Impacts of Macroeconomic Variables on Foreign Exchange Rate of SAARC Member Countries

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ABSTRACT

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Exchange rate (EXR) stability is crucial for especially the developing economies. This study examines the macrorconomic variables which affect EXR in member countries of South Asian Association for Regional Cooperation (SAARC). To do the analyses, data from 1981 to 2019 was relied upon. To estimate the long-run coefficients, Fully Modified Ordinary Least Square (FMOLS) is incorporated. The outcomes of FMOLS exhibit that the variables such as trade, inflation, GDP, total debt services, trade openness, and tariff rate are inversely related to EXR while broad money is found to affect the EXR in positive. As a policy prospect, The Central Bank (CB) is needed to follow tight monetary policy to curtail liquidity of money in economy. It is recommended that CB to discourage government project financing that is to cause increase in money supply but to initiate trendline to facilitate GDP growth, trade, and imposition of tariff to curtail rising EXR.

Keywords:  
Exchange Rate, Inflation, Money Supply, Debt Servicing, GDP Growth Rate, FMOLS, SAARC

JEL Classification:  
F3, F31

INTRODUCTION

The southern region of SAARC is referred to as "Southern Asia." In addition to the geographic importance, South Asian Countries (SAC) are located in a region with a high population density. There are macroeconomic difficulties in this area because of its dense population. This region also experiences differences in statistics related to macroeconomic demographics. There are a number of reasons why South Asia confronts with macroeconomic challenges. Currently empirical studies are taking into account macroeconomic considerations and the currency rate into consideration. Over the past several years, the global economy has experienced rapid growth, falling loan rates, an increase in unemployment, flimsiness in fare, import, and uncharted direct ventures, all of which have a direct, cordial relationship with the EXR. According to Auboin and Ruta (2011), there is a strong relation between the currency rate and the untapped direct venture and employment markets. The SAARC countries of also having trouble managing their EXR appropriately. Some of the key factors that make the cash economy weaker than the produced economy are higher inflation, lower real financing costs, lower GDP per capita, and higher unemployment rates.
The exchange rate plays a crucial role in a country's international trade. It serves as a vital macroeconomic indicator for assessing international competitiveness and reflects the overall economic standing of the country on a global scale. In the realm of international trade, a country's exchange rate serves as a measure of its competitiveness. Therefore, fluctuations in the exchange rate have significant and wide-ranging implications for policymakers, investors, businesses, and consumers alike (Adusie & Gyampong, 2007). EXR is estimated in terms of the value of one nation’s currency for the purpose of conversion to other nation’s currency. According to Allen and Gale (2004), EXR is one factor that is a primary cause of interruption in trade between the countries. In this regard, Mishra and Yadav (2012) confirmed that EXR affects the choice making of traders, policymakers, brokers, exporters, vacationers, money-related organizations, shippers, and financial organization that exist among the countries of the developing and developed world.

Furthermore, Auboin and Ruta (2011) argued that EXR stability ensures higher Foreign Direct Investment (FDI) inflows which benefits the economy. However, the volatility of the currency rate is directly influenced by the macroeconomic factors. When examining the health of the country's booming economy, macroeconomic factors are seen as uncertain and doubtful. Given the importance of FDI and its interdependency with EXR, Mehmood et al. (2021) added EXR, political stability, quality of governance, and voice and accountability to be significant in affectation while FDI inflows are taken into consideration.

In the era of globalization and budgetary advancement, the EXR has a big impact on foreign exchange and money for a small open economy like Pakistan. This is due to the fact that variations in return rates have an impact on the earnings of multinational corporations and boost trade between enterprises and financial institutions. Jhingan (2005) asserts that the nation's exports, imports, and ancillary effects have consequences over the EXR. According to Islam (2002), the financial authority chooses the EXR strategy with the intention of achieving key objectives, such as limiting inflation, expanding credit to the general public and the private sector.

**Research Objectives**

The absence of evidence for a long-run relationship between macroeconomic fundamentals and EXR is felt short in the existing literature. Therefore, this study intends to fill this gap with latest data and panel regression technique on SAARC member countries.

The research objectives are:

- To investigate whether macroeconomic variables cointegrate with EXR in long run.
- To explore if selected macroeconomic variables are significant in affecting EXR.
- To determine whether the chosen variables' long-term effects differ from one another.

**Scope of the Study**

This study identifies the key aspects to the concern policy makers regarding proper management of EXR that is achievable while macroeconomics variables are kept a good track of. The findings enable central banks keep track of macroeconomic factors that affect the EXR and assist policymakers in planning to keep EXR stable for better growth in trade and other financial transactions. The study is organized in a way that; Section 1 provides an Introduction. Section 2 is devoted for the Literature Review. Section 3 is allocated for the Methodological Issues.
Likewise, Section 4 is bestowed for the Discussion of Results. Subsequently, Section 5 is written to publish the Conclusion and Policy Recommendations.

**LITERATURE REVIEW**

Various studies are found on the topic of EXR such as; Iliyasu and Sanusi (2023), Salim and Shi (2019), Samuel et al. (2020), Hasanov et al. (2022), Kurita and James (2022), Jamil (2022), and Jamil et al. (2023). In this regard, Salim & Shi (2019) collected data on a quarterly basis for their inquiry of the connection between macroeconomic variables and the currency rate of Indonesia from 1999 to 2017. For the analytical purpose, linear and nonlinear Autoregressive Distributed Lag (ARDL) were used. The empirical results, particular of trade balances, showed significant short- and long-term association between the EXR and its main drivers. EXR is sequential in its effects on exports, foreign trade, foreign remittances, economic growth, and FDI (Mehmood et al., 2020; Khalil et al., 2017; Mehmood et al., 2021; John et al., 2023).

Similarly, Hasanov et al. (2022) studied money demand and fixed EXR for whether there is any difference in impact if the nature of EXR is floating. The study demonstrated that open economy model is in a better framework while characterizing the money demand under the fixed EXR system. Whereas, they study by Kurita and James (2022) aimed to advance an econometric model that aligns with economic theories to scrutinize the Canadian-US dollar EXR during the era of floating EXR after the Bretton Woods system, during the period from 1975 to 2021. To achieve this particular objective, the study explored the historical context of Canada by taking into account major political events and the significance of oil in the Canadian economy. Furthermore, the study acknowledged the presence of structural breaks observed in the data during the early 1980s and 2000s. The empirical findings of the study provided support for the notion that long-term EXR determination is influenced by fundamental factors. Furthermore, the research investigated both the long-term and short-term impact of oil prices on exchange rate dynamics thus identified the substantial role played by the US-Canada relationship in this regard.

The study by Samuel et al. (2020) studied the affectations of macroeconomic variables on the EXR in Ghana. The study went with the utilization of multivariate modelling technique of Vector Autoregression (VAR) and thereby focused on the analyses of affects of broad money supply, lending rate, real GDP, and inflation on EXR. The study relied on a period of 76 quarterly observations from 2000 to 2019 in Ghana. The primary objective was to evaluate the effectiveness of macroeconomic variables in managing the EXR in the country. The study relied on secondary data sourced from the Bank of Ghana, World Development Indicators, and Ghana Statistical Service. The results indicated that real GDP has a causal relationship with the EXR in Ghana. However, inflation, money supply, and lending rate were found to have no any direct effect on EXR. Nevertheless, these variables were found to have indirect effects on the EXR.

This empirical analysis of Jamil et al. (2023) focused on inspecting the effect of various macroeconomic variables, including GDP per capita, GDP growth, inflation, FDI, imports, exports, interest rates, foreign reserves, and foreign debt on EXR regimes. Similar variables such as imports and FDI were opted by John et al. (2023). It is considered that EXR is important ingredient to even influence the economic growth (Jamil, 2022), therefore the study of Jamil et al. (2023) in-focused five
countries from the MSCI emerging markets index, developed markets index, and frontier markets index, covering the period from 1970 to 2020. The research aimed to make predictions and provide valuable insights for the financial and economic markets, addressing gaps in the economic and financial knowledge of these countries.

The study employed advanced statistical frameworks and utilizes a machine learning technique called binary logit (quadratic hill climbing) to explore the influence of macroeconomic variables on changes in EXR regimes. The empirical findings indicated that Hong Kong, Australia, New Zealand, Japan, and Singapore make timely and accurate decisions regarding EXR regimes, which contribute to their status as developed markets. On the other hand, emerging markets and frontier markets do not adopt EXR regimes three, four, and six, which significantly impacts their growth compared to developed markets. Foreign debt, inflation, and foreign reserves emerge as major challenges for emerging and frontier markets.

Naseem et al. (2019) looked for the relationship between EXR and macroeconomic indicators from 1980 to 2017 on Pakistan like Adudei and Gyapong (2017) and Akhter and Faruqui (2015) did earlier on Ghana and Bangladesh. The findings posted that inflation, GDP, current account balances, FDI, and trade openness had significant effect over EXR of Pakistan. akin to Bhasin and Nisa (2019) who located interest rate, money supply, foreign exchange reserves, and current account balances as factors that affect the EXR of India.

The transfer of resources has become increasingly useful for both emerging and industrialized economies. Such transfer offers wide range of tangible and potential benefits, including job creation, technological spillovers, and improved productivity and managerial skills. Given the capital deficit in the third world countries and the advantageous outcomes associated with such activities, resource transfers play a crucial role in promoting growth and development. To attract a significant amount of FDI, many of such nations have implemented policy reforms which are aimed at creating an attractive investment climate. FDI inflows, in this regard, are widely recognized in the literature as a major driver of an economic stimulation (Kulu et al., 2021).

However, sometimes the results are not appreciable (Mehmood & Hassan, 2017; Mehmood et al., 2018; Mehmood et al., 2018). On the other side, considering the ability of FDI to generate employment opportunities, stimulate private investment, and facilitate knowledge and skill transfer, role of such vital inflows now assumes great significance. There is currently a lack of understanding regarding the specific effects of FDI on recipient economies. Nonetheless, the importance of FDI extends beyond increasing production and job creation; it also plays a vital role in fostering the development of infrastructure and industries, which are essential for economic growth (Nikolaos & Pavlos, 2017). Khan et al. (2019) looked into how macroeconomic factors such as interest rate, GDP growth, purchasing power parity (PPP), purchasing power, and trade openness affect the EXR of China from 1980 to 2017 like Venkatesan and Ponnamma (2017).

The relationship between political unrest and EXR was made clear by Bouraoui and Hammami (2017). From 1992 to 2016, information was gathered on a quarterly basis from five Arab countries. Basic macroeconomic concepts like money supply and economic growth were used as independent variables. In order to get the conclusion from the data, VAR and ARDL models were used. The findings showed
that political instability is associated with a notable decline in the estimation of household financial forms.

The effects of consumption taxes led consequences on real EXR and trade balance were examined by Freund and Gagnon (2017). Likewise, Fraz and Fatima (2016) conducted study on the association between EXR and macroeconomic parameters. The data were compiled between 1970 and 2015 using the International Financial Statistics (IFS) for the analyses on three developed and three developing countries, including Canada, Japan, the United Kingdom, South Africa, Brazil, and India.

Abdoh et al. (2016) looked at how exports, inflation, and interest rates affected the EXR. They made use of the annual reports of ASEAN nations between 2005 and 2014. According to their findings, export has a substantial impact on the currency rate, whereas inflation and interest have little effect. Harberger (2003) examined how the actual EXR is impacted by economic growth. He found there is no clear correlation between economic growth and the actual EXR.

Next to Ali et al. (2015), main macroeconomic factors that influenced the EXR were evaluated by Vidyavathi et al (2016). They observed unfavorable correlations between EXR and GDP, inflation, foreign debt, and interest rates. They also noted a weakly positive association between FDI and the EXR. In the wake of globalization, Khera and Singh (2015) detected the impact of numerous macroeconomic aspects on EXR. The analysis suggested combining imports and increasing FDI to raise the EXR. In the same way, Asari et al. (2011) examined the connection of inflation, interest rates, and exchange rates. The tax led impacts on the EXR were examined by Beck and Coskuner (2007). Agbeyegbe et al. (2004) examined the connections between trade liberalization, currency values, and tax revenue.

DATA AND METHODOLOGY

Data Source

The time series panel data from 1981 to 2022 was used for the empirical analyses. Trade, broad money, inflation, GDP growth, tariff rate, and total debt servicing are selected to locate the effects on EXR of SAARC member countries. Data sources relied upon were The World Bank Development Indicators (WBDI) and the Central Banks of SAARC member countries. The most recent 43 years of annual data, with panel data from 1981 to 2022, are taken into consideration for the chosen 7 sample countries, excluding Afghanistan due to the missing data.

Model of the Study

Based on conceptual framework developed from literature discussed earlier, the model is given as follows:

$$\alpha = \hat{\alpha}_0 + \hat{\alpha}_1 T + \hat{\alpha}_2 INF + \hat{\alpha}_3 TDS + \hat{\alpha}_4 GDP + \hat{\alpha}_5 TR + \hat{\alpha}_6 TD$$

(1)
Whereas;

EXR, represented by $\alpha$, is a dependent variable. The $\partial M3$ is Broad Money (M3) and inflation (INF) is defined by $\partial INF$. The Total Debts Service (TDS) and Gross Domestic Product Growth (GDP) are given the identities of $\partial TDS$ and $\partial GDP$, respectively. And, $\partial TR$ and $\partial TD$ show a Tariff Rate (TR) and Trade (TD).

**Conceptual Model**

The major objective of the study is to analyze if macroeconomic variables have impact over the EXR of SAARC member countries. Therefore, based on the literature, the theoretical model is given in Figure 1.

![Figure 1 Theoretical Model](image)

**Development of Hypothesis**

1. $H_0$: Broad money does not affect the EXR.
2. $H_0$: inflation is not affecting EXR.
3. $H_0$: EXR is not affected by the total debt servicing.
4. $H_0$: GDP growth is away from posting any effect on EXR.
5. $H_0$: tariff rate does not affect EXR.
6. $H_0$: trade is not affecting EXR.

**Econometric Analyses**

The series of steps involved for the econometric analyses are given below.

**Unit Root Test (Levin, Lin, & Chou)**

The past investigation raised certain issues with unit root tests for independent time-series data, including the Augmented Dickey-Fuller (ADF), Dickey-Fuller (DF), and Phillips and Perron (PP) test. Low wattage versus choosing set stationarity was one of the most important challenges, especially if the sample is tiny. The panel unit root test has a number of benefits, such as expanding the degree of freedom, creating more point data, and minimizing multi-collinearity between the two explanatory variables. Previous studies are well known for advocating unit root testing for panel data sets. According to the literature, panel unit root tests are typically recommended over time series unit root
testing. Therefore, this study employed panel unit root tests of Levin Lin and Chu (LLC), (2002). Equation (2) yields the panel unit root regression as follows:

$$\Delta y_{it} = \beta_1 + \phi_i + \gamma_{it} y_{it-1} + \delta_{i-j} \sum_{j=1}^{N} \Delta y_{ij} - \varepsilon_{it}$$

\[ \text{(2)} \]

**Test of Co-integration (Kao)**

Kao (1999) presented the tests for panel cointegration based upon Dickey-Fuller as well as Augmented Dickey-Fuller (ADF). It is referred to as co-integrating two non-stationary sequences with a linear combination. In the second point, Kao uses panel co-integration to strengthen the null hypothesis that homogeneous and heterogeneous panels do not co-integrate. Assuming that entire variables are integrated of I (1). When co-integrating vectors are homogenous, pooled regression allows for individual fixed effect(s) through the panel members individually. This test has the advantage of presenting heteroscedasticity across the cross-section because the cross-sections are assumed to be independent for each SAARC member country in a panel. Given by Equation [3], the Kao co-integration regression is as follows:

$$y_{it} = \partial_{i} + \partial_{1} x_{it} + \partial_{2} x_{2it} + \ldots + \partial_{k} x_{kit} + \varepsilon_{it}$$

\[ \text{(3)} \]

**Long Run Coefficient Estimation (FMOLS)**

In SAARC member countries, the relationship between macroeconomic factors and EXR efficiency is examined using Fully Modified Ordinary Least Square (FMOLS) approach. After the endogeneity issue in the time series has been fixed, FMOLS modelling is a collections of numerous time series models that precisely evaluate the long-term influence of regressors over the dependent variables. The FMOLS technique generates accurate estimates and offers a check for the accuracy of the data for small sample numbers. To Mehmood et al. (2018), the methods developed using FMOLS modify least squares to cater the issue of serial correlation. The model is written as in Equation [4].

$$\beta_{KT} - \beta = \left( \sum_{i=1}^{K} L_{22i} \sum_{i=1}^{K} \left( x_{it} - \bar{x}_{it} \right)^{2} \right) \sum_{i=1}^{K} L_{11i} L_{22i}^{-1} \left( \sum_{i=1}^{K} \left( x_{it} - \bar{x}_{it} \right) \varepsilon_{it} - T \Phi_{i} \right)$$

\[ \text{(4)} \]

$$\varepsilon_{it} = \varepsilon_{it} - \frac{\hat{L}_{22i}}{\hat{L}_{22i}} \Delta x_{it}, \Phi = \hat{f}_{22i} \hat{Q}_{22i} - \frac{\hat{L}_{22i}}{\hat{L}_{22i}} \left( \hat{f}_{22i} + \hat{Q}_{22i} \right)$$

**RESULT AND DISCUSSION**

**Descriptive Statistics**

The summary of descriptive statistics is given in Table 1. The data is used to summarize the mean, maximum, minimum, and standard deviation values for the specified variables. The country with the highest mean, maximum, minimum, and standard deviation values for EXR is Sri Lanka. The EXR of Sri Lanka has the largest value than other countries, whereas the EXR of the Maldives has the lowest mean, maximum, minimum, and standard deviation value. The maximum value of the EXR's standard deviation is 45.77, and Sri Lanka's inflation rate indicates that there is a greater chance that the rate
will deviate from mean value. Among all nations, Sri Lanka’s inflation rate has the greatest mean, maximum, and standard deviation values, but the minimum value of inflation is 0.58. In India, minimum inflation rate is 2.28 that is the lowest.

The lowest inflation rate standard deviation for India indicates that it is the least likely to cause us to go against the predicted value. While Maldives has the second lowest mean, maximum, and minimum inflation rates among all other nations. Bhutan has the highest Broad Money (M3) maximum after India, Bangladesh and Maldives and highest standard deviation values, whereas Pakistan and India have the highest Minimum and Mean values, respectively. The maximum value of standard deviation of Broad Money (M3) is recorded at Nepal. Moreover, highest value of debt servicing of Bhutan shows that it is more likely to turn out differently than planned. Sri Lanka has the highest mean value of TDS that is 4.56 and Maldives has the highest maximum value and Bhutan has the widest dispersion from mean value of TDS which is 2.22 opposite to Bangladesh.

The maximum volume of trade is recorded at Maldives and minimum value of trade is in India and Bangladesh. In Pakistan, it is recorded consistent trade volume because of lowest standard deviation. Moving forward, India also has the greatest mean and standard deviation of tariff rate values which indicates significant trade control. In case of Pakistan, Sri Lanka, Maldives, Bhutan, and Nepal wider dispersion is recorded from mean value. At foremost, appreciable GDP growth figures are evident in case of entire SAARC member countries. However, minimum value of GDP indicates significant volatility in GDP growth therefore, standard deviation values indicate broader dispersal from respective mean values.

Table 1: Country-Wise Descriptive Statistics

<table>
<thead>
<tr>
<th>Information</th>
<th>India</th>
<th>Pakistan</th>
<th>Sri Lanka</th>
<th>Bangladesh</th>
<th>Bhutan</th>
<th>Maldives</th>
<th>Nepal</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>56.89</td>
<td>46.60</td>
<td>38.57</td>
<td>38.31</td>
<td>44.50</td>
<td>37.39</td>
<td>54.18</td>
</tr>
<tr>
<td>Maximum</td>
<td>79.07</td>
<td>59.03</td>
<td>61.79</td>
<td>65.85</td>
<td>74.58</td>
<td>48.29</td>
<td>109.04</td>
</tr>
<tr>
<td>Minimum</td>
<td>34.46</td>
<td>34.80</td>
<td>28.26</td>
<td>14.06</td>
<td>16.84</td>
<td>23.51</td>
<td>23.46</td>
</tr>
<tr>
<td>Std. Dev</td>
<td>16.09</td>
<td>6.70</td>
<td>8.91</td>
<td>17.95</td>
<td>20.54</td>
<td>8.08</td>
<td>26.76</td>
</tr>
<tr>
<td>INF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>7.11</td>
<td>8.36</td>
<td>9.95</td>
<td>6.48</td>
<td>6.28</td>
<td>5.05</td>
<td>8.68</td>
</tr>
<tr>
<td>Minimum</td>
<td>2.28</td>
<td>0.40</td>
<td>0.58</td>
<td>0.15</td>
<td>-1.14</td>
<td>-1.14</td>
<td>3.07</td>
</tr>
<tr>
<td>Std. Dev</td>
<td>2.82</td>
<td>4.21</td>
<td>5.57</td>
<td>3.06</td>
<td>3.25</td>
<td>3.01</td>
<td>3.65</td>
</tr>
<tr>
<td>TDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>2.35</td>
<td>3.41</td>
<td>4.56</td>
<td>1.30</td>
<td>2.71</td>
<td>4.40</td>
<td>1.35</td>
</tr>
<tr>
<td>Maximum</td>
<td>4.61</td>
<td>6.63</td>
<td>8.94</td>
<td>2.26</td>
<td>8.34</td>
<td>9.87</td>
<td>2.14</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.75</td>
<td>1.33</td>
<td>1.84</td>
<td>0.76</td>
<td>0.00</td>
<td>2.14</td>
<td>0.40</td>
</tr>
<tr>
<td>Std. Dev</td>
<td>0.88</td>
<td>1.43</td>
<td>1.68</td>
<td>0.38</td>
<td>2.22</td>
<td>1.99</td>
<td>0.44</td>
</tr>
<tr>
<td>GDP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>6.10</td>
<td>4.84</td>
<td>4.95</td>
<td>5.14</td>
<td>7.61</td>
<td>5.77</td>
<td>4.47</td>
</tr>
<tr>
<td>Minimum</td>
<td>1.06</td>
<td>0.99</td>
<td>-1.55</td>
<td>0.82</td>
<td>-0.41</td>
<td>-13.13</td>
<td>-2.98</td>
</tr>
<tr>
<td>Std. Dev</td>
<td>1.86</td>
<td>2.09</td>
<td>1.97</td>
<td>1.61</td>
<td>4.98</td>
<td>5.54</td>
<td>2.59</td>
</tr>
<tr>
<td>TR</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Unit Root Test

The panel unit root test results proposed by Levin et al. (2002) are given in Table 2. The results show that all the variables are stationary at first difference. Therefore, the conclusion regarding integration is fixed at I(1) for each variable.

<table>
<thead>
<tr>
<th>Variable</th>
<th>I(0)</th>
<th>I(1)</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXR</td>
<td>3.13 (0.98)</td>
<td>-2.80 (0.00*)</td>
<td>I(1)</td>
</tr>
<tr>
<td>M3</td>
<td>0.86 (0.75)</td>
<td>-8.19 (0.00*)</td>
<td>I(1)</td>
</tr>
<tr>
<td>INF</td>
<td>1.24 (0.88)</td>
<td>-3.64 (0.00*)</td>
<td>I(1)</td>
</tr>
<tr>
<td>TDS</td>
<td>-1.18 (0.64)</td>
<td>-9.26 (0.00*)</td>
<td>I(1)</td>
</tr>
<tr>
<td>GDP</td>
<td>-4.94 (0.88)</td>
<td>-2.53 (0.00*)</td>
<td>I(1)</td>
</tr>
<tr>
<td>TR</td>
<td>-0.41 (0.30)</td>
<td>-7.69 (0.00*)</td>
<td>I(1)</td>
</tr>
<tr>
<td>TD</td>
<td>-0.14 (0.44)</td>
<td>-8.43 (0.00*)</td>
<td>I(1)</td>
</tr>
</tbody>
</table>

Note: * refers significant at 5 percent. Probability values are given in parenthesis.

Cointegration Analysis

Long-run co-integration among the variables is derived after it is proved that the variables are integrated of order I(1). Table 3 provides assistance in this regard by displaying the results of Kao (1999) panel co-integration. The findings demonstrate that the Kao Residual Co-integration test rejects $H_0$ of no cointegration at 10% level of significance. Additionally, the significant probability value provides convincing evidence that variables have long run cointegration.

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>t value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADF</td>
<td>1.30</td>
<td>0.09*</td>
</tr>
</tbody>
</table>

Note: * refers to significant at 10 percent
Long Run Coefficients

Table 4 provides the estimates of long-run coefficients. The fallouts of the ADF and cointegration tests confirmed that the variables of the model have long run equilibrium relationships. The FMOLS approach is therefore used to predict the long-run elastic ties. The findings show that except M3, all the regressors exhibit negatively influence the EXR.

Table 4: Long Run Coefficients

<table>
<thead>
<tr>
<th>Regressors</th>
<th>Coefficient</th>
<th>SE</th>
<th>t value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td>0.10</td>
<td>0.14</td>
<td>7.13</td>
<td>0.00*</td>
</tr>
<tr>
<td>INF</td>
<td>-1.91</td>
<td>0.54</td>
<td>-3.58</td>
<td>0.00*</td>
</tr>
<tr>
<td>TDS</td>
<td>-2.45</td>
<td>1.38</td>
<td>-1.77</td>
<td>0.08***</td>
</tr>
<tr>
<td>GDP</td>
<td>-1.16</td>
<td>0.60</td>
<td>-1.94</td>
<td>0.05**</td>
</tr>
<tr>
<td>TR</td>
<td>-0.49</td>
<td>0.14</td>
<td>-3.63</td>
<td>0.00*</td>
</tr>
<tr>
<td>TD</td>
<td>-0.15</td>
<td>0.09</td>
<td>-1.79</td>
<td>0.07***</td>
</tr>
</tbody>
</table>

Note: *, **, & *** represent significant at 1, 5, & 10 percent.

The long run coefficient of M3 gives an illustration that the impact on EXR is positive and significant. The coefficient value is 0.01 that means 1 percent increase in broad money tends to degrade the local currency by increasing EXR by 0.01 percent. When there is a plenty of money, obtaining it is simpler, and less expensive – the interest rate is lowered. Therefore, causes local currency to devalue. The quantity of money also has an impact on how readily available is a cash in the market to purchase goods and services. Companies increase their workforces in order to meet this growing demand, which raises the cost of production. The scenario results in price increases, decreased global competitiveness, and a depreciation of the nation's currency (Bleaney, & Fielding, 2002).

It is discovered that the EXR is negatively and significantly correlated with the INF. According to the variable's coefficient which is -1.91, the EXR decreases by -1.91 percent as INF rises by 1%. A nation's inflationary pressures can significantly affect the currency. Rising rate of inflation is indeed have a large detrimental effect on a country's currency. However, low inflation does indicate a favorable stance on EXR. Because of the close relationship between inflation and interest rates, authorities work to balance their effects. A compromise between the two has frequently been found due to the delicate interplay between the two factors. Although higher interest rates tend to increase inflation, which puts downward pressure on the currency, they also tend to increase investment (Ahmad et al., 2015). These findings were also supported by Fraz and Fatima (2016).

The findings on TDS institute negative and significant association with the EXR. The coefficient value which is -2.45 demonstrates that as when TDS increase by 1%, the EXR decreases by -2.45 %. It means that more is the debt service payments remitted into the account of the donors, strong is the local currency. These results are also supported by Jean-Claude (2019). Moving on, the EXR has a negative and significant relationship with GDP. The coefficient value is -1.16 which validates that as GDP grows by 1%, the EXR decreases by -1.16 %. Which means strong local currency. An increase in domestic output shows that producers are obtaining their anticipated profits, creating mandate for the domestic currency thus contributing in increasing value of local currency in relation to other currencies (Bleaney, 1996). These findings are also supported by Ahmad et al. (2015) and Mirchandani (2012).
Moreover, TR and the EXR are negatively and significantly connected at the 5% level of significance. Thus, confirm that any imposition of tariff on tradables helps citizens to engage with local manufacturers. Thereby, the need for the foreign currency reduces which improves the local currency and causes the EXR to fall. The fall of -0.49% is recorded at the back of 1% fall in TR. Similarly, the TD is revealed to be negatively and significantly correlated with EXR. According to the coefficient value of -0.15, the EXR decreases by -0.15 percent for every 1% rise in trade. The inverse relationship between TD and EXR reflects the fact that when a country imports more than it exports, the demand for foreign currency rises, which causes the value of the foreign currency to increase. These results were also validated by Ahmad et al. (2015) and Ali and Nazar (2017).

**CONCLUSION AND POLICY IMPLICATION**

**Conclusion**

This study presented the empirical analyses of the macroeconomic determinants of EXR at SAARC member countries. The conclusions are summarized as:

The Kao Residual Co-integration test rejected $H_0$ of no cointegration thus provided strong indication that the variables exhibit long-term relationship after unit root analysis revealed that the variables are integrated of I(1). The FMOLS technique of long run coefficient estimation was used. The findings concluded negative association of all the regressors with EXR except M3.

**Policy Implication**

Based on the empirical results following policy recommendations are furbished to control the EXR volatility in SAARC countries.

To reduce money supply and inflation, the central bank should implement tight monetary policy. The central bank(s) of SAARC member countries shouldn't allow the state government have an excessive financing which boosts inflation such as via printing of notes. In this regard, the central banks are to raise the reserve requirements to limit credit issuance. Trade was found to be negatively correlated with EXR in terms of exports, allowing policymakers to create measures to keep the terms of trade in balance. Exporters may be given export subsidies for this reason in order for them to raise output and compete on the global market which could result in a rise in the value of the foreign currency. Import tariffs may also be introduced in an effort to lower the level of imports.

The development of infrastructure, sound political leadership, and good administration will all help the nation draw in more international investment as a result, the foreign exchange market will be stabled. Infrastructure development, wise political leadership, and efficient management will aid the country attract foreign investment. As a result, the foreign exchange market will be stable.
REFERENCES


