Volatility of Macroeconomic Fundamentals and Real Exchange Rate Volatility in India: A Correlational Approach

RASHMI

NAVITHA THIMMAIAH

Abstract

This paper attempts to analyse the impact of the volatility of macroeconomic fundamentals on the volatility of real exchange rate of the Indian rupee for the period 1996-97 to 2015-16. The conditional variances of the variables are used as proxies for the measurement of volatility. The results of the correlation analysis indicate that there is a moderate impact of macroeconomic fundamentals on real exchange rate behaviour. Further, the results of the volatility analysis indicate that the macroeconomic fundamentals and real exchange rate are correlated not only in their level forms, but their volatilities are also correlated.

Keywords: Macroeconomy, Volatility, Indian rupee, Foreign exchange

Authors: Rashmi, Research Scholar, DoS in Economics and Cooperation, University of Mysore, **Navitha Thimmaiah**, Assistant Professor, DoS in Economics and Cooperation, University of Mysore, Karnataka, India, **Email**: navitha_t@yahoo.com

INTRODUCTION

Increased volatility in real exchange rates began in mid-1970s when major industrialized economies of the world turned to flexible exchange rate system after the collapse of the Bretton Woods system of fixed exchange rate system. Although the developing countries were slow in adopting the flexible exchange rate regime, they had to make frequent adjustments in the form of devaluations and revaluations in order to maintain the value of their currencies. Indian rupee was pegged to the British pound sterling till September 1975 when the single-currency peg was replaced by a basket of currency, that is, the external value of rupee would be fixed on the basis of the value of a basket of currencies. However, frequent changes in the value of the currencies in the basket, internal instability in the macroeconomic policies, balance of payments crisis and shrinking foreign exchange reserves all led to the implementation of New Economic Reforms of 1991, which necessitated a major shift in macroeconomic policies in the country. One such significant change in external policy of India was the adoption of market based floating exchange rate system in India. Exchange rate of the rupee has since then been largely determined by the market

forces of demand and supply. Adoption of floating exchange rate system has led to heightened volatility of exchange rate in India, which resulted in RBI intervention in foreign exchange market in order to maintain stability.

Managing volatility in real exchange rate (RER) assumes utmost importance in a developing country like India, for it affects the decisions of exporters, importers, foreign investors and policy makers adversely. Appreciation of real exchange rate leads to rise in internal price levels thereby affecting the external competitiveness in traded goods sector as well as internal resource allocation in non-traded goods sector in the economy. Therefore, ensuring exchange rate stability is one of the significant factors in increasing exports, promoting higher investments and achieving sustained growth rate in the economy. This requires an understanding of the sources of real exchange rate that affect the behaviour of exchange rate volatility.

LITERATURE REVIEW

The study by Dua and Sen (2006) investigates the long-run relationship between India's foreign exchange rates and Capital flow, fiscal and monetary variables, and foreign exchange acquisitions of RBI, using cointegration test. The study finds that the real effective exchange rate is associated with the level of capital flows, volatility of the flows, high-powered money, current account surplus and government expenditure in the long run.

The study by Kumar (2010) evaluates the long-run determinants and impact of Real Exchange Rate of India on trade, capital flows and conduct of monetary policy, using cointegration method. Quarterly data on productivity differentials, terms of trade, government expenditure, trade openness, interest rate differentials, capital inflow and net foreign assets are used as determinants of exchange rate. The results establish that productivity differential, foreign exchange assets, terms of trade and external sector openness are main determinants of real exchange rare in India in the long-run.

The study by Sohrabji (2011) derives exchange rate misalignment and attempts to establish the link between capital flows and misalignment of exchange rate. The study considers Terms of Trade (TOT), Openness, Investment, Capital Flows, Government Spending, Technological progress, Excess domestic credit growth and Nominal exchange rate growth as the fundamental determinants of exchange rate for the period 1975 to 2006. The

results from Cointegration analysis indicate that all the fundamental factors are significant in the long-run as well as in the short-run

The study by Mirchandani (2013) investigates different macroeconomics variables causing fluctuations in exchange rate of Indian Rupee and their correlation with the exchange rate. The study tries to find out the correlation between exchange rate and Inflation, Interest Rate, External Debt, GDP and FDI. Results indicate that there is a high negative correlation of -0.934 between exchange rate and interest rate, a moderate negative correlation of -0.606 between exchange rate and rate of inflation, a moderate positive correlation of 0.525 between GDP and exchange rate, and a mild positive correlation of 0.442 between FDI and exchange rate.

The study by Goel (2014) tries to analyse the relationship between the components of capital inflows and the real exchange rate of India for the period 1996-97 to 2012-13 using cointegration analysis. The results indicate that only FDI and real exchange rate are cointegrated.

The study by Vidyavathi et al., (2016) examines interest rate, inflation, GDP, current account deficit, FDI and their impact on exchange rate movements during the period 2006 to 2015. They use annual data and employ graphs and simple correlation analysis to study the relationship between the variables. The results indicate that five of the six variables, viz., GDP, Inflation, current account deficit, lending interest rates and external debt have an inverse relationship with exchange rate. On the contrary, FDI and Exchange rate have positive correlation.

The study by Poornima and Ganeshwari (2016) attempted to analyse the relationship between macroeconomic variables like inflation, interest rates, trade balance, current account, money supply and exchange rates for the annual data during the period 2005-2015. The study used Pearson correlation technique and regression to find out the relationship between the said variables. The results indicate that inflation and current account deficit have a negative relationship with exchange rate, while money supply, trade balance and interest rates have a positive relationship with the exchange rates.

An analysis of the empirical works indicate that macroeconomic fundamentals have a strong influence on exchange rate behaviour. However, all the above studies have analysed the relationship between exchange and its determinants in level form. The present study tries to analyse the correlation between the macroeconomic variables and real exchange rate in

both level form and also the correlation between the variables in volatility form. Some of the important macroeconomic factors considered for the analysis are net capital inflows like FDI and FII, government spending, foreign exchange reserves, terms of trade, trade openness, growth in economic productivity.

OBJECTIVES

- To analyse the impact of the volatility of macroeconomic fundamentals on the volatility of real exchange rate of the Indian rupee for the period 1996-97 to 2015-16.

- To conduct correlation analysis to establish whether there is impact of macroeconomic fundamentals on real exchange rate behaviour or not.

METHODOLOGY

The study is based on secondary data. Quarterly data on Indian economy for the period 1996-1997: Q1 to 2015-16: Q4 is considered for the analysis. The data are collected from RBI, OECD database and Federal Economic Reserve database. The study uses correlation analysis to study the relationship between the variables. Correlation analysis studies the strength of linear association between variables. The value of correlation coefficient varies between -1 and +1. A correlation coefficient value closer to -1 implies a strong negative correlation between the variables. A correlation coefficient value closer to +1 implies strong positive correlation between the variables. Conditional variances of the variables are used as proxies for the measurement of volatility.

Estimation Results

Table -1 indicates the correlation between macroeconomic fundamentals and real exchange rate and the correlation between their volatilities.

Macroeconomic determinants	Real Exchange Rate	Volatility of RER	Volatility of Macroeconomic determinants
Net Capital Inflows	0.636	0.319643808	Volatility of Net Capital Inflows
Trade Openness	0.658	0.267051954	Volatility of Trade Openness
Terms of Trade	-0.156	-0.5059652	Volatility of Terms of Trade
Foreign Exchange Reserves	0.047	0.363357322	Volatility of Foreign Exchange Reserves
Government Spending	0.042	0.338049468	Volatility of Government Spending
Growth Rate	0.133	0.005185593	Volatility of Growth Rate

FINDINGS

The findings of the study indicate that real exchange rate and macroeconomic fundamentals are correlated.

Net Capital Inflows and Real Exchange Rate

The correlation coefficient of 0.636 between net capital inflow and real exchange rate indicates that there is a positive and moderate correlation between capital flow and real exchange rate. Further, the correlation coefficient of 0.319 between the volatility of net capital flows and real exchange rate indicates that there is a correlation not only between the variables but also between the fluctuations of the variables. It implies that higher capital flows into the country in the form of FDI, FII affect the value of the rupee leading to appreciation of the currency. Increase in the capital flow demands more and more domestic currency and thereby cause appreciation.

Trade Openness and Real Exchange Rate

Empirical works indicate a negative correlation between trade openness and exchange rate. However, the results from the study indicate that there is a moderate positive correlation of 0.658 between trade openness and real exchange rate, and a mild positive correlation of 0.267 between the volatility of trade openness and volatility of real exchange rate. It implies the degree of openness of the economy increase the supply capacity of the economy thereby improving the trade balance and consequent appreciation of the currency.

Terms of Trade

The correlation between terms of trade that is the ratio of the price index of exports to imports and real exchange rate is -0.156 which indicates there is a weak negative correlation between the variables. However, the correlation between the volatility of the terms of trade and real exchange rate volatility is -0.5059652, which indicates there is a comparatively high negative correlation between the volatility of the variables than the value of the variables itself. The higher the imports the higher is the demand for foreign currency thereby depreciating the domestic currency. This implies, the variation in terms of trade has a strong negative influence on real exchange rate.

Foreign Exchange Reserves and Real Exchange Rate

The results of the study indicate there is a weak positive correlation of 0.047 between forex reserves and real exchange rate, but a moderate correlation of 0.363 between the volatility of forex reserves and real exchange rate. It indicates, that the RBI has prevented the appreciation of the Real Exchange Rate in the face of capital inflows, thus mitigating its adverse impact on Indian economy.

Government Spending and Real Exchange Rate

Government spending and real exchange rate have a weak positive correlation of 0.042 between them but a relatively moderate positive correlation of 0.338 between the volatility measures. It implies the changes in the public spending on tradable goods and non-tradable goods has an impact on the real appreciation rate.

Growth Rate and Real Exchange Rate

The results of the study indicate that there is a mild positive correlation of 0.133 between the growth rate and real exchange rate and a weak positive correlation 0.05 between the volatility of growth rate and volatility of real exchange rate. This implies that the growth rate has a mild impact on the value of real exchange rate.

CONCLUSION

The findings of the study indicate that macroeconomic fundamentals like net capital inflows, the degree of openness of the economy, terms of trade, foreign exchange reserves and government expenditure have a significant impact on real exchange rate behaviour. Not only the macroeconomic variables *per se* are important but also the volatility in these variables need to be watched. Thus, the policy makers need to reckon with the variability of the macroeconomic factors along with the values of the variables while drafting policies affecting the internal and external sector of the economy.

REFERENCES

1. Dua, Pami, and Partha Sen. 2006. *Capital Flow Volatility and Exchange Rates: The Case of India.* Working Paper No. 144, Delhi: Centre for Development Economics.

2. Goel, Shashank. 2014. *International Capital Flows to India and Implications for the Real Exchange Rate.* PhD Thesis, Delhi: IIFT.

3. Kumar, Sunil. 2010. *Determinants and Impact of Real Exchange Rate in India on Trade, Capital Inflows and conduct of Monetary Policy.* PhD Thesis, Chandigarh: Panjab University.

4. Mirchandani, Anita. 2013. "Analysis of Macroeconomic Determinants of Exchange Rate Volatility in India." *International Journal of Economics and Financial Issues* 3 (1): 172-179.

5. Poornima, S, and M Ganeshwari. 2016. "An Analysis of Macro-economic Determinants of Exchange Rate Volatility in India." *International Journal of Multidisciplinary Research and Modern Education* II (II): 442-445.

6. Sohrabji, Niloufer. 2011. "Capital Inflows and Real Exchange Rae Misalignment: The Indian Experience." *Indian Journal of Economics & Business* 407-423.

7. Vidyavathi, B, Kulkarni Keerti, and Ainapur Pooja. 2016. "A Study on Macro Economic Indicators and their Impact on Exchange Rates." *International Journal of Engineering and Management Sciences* 7 (3): 160-169.