

Relationship of Exchange Rate with GDP, Interest Rate and Inflation of Developed and Developing Countries

TAYYAB RAZA FRAZ & SAMREEN FATIMA

UNIVERSITY OF KARACHI

Introduction

In International trade and finance, the exchange rate always play an important role. The exchange rate is a very useful macroeconomic variable utilized as parameter for deciding worldwide strength and demonstrates the worldwide position of economy of the countries.

A steady exchange rate may help undertaking and money related establishments in evaluating the execution of speculations, financing and supporting and accordingly decreasing their operational dangers (Samea et al., 2014).

The fluctuations in the exchange rate effects the development of multinational organizations

Introduction

According to Medura (2006), the fluctuations in the exchange rate is actually due to the variation in the demand and supply of many macroeconomic factors e.g. GDP, interest rate, CPI, Industrial production, political stability, unemployment rate and treasury bills etc.

The aim of the study is to share in existing literature by finding the effect of macroeconomic variables on exchange rate not only in developing but also in some developed countries.

Macroeconomic factors

One of the most important macroeconomic factor is the interest rate which is the profit after some time because of monetary instruments. Interest rate is assumed a noteworthy part in exchange rate determination (Ramasamy & Abar, 2015).

Macroeconomic factors

Exchange rate

As the Exchange rate tends to indicate the value of currency of a country, therefore, if the inflation is high or low, there is always an impact on the currency.

GDP

GDP obviously gives a general photo of the condition of the economy to that of a satellite in space that can review the climate over a whole mainland. Gross domestic product empowers policymakers and national banks to judge whether the economy is contracting or extending, whether it needs a help or limitation (Samuelson and Nordhaus, 2000).

Interest rate

Interest rate is assumed a noteworthy part in exchange rate determination. One of the most important macroeconomic factor is the interest rate which is the profit after some time because of monetary instruments.

Inflation

Inflation is the expansion in the prices of goods and services in an economy which is measured by the Consumer Price Index CPI.

Literature Review

Macdonald & Nagayasu (2000) studied the relationship of interest rate and exchange rate on quarterly time series data which from 1976 to 1997 of fourteen industrialized countries. They found that for a long run, there is a relation present between the exchange rate and interest rate.

Ramasamy & Abar (2015) used bootstrapping technique to analyze the impact of macro-economic factors on the exchange rate. They found that all macroeconomic factors i.e. Interest rate, GDP and CPI except employment and budget deficit on the basis of yearly data.

Madura (2006) studies the market interaction. He found that the exchange rate depends on the market interaction. He concluded that the GDP has often have negative effect whenever the exchange rate system is fixed.

Literature Review

Edison & Paula (1991) studies the relationship of interest rate and exchange rate on the quarterly data. Unlike other studies which favors the relationship of macroeconomic factors with exchange rate, they concluded that there is no impact of interest rate on exchange rate on long run.

Similarly, McPherson et al. (2000) proved that there is no relationship between the gross domestic product GDP with exchange rate. They also showed that there is no impact of interest rate on the exchange rate.

Data & Methodology

We take gross domestic product (GDP), inflation (CPI) and interest rate.

We decided to analyze these relationship using both developed and developing countries i.e. Canada, Japan UK, South Africa, Brazil and India on the basis of quarterly time series.

The data covers a period according to the availability

Data & Methodology

Abbas et al. (2015) used the Madura (2006) model specification which we are also adopt. According to Madura (2006), the change in the exchange rate is due to the change in GDP, Inflation rate as well as interest rates. So the model is as follows:

$$\Delta Ex.rate = Const. + f(\Delta GDP, \Delta CPI, \Delta Int, e_t)$$

we used to analyze the data in which autocorrelation is eliminated from regression model using AR(1) in the same way as (Abass et al., 2015) used in the model.

Hypothesis

H_a : There is a relationship present between Gross domestic product and exchange rate of developed and developing countries.

H_b : There is a relationship present between real interest rate and exchange rate of developed and developing countries.

H_c : There is a relationship present between Inflation and exchange rate of developed and developing countries.

Results & Discussion

ADF unit root test

The GDP of all countries including developed and developing countries are stationary. While other macro-economic factors are not stationary at level.

* Significant at 1% and

** Significant at 5%

Country	ADF Test at	Macro-economic Factors				
		Exchange rate	GDP	Interest rate	CPI	
Developed	UK	Level	-2.7	-7.3097*	-1.1	-1.5
		1st Difference	-10.28*	---	-10.84*	-2.25*
	Japan	Level	-2	-11.10*	-1.9	-6.13*
		1st Difference	-5.86*	---	-8.16*	---
	Canada	Level	-1.7	-8.93*	-1.4	-4.34*
		1st Difference	-9.73*	---	-7.09*	---
Developing	Brazil	Level	0.6	-7.50*	-3.4	-2.3
		1st Difference	-9.27*	---	-9.86*	-2.90*
	South Africa	Level	1.5	-10.2	-2.6	-2.9
		1st Difference	-9.21*	---	-8.76*	-3.55*
	India	Level	1	-8.13*	-1.9	-1
		1st Difference	-10.33*	---	-16.40*	-6.85*

Empirical Results & Discussion for Developed Countries

United Kingdom

According to our findings, there is a significant relationship of exchange rate with the interest rate. While there is no relationship present between the GDP and CPI with exchange rate.

Japan

It is quite similar with the results of McPherson et al. (2000) in which they proved that there is no impact of GDP and interest rate on the exchange rate fluctuations.

Canada

We have to support the second hypothesis of our study and we can conclude that there is a significant relationship of interest rate with the exchange rate.

Empirical Results & Discussion for Developing Countries

Brazil

we find that there is no relationship of GDP, CPI and interest rate with the exchange rate. Therefore, all three hypothesis are rejected for Brazil.

South Africa

There is a relationship of interest rate with exchange rate but there is no impact of GDP and CPI on the ups and downs fluctuations of exchange rate.

India

India is the country in which a relationship between the inflation rate CPI exist with the exchange rate.

Results & Discussion

Country	GDP	CPI	Interest rate	
Developed	UK	0	-0.06	-0.01*
	Japan	-0.02	0.01	0.05
	Canada	0	0	-0.01**
Developing	Brazil	-0.02	-0.01	0
	South Africa	-0.02	0.01	0.14*
	India	0	0.00**	0

* Significant at 1% and ** Significant at 5%

Model Evaluation

The results regarding the model evaluation for both dynamic and static forecast of each and every model. The static forecast gives less RMSE and MAE for every estimated model.

Method Criteria	Dynamic Forecasting		Static Forecasting	
Countries	RMSE	MAE	RMSE	MAE
UK	0.06634	0.0568	0.02323	0.0161
Japan	1.1551	0.8174	0.347	0.1007
Canada	0.2124	0.1757	0.0282	0.0199
Brazil	0.6843	0.5298	0.171	0.1231
South Africa	1.68	1.481	0.417	0.2509
India	0.1231	0.1032	0.0297	0.0219

Conclusion

The importance of exchange rate is very important in the economy for the whole world (Samea et al., 2014). There are many positive and negative consequences about the fluctuations in the exchange rate regarding the impact of macroeconomic variables on the exchange rate.

This study includes only four macro-economic variables which are exchange rate, interest rate, GDP and CPI. Many other macro-economic variables such as Exports, imports, Stock price index, metal prices, Manufacturing and Industrial production, and Money monetary supply can also be study with the exchange rate.

Conclusion

We found that in developed countries i.e. UK and Canada, interest rate is the only macro-economic variable which has a significant relation with exchange rate while there is no significant relationship present between the other two variables i.e. CPI and GDP with the exchange rate.

South Africa is the only developing country in which there is a significant relationship present with the exchange rate. Also, there is an impact of CPI on the exchange rate only for the developing country India.

we can conclude that for developed countries, the variation in the interest rate has an influence in the fluctuation in the exchange rate. While for developing countries, only South Africa shows a relation of interest rate with exchange rate.

References

- Abbas, Q., Iqbal, J., & AYZAZ, L. (2012). Relationship Between GDP, Inflation and Real Interest Rate with Exchange Rate Fluctuation of African Countries. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 2(3), 132-141.
- Bhutt, S. K., ur Rehman, M., & ur Rehman, S. (2014). Analysis of exchange rate fluctuations: A study of PKR vs USD. *Journal of Managerial Sciences Volume VIII Number, 1*, 42.
- Bosworth, B. (2014). Interest Rates and Economic Growth: Are They Related?. *Center for Retirement Research at Boston College Working Paper*, (2014-8).
- Clements, M. P., & Hendry, D. F. (2005). Evaluating a model by forecast performance. *Oxford Bulletin of Economics and Statistics*, 67(s1), 931-956.
- Edison, H. J., & Pauls, B. D. (1993). A re-assessment of the relationship between real exchange rates and real interest rates: 1974–1990. *Journal of Monetary Economics*, 31(2), 165-187.
- Gujarati, D. N. (2003). Basic Econometrics. 4th. *New York: McGraw-Hill*.
- Hyndman, R. J., & Koehler, A. B. (2006). Another look at measures of forecast accuracy. *International journal of forecasting*, 22(4), 679-688.

References

- Khalid, M., Altaf, M., Bagram, M. M. M., & Hussain, H. (2012). Long-run relationship of macroeconomic variables and stock returns: evidence from Karachi stock exchange (KSE) 100 index. *The Journal of Commerce*, 4(3), 45-59.
- Kurihara, Y. (2006). The relationship between exchange rate and stock prices during the quantitative easing policy in Japan. *International Journal of Business*, 11(4), 375.
- MacDonald, R., & Nagayasu, J. (2000). The long-run relationship between real exchange rates and real interest rate differentials: A panel study. *IMF staff papers*, 47(1), 116-128.
- Madura, J., & Exchange rate determination. (2006). *International Corporate Finance*. Thomson/South-Western.
- McPherson, M. F., & Rakovski, T. (2000). Exchange Rates and Economic Growth in Kenya: An Econometric Analysis.
- Ramasamy, R., & Abar, S. K. (2015). Influence of Macroeconomic Variables on Exchange Rates. *Journal of Economics, Business Management*, 3(2).
- Samuelson, P. A., & Nordhaus, W. D. (2000). *Economies*. Publishing Williams, Moscow.
- ur Rehman, M., & ur Rehman, S. (2002). Relationship of Exchange Rate with Various Macro Economic Variables.