DETERMINENTS OF EXCHANGE RATE: A CASE STUDY OF SAARC COUNTRIES

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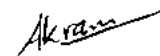
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1. Foreign exchange rates

بسم الله الرحمن الرحيم

"And say: My Lord increase me in knowledge."

(Qur'an, Ta-Ha 20:114)

Certificate

The thesis entitled **"Determinants of Exchange Rate: A Case Study Of SAARC Countries"** submitted by **Madiha Zehra** in partial fulfillment of MS degree in Economics has been completed under my guidance and Supervision. It is certified that the student has incorporated the necessary changes suggested by the Examiners during viva voce exam on December 18, 2015. Now the thesis is ready for further process.

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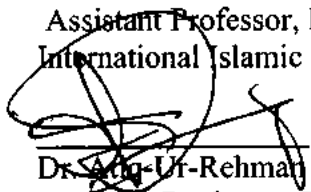**Determinants of Exchange Rate: A Case Study of SAARC Countries**
By

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Accepted by the International Institute of Islamic Economics, International Islamic University, Islamabad, as partial fulfillment of the requirements for the award of degree of MS in Economics.
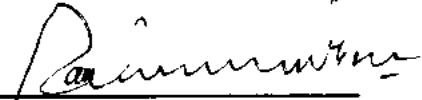
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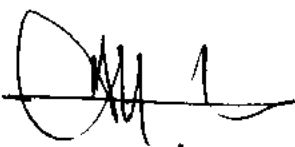
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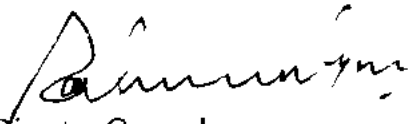Associate Professor,
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<div align="right">Madiha Zehra</div>

Dedication

To my family

Acknowledgement

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List of Abbreviations

NCI	Net Capital Inflow
RY	Relative Income
TP	Technological Progress
FOREX	Foreign Exchange reserves
TB	Trade Balance
RMS	Relative money supply
TR	Trade Restrictions
RINF	Relative Inflation Rate
RI	Relative Interest Rate
IFS	International Financial Statistics
ER	Exchange Rate
ECM	Error Correction Method
CPI	Consumer Price Index
GDP	Gross Domestic Product
TR	Trade Restrictions
TOT	Terms of Trade

Abstract

This study investigates the fundamental determinants of nominal exchange rate. The empirical analysis is carried out for South Asian Association for Regional corporation (SAARC) countries including Pakistan, India, Bangladesh and Sri Lanka, using panel data from 1980 to 2013. General to specific methodology is followed and the encompassing technique specifically developed by Harvey et al., (1998) is used to pave the way to single model. Using panel cointegration technique and error correction model we find that the variables including foreign exchange reserves, relative money supply, relative interest rate, trade balance and real income are the significant variables determining the nominal exchange rate both in the long run as well as the short run. In addition, these variables also play a significant role in the convergence process to achieve long run equilibrium. Thereby the equilibrium exchange rate can be determined by the relative money supply, trade balance, foreign exchange reserves relative income and relative interest rate of the South Asian economies. Furthermore, using Granger causality test a significant relationship is found in case of foreign exchange reserves while relative money supply, trade balance, relative interest rate and relative income are not Granger caused by nominal exchange rate of the SAARC countries. The empirical findings of our study are useful for the policy makers in order to set an appropriate monetary policy for their countries.

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CHAPTER 1

INTRODUCTION

Exchange rate plays an important role in determining the level of competitiveness of different economies by affecting the volume of trade, capital mobility, foreign direct investment and the economic development. Moreover, exchange rate has attained great importance in macroeconomic policy discussions after the breakdown of fixed exchange rate system in the early 1970, which worked since the Bretton Woods conference (1944). It is widely acknowledged that stability in exchange rate ensures macroeconomic stability which formats economic growth. Therefore, the exchange rate attracts significant attention in macroeconomic policy discussions.

A stable exchange rate helps the enterprises and financial institutions in evaluating the performance of investments and finance. It is because movements in exchange rate affect the profitability of multinationals and increase the exposure of the enterprises and financial institutions, which in term effects the growth of an economy. Therefore, without stabilizing exchange rate it is hard to achieve success in macroeconomic stability. In this regards, an understanding of the determinants of exchange rate help policy makers in designing an appropriate exchange rate policy in order to achieve economic sustainability (Khan and Qayyum, 2008).

In spite of the importance of exchange rate in international economics and its importance for economic stability, the set of determinants that explain long term and short term dynamics of exchange rate is still controversial.

On the basis of the empirical studies it is inferred that after the demise of the Bretton woods system more volatility in the nominal exchange rate is observed as compare to real exchange rate in the short run. This argument supports the importance of nominal exchange rate in the period of floating exchange rate regime hence the identification of the determinants of the nominal exchange rate is a key question to be resolved in order to provide useful information regarding the market participants and the policy makers. Our study will be helpful in setting a road map for the state banks of the south Asian countries in designing an appropriate exchange rate policy to stabilize exchange rate in the long run. A number of studies have empirically examined the potential role of nominal and real macroeconomic variables to explain the behavior of exchange rates at levels. However, the existing literature presents contradictory results regarding the variables determining the exchange rate and their significance.

1.1 Objectives of the Study

The objectives of the study are as following:

- To find a comprehensive model on statistical grounds from a number of pre estimated models on SAARC countries.

- To select most significant variables out of many in the comprehensive model.

- To explore the long run relationship and the short run dynamics of the nominal exchange rate and its fundamental determinants.

- To elaborate the causal relationship among nominal exchange rate and its fundamental determinants.

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1.2 Significance of the Study

As the modeling of determinants of the exchange rate continues to attract the attention of both academic and policy researchers due to the significant role of exchange rate for the economy. This study compares the existing empirical models using non-nested hypothesis testing most specifically through encompassing technique developed by Harvey et al., (1998) for SAARC countries over the period from 1980 to 2013. The encompassing methodology attempts to extract a single model which is the best among a class of models. The variables of the other models can offer an improved research strategy. This technique is basically developed to augment in the field of empirical testing by fulfilling the further requirements a model needs in order to account and explain the results of the rival models and an improved research strategy is offered by encompassing.

On the basis of the empirical studies it is inferred that after the demise of the Bretton woods system more volatility in the nominal exchange rate is observed as compare to real exchange rate in the short run. This argument supports that the fluctuation in real exchange rate is basically originated from the nominal exchange rate in the period of floating exchange rate regime. Hence, the nominal exchange rate needs more attention to get an effective exchange rate policy. Ultimately the identification of the determinants of the nominal exchange rate is a key question to be resolved in order to provide useful information regarding the market participants and the policy makers.

The estimated results of this study elaborates the importance and consequences of the determinants on the exchange rate of South Asian countries. Panel cointegration test confirms the presence of long run relationship among the variables including foreign exchange reserves, trade balance, relative interest rate, relative money supply and relative

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income with the nominal exchange rate, suggesting that these variables can be used for the policy simulation of the selected SAARC countries. As a result, with the help of a well-investigated set of exchange rate determinants, it will improve and broaden vision of policy makers about the behavior of exchange rate and set a road map for the central banks for designing future policies to stabilize exchange rate in long run.

1.3 Scheme of the Study

The scheme of the study is structured as the section 1 elaborates the introduction, it covers the nominal exchange rate situation of SAARC countries, the research gap, significance and the objectives of the study. Section 2 shows the literature review related to the exchange rate determination. Section 3 sheds light on the methodology, data description and variable construction. Encompassing and general to specific methodology and the long run and short run dynamics of the nominal exchange rate and its fundamental determinants are elaborated in section 4. Section 5 presents the summery findings, conclusion and the policy implications of the study.

CHAPTER 2

LITERATURE REVIEW

The behavior of exchange rate is one of the debating issues of economic literature. As an important policy tool for many transition economies it serves as a nominal anchor in stabilization process of different economies. Moreover, foreign exchange rate management has been proved to be an important element in stabilization of external imbalances (Kutan & Dibooglu, 1998). Therefore, the exchange rate behavior occupies a central role in policy evaluation and design (Edwards, 1989). Thus, keeping in view the importance of exchange rate it becomes important to explore its behavior and to know how it is being determined, what forces are involved in determining the exchange rate. In this regard a huge work has been done in determining the significance of exchange rate in the existing literature. Explaining the importance of exchange rate Kia, (2013) states that exchange rate can lose its significance if its fundamental determinants are not known. According to Della Corte et al., (2013) fundamentals matter a lot for exchange rates, they found that nominal fundamentals are more important than real fundamentals. Hence, it is important to study the fundamental determinants of exchange rate as well as foreign exchange markets behavior in detail. In this context different researchers have introduced various models to explain and predict patterns in determining exchange rate both in nominal and real terms.

2.1. Different Approaches to Explaining Exchange Rate

Two types of approaches have been focused in literature. One, the fundamentalism approach which is related to economic theories in explaining exchange rate. Second is the

chartists' approach that explain exchange rate on the basis of its lag values. Some studies have compared the both approaches. While comparing both studies Mussa, (1979) found that the performance of the random walk model is better than other model which determine exchange rate. Altavilla & De Grauwe, (2010) compare the linear models with the models characterizing exchange rate fundamentals through nonlinear dynamics, and found that accurate forecasts can be obtained by combining different forecasting procedures. Furthermore, findings of Messe & Rogoff (1983) shows that the simple random walk models can beat economic models in forecasting exchange rate. In addition, Engel, (1993) & Hamilton, (1990) have argued that random walk model had more power in beating the structural models of forecasting exchange rate. But some of the authors contradict with this point of view and found that the variability in nominal exchange rate is not explained by random walk models (Rossi, 2006). It is also evident that some monetary fundamentals have low out of sample predictability in the presence of short time horizons but there is a chance of increasing forecasting accuracy of the fundamentals by increasing time horizons (Cheung et al., 2004; Mark, 1995). Some authors have found that the macroeconomic determinants and economic theories both are relevant in determining the exchange rate (Abbas et al., 2011; Faust et al., 2003). However, some authors have emphasized on the importance of nominal shocks and found a transitory effect of nominal exchange rates (Dornbusch, 1976; Edwards, 1989; Mussa, 1986).

2.2. Determinants of Exchange Rate, studies in South Asia

As South Asian economies are emerging day by day and capital markets are volatile. Therefore, exchange rate should be focused as an important factor. According to the literature some of the following studies have been conducted in the field of investigating

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the relationship between exchange rate and its fundamental determinants. Most of the authors have focused majorly in determining the exchange rate. Abbas et al., (2011) have studied exchange rates and macroeconomic fundamentals in emerging Asian countries. He found that economic variables play an important role in determining exchange rate. Parveen et al., (2012) have examined the exchange rate variability factors in Pakistan they have used ordinary least method (OLS) and found that inflation, economic growth and export imports are the main factors affecting exchange rate.

Similarly, Khan & Qayyum, (2008) have analyzed the validity of unrestricted purchasing power parity in Pakistan and found long run relationship among exchange rate and relative prices. Saeed, Awan et al., (2012) empirically analyzed the monetary variables including stock of money, foreign exchange reserves and total debt and found that relative debt, foreign exchange reserves and stock of money are the significant determinants of nominal exchange rate. Mustafa et al., (2004) work on correlation between nominal and real exchange rate. They also found that relative prices are not significantly correlated with nominal exchange rate as a result nominal exchange rate variations causes variation in real exchange rate. Khan & Sajjid, (2005) found that the real effective exchange rates are significantly affected by inflation rate, foreign interest rate, real income and real money balances. Abbas et al., (2011) found that the variables including foreign terms of trade, net capital inflows, trade restrictions and relative interest rate can significantly explain the exchange rate of Pakistan, India and Sri Lanka. They also found long run relationship exists between exchange rate of Pakistan, India, Sri Lanka and Korea with some set of macroeconomic fundamentals. Rashid, (2009) analyzed the modified combined version of uncovered interest rate and purchasing power parity for South Asian countries and he found

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that the nominal exchange rate, interest rates and price levels are related with each other in long run and they are significant to each other. Yunus, (2001) have found the existence of long run relationship between the determinants of exchange rate and exchange rate, he used the multivariate co integration technique while interpreting the monitory policies of the South Asian countries. In addition, Krugman (1999) emphasized on a system is required which helps to prevent a serious crisis, given fairly sound domestic monetary and fiscal policies rather than what the IMF does. Bhatti & Din, (2001) found long run relationship between exchange rate with relative prices, income, interest rate and GDP. Khan & Qayyum, (2011) have examined the role of monetary fundamentals in determination of Pak Rupee exchange rates and they found that domestic and foreign prices are co integrated with nominal exchange rate and purchasing power parity can be taken as nominal anchor to stabilize inflation.

Some studies have totally focused on determinants of real exchange rate. Among them Wahid & Shahbaz, (2009) analyzed the impact of real and nominal factors on long run equilibrium of real effective exchange rate in Pakistan and he found that the monetary shocks have little effect and real shocks have lasting effect on real exchange rate. Furthermore, he also found that the real exchange rate is related with terms of trade, real interest rate differentials and tradable and non- tradable ratios. Hussain & kimuli, (2012) found that capital inflows and public expenditure are the major factors behind real exchange rate of Pakistan. Rashid & Husain, (2010) have analyzed capital inflows, inflation and exchange rate volatility and found that exchange rate is not caused by inflation. Zaman et al., (2012) have studied causality between exchange rate, trade, inflation, foreign direct Investment and GDP and he found no long run relationship exists

between exchange rate and inflation. W. Ahmed et al., (2013) analyzed long run equilibrium real exchange rate with short lived shocks and found that the relative productivity and terms of trade are related with appreciation in real exchange rate and government expenditure and trade openness are related with the depreciation in real exchange rate. Macroeconomic fundamentals are not senseless in order to determine exchange rate in case of Pakistan (Abbas et al., 2011).

As far as the comparative statistic is concerned Jabeen & khan, (2014) have analyzed the modeling of exchange rate determinants using general to specific approach and encompassing, they found that the exchange rate volatility of Pakistan is influenced by volatility in real output, net financial assets and technological progress. The encompassing technique is not used in determining the fundamental determinants of nominal exchange rate in any study on South Asian countries. Hence this study is an effort to fill this gap.

2.3. Literature on Determinants of Exchange Rate in some other Countries

In addition, Stockman, (1999) has emphasized on real shocks with permanent effects and found that the real shocks are the key sources of real and nominal exchange rate fluctuations. Adawo & Effiong, (2013) found that the fundamental determinants including the monitory determinants like money supply and interest rate differentials are related to exchange rate in the long run. Papadamou & Markopoulos, (2012) found that the changes in crude oil prices significantly affect the short-term dynamics of the exchange rate. The existing studies discussed above have found conflicting results about the long run relationship between exchange rate and its determinants. According to Sami and Daly (2009) international reserves can play a significant role in determining exchange rate of the

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Some studies have focused on comparative statistics in determining the exchange rate. Sarno, (2005) has tried to find solutions to the puzzles of exchange rate, he concluded that sufficient information is not provided by macro theory in order to provide short run forecast of exchange rate. The forecasts related to random walk is considered to be superior according to Taylor & Peel, (2000) in comparison with random walk the econometric techniques are weak in producing out of sample forecast. According to (Chen & Rogoff, (2003) the theoratical models performs well in beating the random walk in longer horizons.

Recently an important literature regarding nonlinear and linear behavior of the forecasting dynamics of exchange rate has emerged. In this line of research Rossi, (2013) shows that the determinants of exchange rate gives a mixed result regarding out of sample predictability of nonlinear models on the other hand linear models are considered to be most successful in model specification. According to Kilian & Taylor, (2003) economic models with an appropriate nonlinear structure can be proved useful for forecasting in longer horizons. The forecasting accuracy of large deviation between exchange rate and its fundamentals significantly improves through the nonlinear specification by (Altadvilla & De Grauwe, 2010).

2.4. Gap in the Literature

A complete set of determinants of nominal exchange rate is missing in literature. Some of the studies have shown that the monetary variables like stock of money, foreign exchange reserves and total debt as the significant variables affecting the exchange rate of Pakistan (Abbas et al., 2011; Hina & Qayyum, 2015). On the contrary, some other studies have shown macroeconomic variables like inflation, interest rate, foreign direct investment,

trade and GDP are the significant determinants of exchange rate (Abbas et al., 2011; Ahmed, 2009; Khan & Sajjid, 2005). So, an empirical harmony is missing among the findings of the researchers regarding the relationship between exchange rate and its significant determinants in country. In literature the studies have shown contradictory results due to difference in models and estimation techniques used for the analysis. Currently, we have a set of models to explain the dependent variable nominal exchange rate on SAARC countries, when their exist a variety of models, based on some theoretical consideration and also occupy an empirical validity, how to choose among them is a question. Their does not exist any study on statistical comparison of the performance of these models in literature. In order to fill this gap we have conducted a comprehensive analysis of the models to find a true model. This model can determine the nominal exchange rate of the SAARC countries. As a matter of fact, a reasonable policy recommendation should focus on the comparison of the findings of different studies. However, no study in literature exists that compares empirical models of exchange rate determinants to come up with a comprehensive policy prescription with regards to exchange rate determination. Therefore, there is a need of a systematic study of determinants of exchange rate, which take into account all existing models on exchange rate determinants and brings up with a final model after comparing the existing models.

In the light of overall findings on the determinants of exchange rate, it can be concluded that a large number of studies conducted in this field are failed to give a definite set of variables determining nominal exchange rate. A clear long run relationship is missing. This failure is may be due to absence of a comparative study, based on the determinants of the nominal exchange rate. Indeed by using a methodology based on comparative statistic

is a better option to capture the nominal exchange rate and its dynamics in long run and short run.

This study is trying to fill the gap, by using a technique known for comparative statistic most specifically encompassing technique is used to explore a correct model of nominal exchange rate determinants for selected SAARC countries. Unites States of America is designating as foreign country in this study. The estimated study enable us to give a definite set of determinants of nominal exchange rate. Foreign exchange rate needs to be focused not just for the benefit of the policy makers but it can act like a bridge between banking sector and the individual consumers and business persons.

CHAPTER 3

METHODOLOGY AND DATA DESCRIPTION

3.1. Methodology

Various models on exchange rate have been used in the literature. Instead of focusing any one of them, this study proceeds by taking into account some of the models and comparing them with the help of a relatively novel approach called the encompassing technique, which has rarely been used in literature to focus on the determinants of exchange rate especially for the SAARC countries.

3.1.1. Model Selection by Encompassing Technique

A number of variables have been used in the models considered in previous studies for exchange rate determination. Now ignoring any of these variables may cause omitted variable bias, while considering all variables used in past studies simultaneously may result in to a too big model leading to low precision and insignificant results. Therefore, we have followed the encompassing technique developed by (Harvey, Leybourne, & Newbold, 1998) for exchange rate determination. It considers different models with the intention to select the best representation among the available models. The encompassing assessment is used to check whether the present theory can make the link between the findings concluded by others (Ahmuda & Garegnani, 2010). The approach is stated as follows;

1. Suppose x models have been proposed by different researchers.

2. Re estimate them and rank all models according to their standard error. The necessary condition for the least is that it must have smallest standard error of regression (Hoover & Perez, 1999).

3. Suppose Mi be the model having smallest prediction error, then the following tests will be applied.

$$H_0(1): M_i \text{ encompasses } M_1$$

$$H_0(2): M_i \text{ encompasses } M_2$$

$$H_0(n): M_i \text{ encompasses } M_n$$

The model, for which Ho is not rejected, will be ignored since its prediction power is already present in M_i. The models that are not encompassed by M_i, their variables construct the most general model containing variables of M_i and the models that are not encompassed (Bontemps et al., 2008). The general model contains the information which cannot be obtained from M_i. The comprehensive model is simplified using general to specific methodology.

3.1.2. General to Specific Approach

The most general model may contain some variables which have insignificant effect on the dependent variable. To get the most efficient estimates, the variables may be tested for their significance. Unbalanced panel data model and Wald coefficient restrictions are then applied to all the variables to test their significance level.

3.1.3. Avoiding Spurious Regression by Co-Integration Testing

In order to avoid occurrence of spurious regression, Panel unit root test is used to find the stationarity and Panel Co integration test is used to pin point the long run relationship among nominal exchange rate and its determinants.

3.1.4. Panel Unit Root Test

Econometric literature suggests that the unit root based on panel analysis gives more precise and accurate results as compared to time series analysis. Therefore, we have applied the panel unit root test to see the stationarity of variables included in our study. In particular Im, Pesaran and Shin (2003) panel unit root test is used. This technique begins with separate ADF regression for every cross section by individual effect with no time trend. The equation of the Im, Pesaran and Shin panel unit root test is as under:

$$\Delta y_{it} = \alpha_i + \rho_i y_{i,t-1} + \sum_{j=1}^{\rho_i} \beta_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \tag{3.1}$$

Where null hypothesis is

$$H_0: \alpha_i = 0 \text{ for } all\ i\ series\ and$$

$$H1: \alpha_i \neq 0 \text{ for } i = 1, 2 \dots N1$$

$$\alpha_i < 0, for\ i = N + 2 \dots\dots N$$

We will check the unit root of the variables for all the sample countries.

3.1.5. Panel Cointegration

After verifying that all the regressors are free from unit roots, we present the panel regression as under.

$$Y_{it} = \alpha_i + \beta_i X_{it} + \varepsilon \tag{3.2}$$

Where, X_{it} is a vector of all the regressors

1. Apply panel unit root test to the residuals ε_{it} obtained in step-2, if the residuals are stationary, cointegration exists.

2. The same procedure we adapted for testing Cointegration, except that the data we use is panel. For testing the cointegration among the dependent and the independent variables this procedure is called the Engel Granger procedure.

3.1.6. Error Correction Model (ECM)

The long run relationship is tested with the help of Engel Granger procedure. In order to find the short run relationship of the variables the error correction method (ECM) is used. The regression form equation of basic form ECM is as follows:

$$\Delta Y_t = \alpha + \beta_0 \Delta X_{t-t} - \beta_1 EC_{t-t} + \varepsilon_{it} \tag{3.3}$$

While the single equation ECM is as follows:

$$\Delta Y_t = \alpha + \beta_0 \Delta X_t - \beta_1 (Y_{t-1} - \beta_2 X_{t-i}) + \varepsilon_{it} \tag{3.4}$$

In the above equation 3.4 the portion in parenthesis shows the error correction mechanism. The short term effect of an increase in X on Y is shown by β_0, while the speed of return to an equilibrium after deviation is shown by β_1. When the ECM approach is appropriate, then we get the result as $-1 < \beta 1 < 0$. If the error correction term is significant and negative, it

means that any short term fluctuation among the variables, including both dependent and independent variables, will result to stable long run relationship.

3.1.7. Granger-Causality Test

Granger causality is used to find the causal relationship between exchange rate and its determinants. The idea behind the Granger causality is that whether the past values of X helps in predicting Y. If the past values of X do predict Y, then it means X Granger causes Y. In this case we will check whether selected determinants of exchange rate cause nominal exchange rate. The procedure we are using for Granger causality is as follows.

1. Regress nominal exchange rate (ER) on its own lags, and lags of determinants of nominal exchange rate (DS).

$$ER_{it} = \alpha_i + \beta_{1i}ER_{it-1} + \beta_{2i}ER_{it-2} + \ldots\ldots\ldots\ldots + \beta_{3i}DS_{it-1} +$$

$$\beta_{4i}DS_{it-2}\ldots\ldots\ldots + \varepsilon_{it} \tag{3.5}$$

2. Test exclusion restrictions on all lags of independent variables which are the fundamental determinants of nominal exchange rate via standard F test.

3. If the restrictions are valid, then it means that the nominal exchange rate (ER) Granger cause determinants of exchange rate (DS). It means that the nominal exchange rate and its lagged values can predict the future values of the independent variable, which are the determinants of nominal exchange rate.

3.2. Data

In this research study, annual data is used. The focus of our analysis is selected SAARC countries subject to data availability. Bangladesh, India, Pakistan and Sri Lanka. USA is considered as foreign country in each case. 132 annual observations from 1980 to 2013 are used in our study. Natural log of all variables are taken except inflation and interest rate. Data sources are International Financial Statistics (IFS) of the IMF and World Development Indicator (WDI).

3.2.1. Variable Sources

The variables including money supply is taken as M2, GDP deflator, Debt variable is taken as debt service on external debt in long term in US dollars, Exports and imports data, industrial production index, domestic credit, capital account and financial account balance. The data is available on World Development Indicator (WDI).

Data of the variables including inflation (in the form of consumer price index), Real GDP, nominal GDP and data on Foreign exchange reserves are taken from International Financial Statistics (IFS).

3.2.2. Variable Construction

This section elaborates the methods we have used to construct the variables, which are used in the models. These variables are selected from the models which are selected for the encompassing technique. Following the methodology given in literature, the following variables are constructed accordingly.

i. Relative Interest Rate (RI)

It is constructed as ratio of the domestic (r) and foreign interest rate.

$$RI = \frac{r}{r^*} \tag{3.6}$$

For interest rate money market rates are used for Pakistan, India and Sri Lanka and Treasury bill rates are used in case of Bangladesh.

ii. Inflation Ratio (R_{inf})

In order to analyze this variable we have taken the consumer price index as a proxy for all the sample countries of SAARC.

$$R_{inf} = \frac{I}{I^*} \tag{3.7}$$

R_{inf} is the relative inflation rate and I and I* are domestic and foreign inflation levels respectively. Consumer prices index is used as a proxy for inflation ratio.

iii. Terms of Trade (TOT)

This variable is constructed as ratio of level of exports to level of imports respectively.

$$TOT = \frac{p^x}{p^y} \tag{3.8}$$

TOT is the terms of trade, p^x is the level of exports and p^y is the level of imports prices respectively.

iv.   Trade Restriction (TR)

Trade restriction is obtained by dividing the nominal GDP with sum of export and imports of all four countries including Pakistan, India, Bangladesh and Siri Lanka. Trade restrictions are opposite to the trade openness (Zakaria et al. 2007).Substitution effect is caused by imposing import tariffs and due to the increase in import tariffs the demand for tradable decreases cause a decline in prices of tradable .As a result trade balance improves and nominal exchange rate appreciates. The expected sign of trade restriction can be positive or negative. Trade restriction is obtained by dividing the nominal GDP (NGDP) with sum of export (X) and imports (M) of all four countries including Pakistan, India, Bangladesh and Siri Lanka.

$$TR = \frac{NGDP}{M+X} \tag{3.9}$$

TR is the trade restriction.

v.   Foreign Exchange Reserves (FOREX)

Nominal exchange rate appreciation and depreciation is related with the pattern of consumption on tradable and non-tradable same as the pattern of net capital inflows (Hariharan 2000: Jayaraj 2000 and Iqbal et al. 2007). We have taken it by taking ratio of foreign exchange reserves and GDP deflator.

It is constructed by taking ratio of foreign exchange reserves and GDP deflator. FOREX shows foreign exchange reserves and GDPd shows GDP deflator.

$$FXRES = \frac{FXRES}{GDPd} \tag{3.10}$$

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vi.   Excess Supply of Domestic Credit (ESDC)

Excess supply of domestic credit is taken as a proxy of monitory expansion (Chishti and Hassan 1993, Iqbal et al. 2007). The domestic credit decreases wealth via inflation, as result the demand for tradable and non-tradable decreases and depreciates real exchange rate. This effect balance of payment surplus and results in nominal exchange rate appreciation. This variable is obtained by taking ratio of rate of domestic credit to private sector by nominal GDP. Following Edwards (1998a, 1988b) and Iqbal (2007), its proxy is developed by taking the ratio of rate of domestic credit to private sector (RDCP) by nominal GDP. RDCP is the rate of domestic credit to private sector and NGDP denotes nominal Gross Domestic product.

$$ESDC = \frac{RDCP}{NGDP} \qquad (3.11)$$

vii.   Trade Balance (TB)

Trade balance is obtained by taking the ratio of difference between level of exports and level of imports with the GDP. We have obtained this variable as.

$$TB = \frac{X-M}{GDP} \qquad (3.12)$$

TB is the trade balance, X denotes exports and M denotes imports of the sample countries.

viii.   Net Capital Inflow (NCI)

This variable is constructed as ratio of sum of capital accounts and financial accounts to nominal GDP. Capital inflow is recorded in capital account in case there is inflow in

physical assets and is recorded in financial account in case there is net capital inflow in financial assets such as stocks and bonds.

$$NCI = \frac{CA+FA}{GDP} \qquad (3.13)$$

NCI is the net capital inflow. CA denotes capital account and FA denotes financial accounts.

ix. Relative Income (RY)

Relative real GDP is used as a proxy of relative income (Yadav and Mishrai, 2013). When GDP increase the demand of importable goods will increase. As a result of increase in demand of foreign currency exchange rate depreciates. This variable is constructed by taking ratio of domestic GDP and Foreign GDP. RY is the relative income and y is domestic real GDP and y* is the foreign real GDP.

$$RY = \frac{y}{y*} \qquad (3.14)$$

Relative real GDP is used as proxy of relative income following Yadav and Mishrai, (2013).

x. Technological progress (TP)

Technological progress can be capital or labor intensive. Demand for both tradable and non-tradable can increase, when technological progress exerts a positive relationship on income effect. Nominal appreciation occurs when the labor intensive technological progress is more because of supply effects as compares to demand effect. Following Iqbal et al., (2007) we have used the following proxy for technological progress. This variable is

constructed by taking ratio of manufacturing, value added (current US dollar) and real GDP.

$$TP = \frac{MNU}{RGDP}$$
(3.15)

TP is the technological progress, MPI is the manufacturing production index and RGDP denotes real gross domestic product.

3.2.3. Descriptive Analysis

The nominal exchange rate situation in SAARC countries can be analyzed by the figures shown below.

Figure 1: The Annual nominal exchange rate between Pak-Rupee and US dollar Exchange Rates
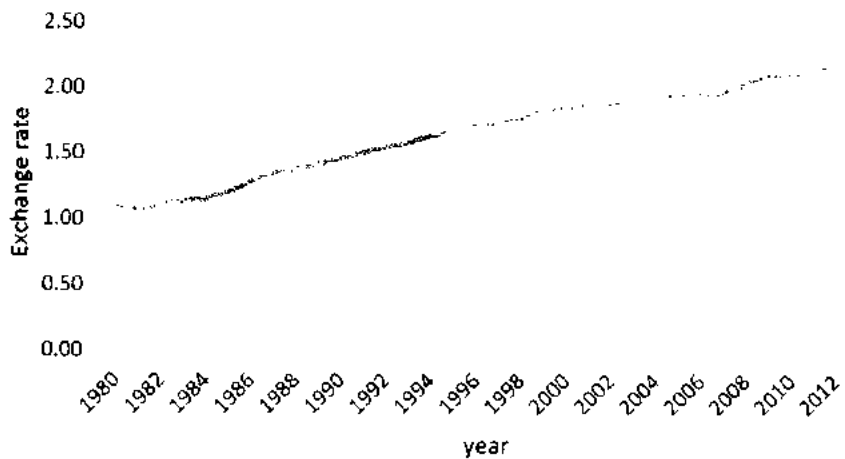
Figure 2: The Annual nominal exchange rate between Bang-Taka with and US dollar Exchange Rates
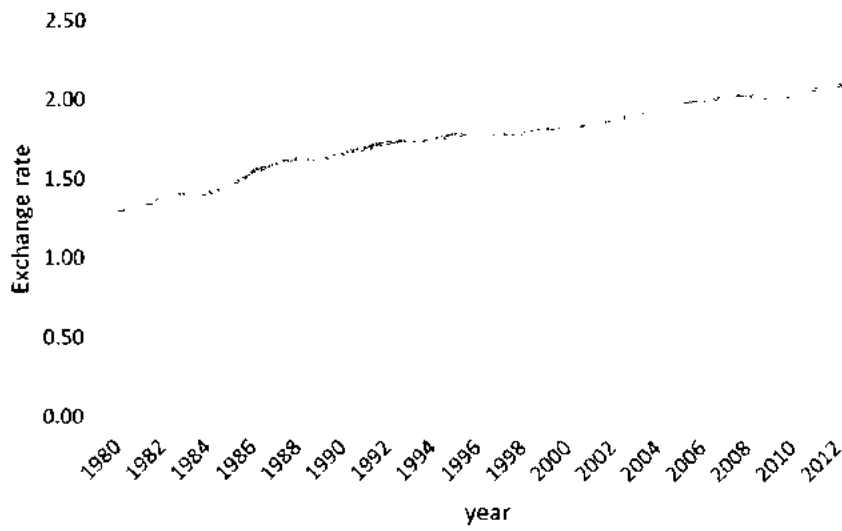
Figure 3: The Annual nominal exchange rate between Ind- Rupee and US dollar Exchange Rates.

Figure 4: The Annual nominal exchange rate between Sri- Rupee and US dollar Exchange Rates.

Figure 1 shows the nominal exchange rate situation of Pakistan. In case of Pakistan the upward trend of the nominal exchange rate is shown from 1982, when it adopt managed floating exchange rate regime. The exchange rate shows depreciation against dollar in the period of managed floating exchange rate. The fluctuation of the nominal exchange rate is shown from 2000, it is the time when the country shifts from fixed or managed floating exchange rate to free floating exchange rate. Exchange rate depreciation is shown in the beginning of 2000.Pakistani rupee exchange rate appreciates in 2008 but its starts deprecation again in 2010.

Figure 2 shows the nominal exchange rate of Bangladesh taka relative to the US dollar. It shows depreciation during the era of floating exchange rate regime. After adopting floating exchange rate regime strong depreciation is shown from the period of 2004 to 2006 and in the period of 2010 to 2012, this depreciation is because of the supply shock and the shocks arise from the external sector of the Bangladesh exchange rate.

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Figure 3 shows the nominal exchange rate of India relative to the US dollar, it shows an upward trend. The year ranges from 1993 to 1995 shows stable exchange rate. While, in the period of 1995 to 1998 extraordinary volatility in the exchange rate is shown because of the adjustment policies of the central bank of India. Till 1993 India operated as managed floating exchange rate regime but after adopting market determined exchange rate regime the exchange rate graph shows an upward trend, the depreciation of the Indian rupee against US dollar is indicating by the upward trend.

Figure 4 shows the nominal exchange rate situation of the Sri Lankan rupee against the US dollar. Sri Lankan rupee shows an upward trend, it shows the depreciation of the local currency which is Sri Lankan rupee against the foreign currency of US dollar.

According to the description of the fluctuation in the nominal exchange rate in South Asian countries a complete set of determinants is needed. As a result of a complete set of determinants exchange rate can be stabilized in long run.

CHAPTER 4

EMPIRICAL RESULTS

4.1 Specifying Model for Nominal Exchange Rate

In literature different models have been estimated for South Asian countries, which represents different theories of exchange rate determination. In these models the researchers have tried to determine exchange rate from different channels. In this study we have used related models for exchange rate determination using encompassing technique because these models are considered for exchange rate determination for selected SAARC countries. The selected models are estimated for each country in order to apply encompassing technique.

Model 1

Kemal & Haider, (2004) used the following model in determination of Pak Rupee exchange rates.

$$ER = c + \alpha_1 RMS_t + \alpha_2 RINF_t + \alpha_3 RY_t + \alpha_4 RI_t + \varepsilon_t \qquad (4.1)$$

where RMS is relative money supply and it is taken as M_2, R_{inf} is relative inflation rates, taken as consumer price index, RY is relative real income it is taken as a proxy of relative real GDP and RI is relative interest rate taken as money market interest rate as monetary determinants.

Model 2

Zakaria et al., (2007) have employed following model in determining exchange rate at the level.

$$ER = c + \emptyset_1 RP_t + \emptyset_2 TOT_t + \emptyset_3 TP_t + \emptyset_4 TR_t + \emptyset_5 NCI_t + \emptyset_6 lnFOREX_t +$$

$$\emptyset_7 ESDC_t + \varepsilon_t \qquad (4.2)$$

RP_t is the relative price level. TOT_t abbreviates the terms of trade. TP_t is the technological progress it can be capital or labor intensive. Demand for both tradable and non-tradable can increase, when technological progress exerts a positive relationship on income effect. TR_t is the trade restrictions, NCI_t is the net capital flows, $FOREX_t$ is the foreign exchange reserves, $ESDC_t$ is the excess supply of domestic currency.

Model 3

Abbas et al., (2011) have followed a monetary approach in finding the determinants at the level on Selected South Asian countries.

$$r_t = c + \beta_1 RINF_t + \beta_2 RI_t + \beta_3 TOT_t + \beta_4 TR_t + \beta_5 NCI_t + \beta_6 TB_t + \varepsilon_t \qquad (4.3)$$

Where as $Rinf_t$ is the relative inflation levels, RI_t is the relative interest rates, the expected sign of relative interest rate depends upon interest rate parity theory and portfolio balance approach and it can be positive or negative, TOT_t is the terms of trade, its effect on exchange rate depends upon the income and the substitution effect [1](Edwards 1987). TR_t is the trade restrictions, NCI_t is the net capital flows. TB_t is the trade balance ratio theoretically there exist positive relationship between exchange rate and exports and a negative relationship

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[1] When terms of trade improves, the income effect dominates substitution effect in a way when the level of income increases, people can spend more, demand for non-tradable will increase and it will affect the price of non-tradable by increasing the prices of non-tradable sector, but due to the fix the prices of tradable goods by world price, the exchange rate appreciates.

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exists between exchange rate and imports. The expected sign of this variable can be negative according to the current account theory

Model 4

Saeed et al., (2012) have analyzed nominal exchange rate by analyzing some monitory variables.

$$ER = c + \pi_1 RMS + \pi_2 FOREX + \pi_3 DBT + \varepsilon_t \qquad (4.4)$$

Whereas RMS is a function of stock of relative money supply, FOREX is foreign exchange reserves and DBT is debt.

Model 5

Kohli & Kletzer, (2001) have followed monitory approach in determining exchange rate of India.

$$ER = c + \sigma_1 RMS + \sigma_2 RY + \sigma_3 RI + \sigma_4 R_{inf} + \sigma_5 P + \varepsilon_t \qquad (4.5)$$

RMS is relative money supply, RY is relative income relative real GDP is taken as a proxy of relative income, RI is relative interest rate, R_{inf} is the relative inflation and P is price variable which is expected to take positive value of non-tradable goods in domestic market.

Model 6

Yadav & Mishrai, (2012) have employed a model by relating Exchange rate with five very important macroeconomic variables namely money supply (MS), real interest rate (RI), real Output (Y), inflation rate (IR) and trade balance (TB) on India.

$$ER_t = c + \delta_1 RMS + \delta_2 RY + \delta_3 RI + \delta_4 R_{inf} + \delta_5 TB + \varepsilon_t \qquad (4.6)$$

RMS is relative money supply, RY is relative income, RI is relative interest rate differential, R_{inf} is relative inflation rate differential and TB is the trade balance.

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Model 7

Khan & Qayyum, (2011) employed following variables in determining the nominal exchange rate.

$$ER = c + \emptyset_1 RI_t + \emptyset_2 INF + \emptyset_3 MS + \emptyset_4 RY + E_t \qquad (4.7)$$

whereas RI is the interest rate, INF is the inflation it is used as consumer price index, MS is the money supply, RY is the relative income..

Models M_1, M_2, M_3, M_4, M_5, M_6 and M_7 are estimated and then ranked according to their standard errors. Model M_2 contains smallest prediction error at an average 0.070 as shown in Table 1.

Table1: Standard Errors of Model M1-M7

	Std. Error				
	Pakistan	**Bangladesh**	**Sri Lanka**	**India**	**Average**
Model 1	0.023	0.021	0.018	0.024	0.088
Model 2	0.016	0.017	0.016	0.019	0.070
Model 3	0.023	0.019	0.019	0.023	0.086
Model 4	0.024	0.018	0.017	0.023	0.084
Model 5	0.023	0.016	0.016	0.023	0.080
Model 6	0.023	0.020	0.016	0.025	0.085
Model 7	0.023	0.019	0.018	0.028	0.090

We have tested the null hypothesis as we have mentioned in section 3.1.1 and M_2 is encompassed with other models including M_1, M_3, M_4, M_5, M_6 and M_7. The test results are shown in Table 2.

Table 2: Results of Hypothesis M encompasses M_i

Hypothesis	Test statistics	Pakistan	Bangladesh	India	Sri Lanka
M_2 encompasses M_1	COX	-0.730* (0.052)	-3.932*** (0.000)	-2.436** (0.014)	-4.600** (0.014)
	Ericsson IV	3.876** (0.000)	0.205 (0.052) *	0.725** (0.042)	1.056 (0.290)
M_2 encompasses M_3	COX	-0.173 (0.862)	-4.287*** (0.000)	-6.162*** (0.000)	0.6111 (0.541)
	Ericsson IV	3.999 (0.721)	-0.313*** (0.001)	2.948 (0.003)**	0.4951 (0.620)
M_2 encompasses M_4	COX	1.141 (0.253)	-3.878*** (0.000)	-1.216 (0.223)	-4.394*** (0.000)
	Ericsson IV	-0.280 (0.779)	-0.279* (0.524)	2.442 (0.014)	0.130 (0.896)
M_2 encompasses M_5	COX	1.913** (0.055)	-4.71*** (0.000)	-3.210** (0.001)	-5.206*** (0.001)
	Ericsson IV	3.641*** (0.000)	-0.584 (0.5587)	15.20 (0.000)**	8.206 (0.041)*
M_2 encompasses M_6	COX	1.682* (0.092)	-5.214*** (0.000)	-3.279** (0.001)	-4.609*** (0.000)
	Ericsson IV	3.723** (0.000)	0.547 (0.584)	5.777 (0.000)**	8.430 (0.037)*
M_2 encompasses M_7	COX	0.3090 (0.757)	-0.7603 (0.447)	3.095 * (0.002)	-1.026 (0.304)
	Ericsson IV	3.847 (0.453)	0.9895 (0.322)	0.2806 (0.779)	0.7457 (0.455)

Note: ***presents significance at 1 percent, ** presents significance at 5 percent and *Shows significance at ten percent.

According to the encompassing results shown in Table 2, It is clear that the null hypothesis; M_2 encompasses M_1 is rejected because of the significant P-value in case of all sample South Asian countries. It means M_2 does not encompass M_1. Hence the variables of M_1 are included in the general model. Similarly in case of the null hypothesis; M_2 encompasses M_3 because of significant P-value of Bangladesh and India null hypothesis is rejected, the variables of M_3 are included in the final model. Same is the case for the null hypothesis of M_2 encompasses M_4, due to significant P-values in case of Bangladesh and Sri Lanka the null hypothesis is rejected, the variable of M_4 are included in the final model. According to the null hypothesis of M_2 encompassing M_5, due to the presence of significant p-value in all sample countries the null hypothesis is rejected and concludes that the variables of M_5 can also be included in the final model. Same results are shown in case of the null hypothesis of M_2 encompassing M_6, due to presence of significance in case of all sample countries the null hypothesis is rejected, as a result the variables of the model M_6 are included in the final model. Contrary to the results shown by other null hypothesis, the null hypothesis of M_2 encompasses M_7 is accepted. Hence, the variables of the model M_7 are not included in the final model. On the basis of this analysis we have constructed a final model which contains the variables of the models M_1, M_2, M_3, M_4, M_5 and M_6.

$$ER = \beta_0 + \beta_1 RP_t + \beta_2 TOT + \beta_3 TP_t + \beta_4 TR_t + \beta_5 NCI_t + \beta_6 FOREX_t +$$

$$\beta_7 ESDC_t + \beta_8 Rinf_t + \beta_9 TB + \beta_{10} RI_t + \beta_{11} RMS + \beta_{12} RY + \beta_{13} DBT +$$

$$\varepsilon_t \tag{4.8}$$

As a result of encompassing technique, equation 4.8 is obtained, which is the general model. This model contains twelve independent variables. The independent variables include relative price, terms of trade, technological progress, trade restrictions, net capital

inflow, foreign exchange reserves, excess supply of domestic currency, relative inflation, trade balance, relative interest rate, relative money supply, relative income, net capital inflows and debt variable. Among these independent variables some of the variables might be insignificant.

Table 3: Estimation results of the most General Model. Dependent Variable: LNER

Variable	Coefficient
CONSTANT	1.519***
LESDC	0.001
LDEBT	0.045
LFOREX	0.160***
LRY	0.402***
LRMS	0.341***
LRP	-0.014
LTB	-0.108**
LTOT	0.000
RI	-2.152***
Rinf	-0.004
LTP	-0.001
LTR	0.020
NCI	0.054

Wald coefficient restriction test
F-statistic = 1.141926

P-value = 0.3428

Note: *** shows significance level at one percent, ** shows significance at five percent and * shows significance at ten percent.

The results of the Table 3 shows the estimation result of the most general model. According to the test results some of the variables including foreign exchange reserves, relative income, relative money supply, trade balance and relative interest rate are found highly significant at one percent level of significance. Contrary to that some of the variables including excess supply of domestic currency, relative prices, and terms of trade, technological progress, debt, and relative inflation and trade restrictions are found to be highly insignificant.

4.1.1. General to Specific Methodology

The general to specific approach and encompassing approach are related with each other (Mizon, 1995 and Hendry & Richard, 1987). Following the methodology of general to specific approach mentioned in 3.1.2. Wald coefficient restriction test is applied on highly insignificant variables in order to construct a single model. According to the results given in Table 3 the null hypothesis of Wald coefficients restriction (exclusion is valid) and the alternate hypothesis (the exclusion is invalid), the null hypothesis is accepted in our case. Table 3 shows the acceptance of null hypothesis because the P- value 0.342 is greater than 0.05 at 5% level of significance. Hence, on the basis of this result our final model is constructed, which is composed of foreign exchange reserves, relative income, relative money supply, trade balance and relative interest rate. These selected variables can be called as fundamental determinants of nominal exchange rate of selected SAARC countries.

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4.1.2. Final Model

After dropping highly insignificant variables, we have developed and estimated following model.

$$ER = \beta_0 + \beta_1 FOREX + \beta_2 RMs + \beta_3 RY + \beta_4 TB + \beta_5 Ri + \varepsilon_t \qquad (4.9)$$

Table 4: Estimation results of the simplified most General model. Dependent Variable: LNER

Variable	Coefficient	Std. Error
CONSTANT	1.718***	0.352
LFXRES	-0.015**	0.081
LRMS	-0.012	0.038
LRY	0.338***	0.069
LTB	-0.181	0.224
RI	0.000 ***	0.941

Note: *** = Significant at 1 percent. ** = Significant at 5 percent. *= Significance at 10 percent

Table 4 shows the coefficient values of the variables and the standard errors of the determinants of nominal exchange rate in the final model. According to the results out of five variables, relative income and relative interest rate are significant at 1% and foreign exchange reserves are significant at 5% level of significance. Foreign exchange reserves are proved to be significant variable in determining nominal exchange rate of selected SAARC countries and the negative sign of foreign exchange reserves shows the depreciation of the exchange rate of the sample countries. As the nominal exchange rate appreciation and depreciation is related with the pattern of consumption on tradable and non-tradable same as the pattern of net capital inflows. Money supply possess negative

sign, which shows negative relationship between money supply and exchange rate, hence when money supply increases exchange rate decreases.

Real income shows significant and positive sign in determining nominal exchange rate. Theoretically, real GDP and exchange rate shows negative relationship because increase in GDP leads more demand for importable goods it results in increase in imports of the country. As a result demand for foreign currency increases and exchange rate decreases. In our case real GDP is showing positive relationship it can be because of overshadowing of the GDP of South Asian countries by the US GDP.

Trade balance impacts exchange rate. Our results have shown a negative value which leads to the existence of negative relationship among trade balance and exchange rate. Hence, it shows that increase in trade balance of the selected SAARC countries leads to currency depreciation.

Relative interest rate possess a significant positive effect in determining nominal exchange rate of the selected SAARC countries. Interest rate and exchange rate have positive relationship when currency value changes as a result of any external factor, by decreasing domestic interest rate currency will depreciates. Foreign capital can be attracted as a result of rise in domestic interest rate which results in appreciation of the local currency[2].

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[2] Dornbusch, (1976)

4.2. Long Run and Short Run Dynamics of Nominal Exchange Rate

4.2.1. Panel Unit Root Test

In order to find the long run relationship among the nominal exchange rate and its fundamental determinants, before testing the co integration, the variables are tested for the stationarity, the order of integration on level and also in first difference form. Specifically we have tested whether all the variables including dependent and independent are integrated of same order. The results are obtained by applying the panel unit root test. The procedure adopted is discussed in section 3.1.4. The results of panel unit root test are given in Table 5. According to the test results all the variables are proved to be insignificant on level. Therefore the null hypothesis of trend stationary is rejected at level. As a result it can be concluded that all the variables follow unit root (non-stationary) at levels. All the variables are of same order of integration I (1).

Table 5: Results of Im, Pesaran and Shin Unit Root Result

Variables	level T-Statistic	1st Difference T-Statistic	Order of integration
Nominal exchange rate	-0.858	- 3.433***	I(1)
Relative money supply	3.597	-4.356***	I(1)
Relative interest rate	8.246	-3.738***	I(1)
Relative income	8.144	-4.326***	I(1)
Trade Balance	-0.431	-7.798***	I(1)
Foreign Exchange reserves	2.626	-6.050***	I(1)

Residual series T-statistic at level = -6.492***			I(0)

Note: *** = Significant at 1 percent. ** = Significant at 5 percent. *= Significance at 10 percent

4.2.2. Panel Cointegration

In order to find the long run relationship among the nominal exchange rate and its fundamental determinants, we have used the panel cointegration test. We have followed the procedure described in section 3.5.5.

4.2.3. Unit Root Test for the Residual Series

Here in this section we have tested the residual series for the unit root. If the residuals are stationary then Cointegration exists. In Table 5 the unit root test results for the residual series are shown. As the formal investigation of the variables have shown unit root at levels. On taking first difference the economic variables become stationary. In order to determine the long run relationship among nominal exchange rate and its determinants. We have used the Engel Granger two step procedure, the Im, Pesaran and Shin W-stat test is applied on

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residuals series. In Table 5 the results of the stationarity of the residual series is mentioned. Accordingly, the null hypothesis of no cointegration or presence of unit root is rejected. Thus, there exist a long run relationship among the variables. The presence of the co integration is implying that nominal exchange rate and determinants including relative interest rate, foreign exchange reserves, relative real income, relative money supply, and trade balance are related in long run for selected SAARC countries.

4.2.4. Short run relationship between NER and independent Variables:

In order to find the adjustment process in the long and short run, the Error correction method is used .This approach is used to find the short run responses of the nominal exchange rate and its determinants including relative money supply, relative interest rate, relative prices, foreign exchange reserves, excess supply of domestic credit, terms of trade, and relative income.

Table 6: Error Correction Representation. Dependent Variable (LNER)

Regressor	Coefficient	Std. Error	t-Statistic	Prob.
C	1.6828	0.032	51.858	0.000
DLFOREX	0.006	0.015	0.432	0.666
DLTB	0.028	0.107	0.263	0.792
DLRMS	0.162	0.031	5.130	0.000
DLRRGDP	0.131	0.046	2.807	0.005
DRI	0.006	0.013	1.260	0.209
ECT(-1)	-0.020	0.011	-1.799	0.074

R-squared -0.450685

Adjusted R-squared -0.508252

Note: *** = Significant at 1 percent. ** = Significant at 5 percent. *= Significance at 10 percent

Table 6 shows the results of ECM, the ECM coefficient on the nominal exchange rate is negatively signed, which shows -0.02 and it is significant statistically. Almost 2 % of disequilibrium in long run is adjusted from the lagged error shocks.

According to the empirical results, both long run and short run relationship between the nominal exchange rate and its fundamental determinants is evident in case of selected SAARC countries specifically Pakistan, India, Bangladesh and Sri Lanka. Convergence towards equilibrium can occur in long run. Both dependent variable nominal exchange and the determinants can adjust to restore equilibrium in the long run.

4.2.5. Granger-Causality Test

Granger causality test is applied to check whether determinants of nominal exchange rate cause nominal exchange rate. We follow the procedure discussed in section 3.1.6.

We have applied Granger-Causality in order to check whether the determinants of nominal exchange rate granger causes the nominal exchange rate. We check the null hypothesis (no granger causality) against the alternative (having granger causality).

Table 7: Method: Granger-Causality/Block Exogeneity Wald Test

Null Hypothesis	F – Statistic	Decision at the 5% level
LFOREX does not Granger Cause NER	7.367*** (0.001)	Reject null
LTB does not Granger Cause NER	0.915 (0.403)	Do not reject null
LRMs does not Granger Cause NER	1.420 (0.245)	Do not reject null
RY does not Granger Cause NER	1.503 (0.226)	Do not reject null
RI does not Granger Cause NER	0.320 (0.726)	Do not reject null

Note: *** presents significance level at one percent, ** at five percent and * at ten percent of significance level. The values in parenthesis shows probability values.

According to the results of Granger-Causality/Block Exogeneity Wald test in Table 7. The null hypothesis is rejected in case of Foreign exchange reseves and result that the nominal exchange rate is granger caused by the foreign exchange reserves of south Asian countries. In other words the past values of foreign exchange reserves can help in predicting the nominal exchange rate of these countries. This finding is reflecting that the South Asian

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situation that the foreign exchange reserves holdings dictates the exchange rate value and due to which the fluctuation in nominal exchange rate is caused by the high import of manufactured goods. Trade balance does not granger causes the nominal exchange rate, which indicates that the past values of trade balance does not help in predicting the nominal exchange rate of the selected SAARC countries. Improvement in Trade balance can be obtained by the depreciation of the local currency.

Similar results are shown in case of the relative money supply, according to the test results relative money supply does not granger cause nominal exchange rate of the south Asian countries. It indicates that past values of relative money supply does not help in predicting the nominal exchange rate of the sample countries. In case of relative income the null hypothesis is accepted because of insignificant p-value, and concluded that relative real income does not granger causes nominal exchange rate. This leads to the description that the past values of the relative real income does not help in predicting the future values of the nominal exchange rate of the four sample countries including Pakistan, India, Bangladesh and Sri Lanka. Similarly the null hypothesis of no causal relationship among relative interest rate and nominal exchange rate is accepted. Relative interest rate does not granger causes the nominal exchange rate and the past values of the relative interest rate does not predict the future values of the nominal exchange rate.

Chapter 5

CONCLUSION

5.1. Summary of Findings

In this study the nominal exchange rate is analyzed by using non-nested hypothesis testing, most specifically encompassing technique. This technique gives us a single best model determining the nominal exchange rate of some selected SAARC countries. In order to get the desired results we have used annual data of nominal exchange rate of Pakistani rupee, Bangladesh Taka, Sri Lankan rupee and Indian rupee in terms of US Dollar and macroeconomic fundamentals from 1980 to 2013 for a total of 136 annual observations.

We have developed a general model of determinants of nominal exchange rate by incorporating those variables having a relation on the basis of different theoretical considerations. However, encompassing technique is applied on all the selected models. As a result a single best model is obtained. Wald coefficient restriction test is applied on the general model as a result our final model is obtained. The final model contain relative interest rate, relative money supply, trade balance, and relative income and foreign exchange reserves. Our results are consistent with the findings of the studies in the existing literature explaining the relationship between exchange rate and its fundamental determinants.

In order to get the desired objectives of the study, the long run relationship among the dependent and independent variables, firstly the stationarity of the final model is found by using Im, Pesaran and Shin (2003), as a result all variables including nominal exchange

rate and all independent variables including relative money supply, relative interest rate, foreign exchange reserves, trade balance and relative income were found stationary at first difference. However, using Engel Granger cointegration test we found stationary residual series, which indicates the presence of long run relationship among the dependent and independent variables. The short run relationship is shown by the ECM term showing appropriate sign and significance. The causal relationship is found with the help of Granger causality testing. It results that the nominal exchange rate is granger caused by the foreign exchange reserves of all sample countries including Pakistan, India, Bangladesh and Sri Lanka.

5.2. Conclusion

The fundamental determinants of nominal exchange rate for South Asian countries are revealed in this study. The variability in these fundamental determinants can cause variability in nominal exchange rate. By stabilizing these fundamental determinants of nominal exchange rate, the fluctuations and variability can be controlled. Following conclusion and policy implications can be drawn from the results of this study.

First, foreign exchange reserves helps in the exchange rate adjustment process. As the nominal exchange rate appreciation or depreciation depends upon the foreign exchange reserves accumulation. Whether the reserves are used for consumption of either tradable or non-tradable goods. Our results have shown a long run relationship between foreign exchange rate with nominal exchange rate, while in short run it is not found significant in affecting the nominal exchange rate in the short run, it is intending towards depreciation of foreign exchange rate in SAARC countries.

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Second, money supply in relative terms also proved to be significant variable in determining nominal exchange rate both in long run and in short run. Money supply is considered as a major factor that affects exchange rate. Money supply and exchange rate are positively related to each other according to the test results of the ECM model. When money supply increase the interest rate reduce, this depreciates money value. The positive sign in our estimation also pointed towards the exchange rate appreciation. A tight monetary policy seems to be advisable not only to fight inflation but also to maintain the stability of the exchange rate.

Third, we found relative income to be a significant variable in determining nominal exchange rate of South Asian countries both in the long run and in the short run. A rise in relative income raises domestic money demand for imports it will result in appreciation of the domestic currency of the selected SAARC countries.

Fourth, trade balance is proved to possess negative relationship. The exchange rate is also adjusted due to improvements and deterioration of trade balance. Depreciation in exchange rate due to deterioration in trade balance makes domestic goods cheaper in foreign market, which helps in boosting exports and decline in imports. The pressure on the currency value of selected SAARC countries can be explained by the soaring trade deficits.

Fifth, as the interest rate has attained significant attention after 1970s after removal of barriers on trade and capital mobility. High interest rate enhances foreign investment in the domestic country. As a result demand for local currency enhances in foreign exchange markets and due to an upward pressure on its prices exchange rate appreciates. We found a significant impact of interest rate in determining nominal exchange rate of selected SAARC countries.

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5.3. Policy Implications

Our results shows that foreign exchange reserves, relative money supply, trade balance, relative income and relative interest rate, significantly affect the nominal exchange rates of the South Asian countries. In simple words we can say that the nominal exchange rate of South Asian countries is mostly driven with the monetary and some real variables both. Thus, this study is helpful for the monetary authorities in order to strengthen their local currencies by increasing the interest rate against the currencies of the developed countries and to sustain the trade balance. Tight monetary policy should be designed so that by increasing interest rate exchange rate will appreciates. The real factors including the foreign exchange reserves, relative income and trade balance are the fundamental determinants of nominal exchange rate. Moreover, our study is helpful for the policy makers in designing the trade policies along with that of monetary policies. Moreover, our study helps the policy makers in stabilizing and strengthening the exchange rate by designing a well versed and coherent monetary and trade policies.

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