation (4) are provided in panel C Table CI of panel C presents the estimated results of each of the developed countries, while Table C2 presents estimated results related to four developing countries.

**Table 3:** Estimated Fluctuation of Exchange Rate Coefficients of Developing Countries Using GARCH Approach (2006: 2014:11 and 2015:IV 2016 :IV

<table>
<thead>
<tr>
<th>Exporting Countries</th>
<th>US</th>
<th>Japan</th>
<th>Canada</th>
<th>Germany</th>
<th>France</th>
<th>UK</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Indonesia</td>
<td>0.77</td>
<td>-2.14*</td>
<td>-0.37</td>
<td>-0.24</td>
<td>-0.43</td>
<td>0.00</td>
<td>-2.30**</td>
</tr>
<tr>
<td></td>
<td>(1.04)</td>
<td>(-1.95)</td>
<td>(-0.22)</td>
<td>(-0.42)</td>
<td>(-0.35)</td>
<td>(-0.08)</td>
<td>(-1.82)</td>
</tr>
<tr>
<td>2. Malaysia</td>
<td>9.38</td>
<td>-0.80</td>
<td>-130.83</td>
<td>13.63</td>
<td>-4.76</td>
<td>1.55</td>
<td>14.02</td>
</tr>
<tr>
<td></td>
<td>(0.90)</td>
<td>(-0.03)</td>
<td>(-0.91)</td>
<td>(1.04)</td>
<td>(-1.36)</td>
<td>(0.89)</td>
<td>(0.96)</td>
</tr>
<tr>
<td>3. Thailand</td>
<td>-12.00</td>
<td>-0.24</td>
<td>3.37</td>
<td>-0.33*</td>
<td>-8.55</td>
<td>0.28</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>(-0.46)</td>
<td>(-0.10)</td>
<td>(1.38)</td>
<td>(-2.13)</td>
<td>(-0.27)</td>
<td>(0.22)</td>
<td>(-0.49)</td>
</tr>
<tr>
<td>4. Korea</td>
<td>-25.99</td>
<td>-22.09**</td>
<td>-137.76*</td>
<td>-0.82</td>
<td>-78.19*</td>
<td>-0.09</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>(-0.98)</td>
<td>(-1.74)</td>
<td>(-2.47)</td>
<td>(-1.29)</td>
<td>(-1.93)</td>
<td>(0.07)</td>
<td>(-0.03)</td>
</tr>
</tbody>
</table>
Trade Between Developed and Developing Countries

Radelet and Sachs (1998), among others, have identified that the 1997 East Asian financial crisis impacted these four economies (Indonesia, Malaysia, Thailand and Korea) are impacted more severely than the other East Asian countries during the 1997 financial crisis. The real and nominal exchange rates of these countries also have experienced much variation along with their external trade during that period. The real exports of these four East Asian economies to the selected OECD countries are now considered as independent variable for equation (4). During the years under study the volume of exports of these four countries to these selected OECD countries are significant .On average, 57% of the total export earnings of Indonesia came from these seven countries. The figures for the other three countries were respectively, 48% for Malaysia, 53% for Thailand and 49% for Korea. The estimated sample of these four countries excludes data from 1997:3 to 1998:3, the financial crisis period, due to structural shifting in the GARCH process. Figures 8 to 11 in panel B indicate the conditional variance of the real exchange rates of four developing countries with the selected OECD countries estimated by the GARCH technique.

The results, especially the fluctuation coefficient for exports from the developing to developed economies, differ from the results obtained from exports data among developed economies. In most cases, there exists a negative relationship between the fluctuation of exchange rates and the volume of exports. The real exports of Korea to Japan, Canada and to the U.K. decrease significantly with an increase in the variability of real exchange rates. For the case of other four developed countries, the relationship is found to be negative, but the fluctuation coefficients are not statistically significant. The fluctuation coefficients are also found negative and statistically significant for exports of the following pairs of countries: Indonesia to Japan, Indonesia to Netherlands, and Thailand to Germany. In no cases are the fluctuation coefficients found positive and significant for exports from developing countries to developed countries.

Their empirical findings for developing economies indicate that exchange rate fluctuation has a significant negative effect on flow of trade. More importantly, current results from empirical examinations are consistent with the predictions of the theoretical model derived in earlier sections of this chapter.

Corresponding to the estimated income elasticity coefficients, it is evident from Table C2 of panel C that for 40 out of 42 cases, the income elasticity coefficients are positive. That is, the real income of major trade partners has a significant positive impact on the real exports of developing countries. As was the case for trade among the developed economies, the effect of real exchange rates on volume of exports for these developing economies is ambiguous. In some cases, the effects are significantly positive, while in other cases the effect is either significantly negative and or it is insignificant.

CONCLUSIONS

This section provides a partial equilibrium model to identify a relationship between fluctuations of exchange rate and level of international trade. In this model, the nominal exchange rates is allowed to follow a random process, and the fluctuation of exchange rates is assumed to be stemmed from the general economic shocks associated with a white noise process. The fluctuation-trade relationship is examined both in the presence and absence of forward exchange markets. In both cases, an increase in the variance of the general economic shock in the exchange rate process reduces the volume of exports. Moreover, real exports of a country increase with an increase in the mean level of exchange rates and also with an increase in the forward premium.

The finding of this study further suggests that developing countries may increase their profits from foreign trade through increase accessibility to foreign exchange markets. These results strongly support the predictions of the theoretical model and are consistent with the findings of other researchers. Foreign income elasticity estimates for both groups of countries are consistent with economic theory, in that a rise in a trade partners’ income has a significant positive impact on the exports demand of a country.
Battern and Belongia (1984) considered two relevant concerns of the exchange rate issue to be the magnitude of its effect on the identification of policy variables that could be used to decrease the money (dollar) value if these were a desirable policy objective. The answer to this normative question was not clear. Battern and Belongia’s primary focus was determination of factors that affect changes in real exchange rate but they failed to discover any evidence monetary policy or budget deficit have had effects on the real value of the money (dollar). They inferred from these inconclusive results that attribution of the decline in form exports to monetary policy or the deficit are difficult to support empirically.

However, Broda and Romalis (2004) compared the effects of changes in exchange rate (and other macroeconomic variables) in a simple competitive versus a non competitive market for wheat. In the simple competitive case and under a floating exchange rate, a change in exchange rate in one country will cause a short run adjustment in prices, output, trade, market share of exports and exports volume for two countries competitive with one another. The country will see an increased in exports. The more the exchange rates fluctuate, the more variable short-run changes in domestic prices and trade shares are.

In case of developing countries, government should encourage the growth of her currency in order to stimulate stabilization. Government should provide local investors with infrastructural facilities and other social amenities that will bring down the cost of production of goods to reduce over dependence on foreign goods.

REFERENCE