SSHJ Everant ISSN-2456-2653
Social Science and Humanities Journal
CrossMark
Vol. 07 (06). 2023

Exchange Rate Overshooting in Bangladesh: An ARDL Approach

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Abstract

This paper re-assesses the Dornbusch's (1976) sticky price monetary framework of exchange rate determination by adopting ARDL bound testing approach as well as ARDL Error Correction Model (ECM) to show the long-run relationship for monthly data from January 2010 to July 2022. With the advantage of ARDL model which jumble both the I(0) and I(1) variables, we conclude that our model has long run relationship between exchange rate and macro variables which includes in this model. By using ARDL (5, 11, 12, 12, 10) model estimation based on AIC criteria, the findings of this paper shows that BDT overshoot both in short-date as well as long run and patronize the overshooting hypothesis outlined by Dornbusch in 1976. Nevertheless, this overshooting phenomenon does not occur in the present month but in one month after.

Keywords: ARDL, Error Correction Model (ECM), Exchange Rate, Overshooting Phenomenon

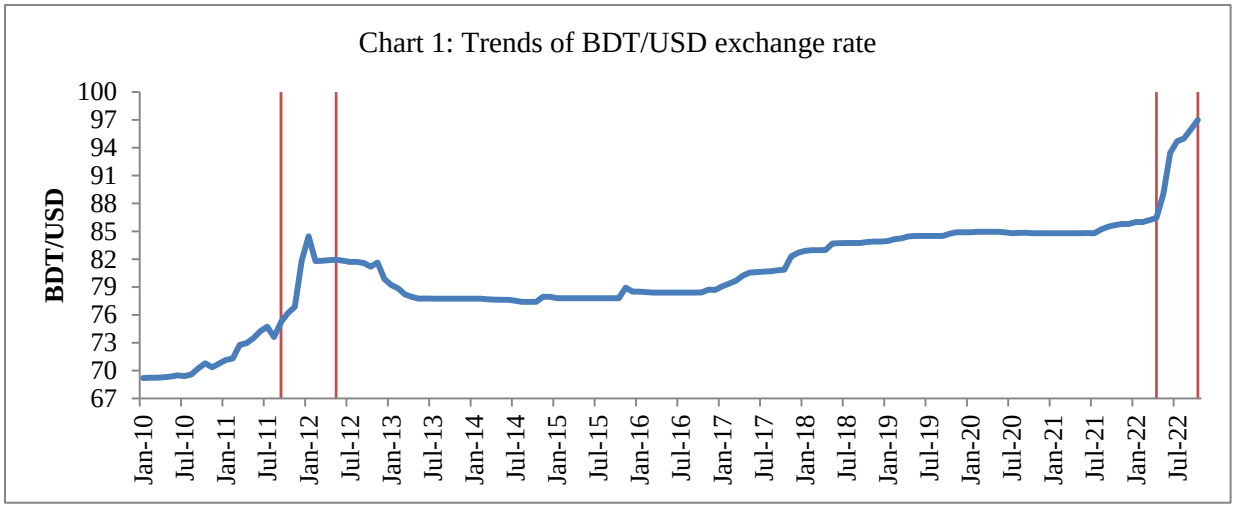
Introduction

Almost all nations across the world now operate under a floating exchange rate regime after giving up on fixed exchange rates following the degeneration of the Bretton Woods Agreement in 1973. After introducing the flexible exchange rate regime in the 1970s, an enormous quantity of both theoretical as well as empirical research has been conducted to identify the factors that affect the equilibrium exchange rate. Key exchange rate doctrines, including purchasing power parity, interest parity, the balance of payments, monetary, and the portfolio path, make an effort to interpret the equilibrium exchange rate with available data by utilizing various econometric models, but the majority of them are incapable of making accurate projections. Forecasting exchange rate behavior is a complex task, as exchange rate influenced through different channels by economic forces.

As a result, exchange rate became one of the most critical economic as well as financial variables all over the world. A probable argument after exchange rate gaining such thinking is that it, directly as well as indirectly, affects many macroeconomic variables that have crucial influences on an economy broadly. So, in empirical and theoretical skeleton, researchers and policymakers from around the world have worked to understand the ER movements in various nations and have assessed the effects of such movements Alagidede, P., & Ibrahim, M. (2017); Gabaix, X., Maggiori, M., Burstein, A., Campbell, J., Coeurdacier, N., Dovis, A., Dumas, B., Farhi, E., Fornaro,

L., & Froot, K. (2015); Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). According to several studies Amin, S. Bin, & Murshed, M. (2018) the exchange rate durability within an economy inevitably complements its globalization process. This affects its biparous and all-around commerce reference with other countries. Due to this, in each exchange rate regime researchers and policymakers all over the world paid attention to find the causes that spur exchange rate ups and downs as well as its effects on a particular economy. Now, almost all countries in the world is in floating exchange rate regime so does Bangladesh. For this reason, vast variations in exchange rates are observed day by day and now and then this fluidity became as big as several percentage points. Fluctuation in the exchange rate affects the competitiveness of a country's international trade. Bangladesh is a country of a small open economy and heavily depends on its export, especially readymade garments. However, we need to import significant amounts of necessary products ranging from food to industrial raw materials. Every year the volume of imports exceeds exports in Bangladesh. Consequently, in order to evaluate the effectiveness of investments, bankroll, and blockading and so lower their operational hazard, businesses as well as financial institutions will benefit from an orderly approach over the propensity of exchange rate variations. The economic, political, and psychological aspects are just a few of the many factors that influence exchange rate movements. These components also interact with one another. The Fleming (1962) and Mundell (1963) optimum currency theory—which is relied on the rule of exchange rates as well as varied assumptions of capital mobility elasticity—turn out as the dominant doctrine guiding exchange rate estimation in the 1960s. From the implantation of floating exchange rate regime in the 1970s, based on the monetary stock, economists have been examining how to determine the foreign exchange rate e.g., Dornbusch. (1976); Frenkel, J. A., Clements, K. W., & No, W. P. (1978); Dornbusch, Rüdiger and Fischer, Stanley, (1980). According to their reputed "monetary approach" to determining exchange rates, the money supply, income of a nation, rates of interest, rates of inflation, balance of trade, and fiscal shortage are the main factors that affect the level of exchange rates. Furthermore, Branson (1977) proposed the asset portfolio approach for determining exchange rates. Dutt, S. D., & Ghosh, D. (2000), Miyakoshi, T. (2000), Rapach, D. E., & Wohar, M. E. (2004) work from the past several years represents part of the supporting literature on the use of monetary frameworks to determine exchange rates. In this study, we re-assess the monetary framework of exchange rate estimation by using BDT/USD exchange rate. In this study, we use exchange rate as well as the four macroeconomic fundamentals such as money supply, income of a nation, rates of interest, and rates of inflation for re-evaluation of the monetary framework of exchange rate estimation for Bangladesh.

We start with chart 1 depicting the trends of the BDT/USD exchange rate. In accordance with chart 1, there were two fundamental changes in the period under review.



Source: Bangladesh Bank

Firstly, sustained depreciation occurred then it turned in the opposite direction of appreciation from September 2011 to February 2012. Secondly, Bangladesh's Taka started to depreciate from the month of April 2022 and this trend continues in recent times due to huge current account balance (CAB) pressure stemming from the huge growth of imports after COVID-19 and sluggish growth of export.

Over the past four decades, an enormous number of researchers extensively studied the overshooting model of exchange rate determination. Bahmani-Oskooee, M., & Kara, O. (2000), Nieh, CC., Wang, YS. (2005), Bjørnland, H. C. (2009), Sharifi-renani, H. (2014) and Güneş, Sevcan & Karul, Çağın. (2016) all justified Dornbusch's (1976) monetary framework of exchange rate estimation with explorative record. According to Bahmani-Oskooee, M., & Kara, O. (2000), the Turkish Lira's depreciation lasted up to 30 years, during which time its exchange rate went to a startling double-digit number of 13 to a breathtaking six-digit number of 400,000. This is an indication of prolong overshooting phenomenon. To illustrate the progressive relevance within the exchange rate as well as macroeconomic variables in this study we use BDT/USD exchange rate to explore Dornbush's (1976) monetary framework on exchange rate estimation. In lieu of barely rely on colloquial co integration approach; we employ comparatively new framework of Autoregressive Distributive Lag Model (ARDL) bound testing approach fabricated by Pesaran, M. H., Shin, Y., & Smith, R. J. (2001) to rummage the short dated and gratifyingly influence of monetary jog to exchange rate over the period January 2010 to May 2022.

The composition of the study is as follows. Section one depicts introductory note followed by review of existing literature in section two. Section three describes the monetary framework of exchange rate estimation of Bangladesh Taka. Data exploration and outcomes are shown in section four and lastly concluding remarks are shown in section five.

Literature Review

Amin, S. B., Murshed, M., & Chowdhury, M. T. (2018) scrutinize the exchange rate over shooting hypothesis in Bangladesh and they found that macroeconomic factors have a limited ability to influence Bangladesh's currency rate over the long term. However, monetary policy has no impact whatsoever on nominal exchange rate movements in the short term.

Güneş, Sevcan & Karul, Çağın. (2016) examines the overshooting hypothesis for Turkey by using ARDL model during 2000:1 to 2014:8 and showed that even though the coefficients are statistically insignificant, empirical findings demonstrate that monetary shocks contributing Turkey's Lira overshooting.

Nieh, CC., Wang, YS. (2005) investigate New Taiwan Dollar-Dollar exchange rate by using both Johansen cointegration as well as ARDL bound test during 1986 to 2003 and showed that ARDL framework justifies the overshooting of currency as pre-stated by Dornbusch (1976).

Sharifi-renani, H. (2014) investigates exchange rate overshooting using a vector error correction method for the years 2001:3 to 2010:2 and found that both long- and short-term monetary shocks have an impact on the exchange rate that is an indication of overshooting in Iran.

Bjørnland, H. C. (2009) demonstrates that "delayed overshooting" of the exchange rate noticed when the impact of monetary policy jog on the exchange rate is subdued by the following "leaning-against-the wind" foreign exchange intervention. This paper uses the structural VAR model for Canada, which demonstrates wide interactions between monetary as well as foreign exchange policies.

Bahmani-Oskooee, M., & Kara, O. (2000) we attempted to assess in this research if the lira has overshot both its short dated and long-run values by using a variation of the monetary framework of exchange rate estimation and found that it overshot its mark both in short date and long-run.

Ario, W. (2008) demonstrates that the Rupiah overshoots and that there was a fundamental change in exchange rates after 1998 when the economic crisis struck Indonesia by using Ordinary Least Squares (OLS) as well as co-integration to show the long run relationship.

Made Suidarma, I., Gede Sanica, I., Ayu, P. C., Nengah, I. G., & Diatmika, D. (2018) examine the overshooting Indonesian Rupiah to US Dollar exchange rate while evaluating the Dornbusch model using data from the years 2010.1 to 2017.12. This analysis demonstrates that the overshooting of the exchange rate predicted by Dornbusch, according to the dynamic vector error correction model, did not ensue in Indonesia throughout the espial period.

Capistrán, C., Chiquiar, D., Hernández, J. R., & Capistrán, C. (2017) identify Dornbusch's (1976) exchange rate overshooting hypothesis by estimating a structural cointegrated VAR that take into account apparently the emergence of a set of long-run theoretical relations on macroeconomic variables ARDL methodology that is robust to the degree of persistence of the time series. This method allows us to confirm that Dornbusch's model

is consistent with the way the exchange rate reacts to changes in monetary policy.

Bhadury, S. S., Ghosh, T., & others. (2015) establish the exchange rate overshooting hypothesis with greater accuracy for Canada, New Zealand, Australia, and Sweden, and supports their argument that SVAR models of exchange rates should include both the money supply and demand equations to accurately capture the dynamics of the money market rather than using interest rates alone as the monetary policy instrument.

The Model

The model is formed using both the Fisherian Theory and the Purchasing Power Parity (PPP) theorem. Let's start by defining the variable S as the proportion of the general price levels in Bangladesh (P_B) to the general price levels in the United States. (P_{US}) as depicts in equation 1.

$$\left(\frac{P_B}{P_{US}}\right) \qquad (1)$$

Equations $M_B.V_B = P_B.Y_B$ and $M_{US}.V_{US} = P_{US}.Y_{US}$ can be described for Bangladesh and United States respectively, in accordance with the Fisherian Theory. Composing the terms P_B and P_{US} for equation (1) gives;

$$\left(\frac{M_B}{M_{US}}\right)\left(\frac{V_B}{V_{US}}\right)\left(\frac{Y_B}{Y_{US}}\right) \qquad (2)$$

Equation (2) displays the exchange rate determined in terms of comparative income, comparative money supply, and comparative money velocity. We get equation (3) after using the logarithms in each sides of equation (2).

$$logS \quad (logM_B - logM_{US}) - (logY_B - logY_{US}) + (logV_B - logV_{US}) \qquad (3)$$

The rates of interest and the rates of inflation are the two key factors influencing the velocity of money in both countries (Bahmani-Oskooe & Kara, 2000). To arrive at the monetary framework the final step is to recognize the main elements of the velocity of each country. In the model formed, Bangladesh and United States interest rates are illustrated by i_B and i_{US}, and inflation rates by π_B and π_{US} respectively.

$$logS \quad (logM_B - logM_{US}) - (logY_B - logY_{US}) + (i_B - i_{US}) + (\pi_B - \pi_{US}) \qquad (4)$$

The following is the shape of the monetary model that we intend to estimate;

$$s_t = \alpha + \beta_1 m_t + \beta_2 y_t + \beta_3 i_t + \beta_4 \pi_t + \varepsilon_t \qquad (5)$$

Where, $s = logS$, $m = (logM_B - logM_{US})$, $y = (logY_B - logY_{US})$, $i = (i_B - i_{US})$, $\pi = (\pi_B - \pi_{US})$ and ε illustrate the error term. According to our expectation, Bangladesh's Taka will depreciate if the money supply growth in Bangladesh is greater than in the United States. Also suggested by monetarists $\beta_1 = 1$. The β_2 coefficient is anticipated to depict minus sign, since it will result in a depreciation of Bangladesh Taka, in line with the monetarist viewpoint, when income swelling in Bangladesh is comparatively higher than that in the United States. Since Bangladesh's comparative higher interest rate as well as inflation will cause depreciation in the Bangladesh Taka, β_3 and β_4 coefficients are both anticipated to

show positive signs. The sticky price model developed by Dornbusch (1976) predicted that $\beta_3 = 0$.

Data, Analysis, and Outcomes

S, M_B and Y_B series used to estimate the framework are collected from Bangladesh Bank; M_{US} and Y_{US} are derived from Word Development Indicators (WDI); i_{US} , i_{US} , π_B and π_{US} are sourced from International Financial Statistics of International Monetary fund (IMF). Whole data used in this study to estimate the model are monthly basis and over the period of January 2010 to July 2022.

Error-correction modeling and cointegration approaches would be a suitable approach to investigate the overshooting hypothesis because it is a short-dated phenomenon. Unit root tests were applied at the beginning stage of the analysis, and the outcomes are shown in Table 1.

Table 1. Results of Unit Root Test

Variables	ADF		PP	
	Level	1st Difference	Level	1st Difference
s	-3.571**	-4.278***	-1.992	-7.602***
m	-0.710	-6.627***	-0.713	-10.142***
y	-1.913	-4.500***	-9.053***	-47.360***
ir	-2.393	-4.339***	-1.563	-10.381***
inf	-3.347*	-9.138***	-4.404***	-11.959***

Akaike info criterion (AIC) is used to select optimal lag for ADF test.
Newey-West Automatic is used to select bandwidth for PP test
The symbols (***), (**), and (*) denote significant levels of the relevant coefficient at 1%, 5%, and 10%, respectively.

However, varied tests produce varied findings depending on the strength of unit root tests (Bahmani-Oskooee, 1998). The unit root test outcomes illustrate that variables are integrated at various degrees. Pesaran, M. H., Shin, Y., & Smith, R. J. (2001) provide yet another technique of testing for cointegration in light of this ambiguity, particularly when some variables in the framework are at level (e.g., s, m, y) and some are in the form of change (e.g., ir, inf). The technique is familiar as Autoregressive Distributive Lag Model (ARDL). Unlike the standard co-integration test this technique can avoid the ramification issue of variables into *I(1)* or I*(0)*. We can get the ARDL model's error correction version from equation (5) as follows;

$$\Delta s_t = \phi_0 + \phi_1 s_{t-1} + \phi_2 m_{t-1} + \phi_3 y_{t-1} + \phi_4 i_{t-1} + \phi_5 \pi_{t-1} + \sum_{j=1}^{n} a_j \Delta s_{t-j} + \sum_{j=1}^{n} b_j \Delta m_{t-j} + \sum_{j=1}^{n} c_j \Delta y_{t-j} + \sum_{j=1}^{n} d_j \Delta i_{t-j} + \sum_{j=1}^{n} e_j \Delta \pi_{t-j} + \varepsilon_t \quad (6)$$

The ARDL technique has couple of moves. The first move is to use the well-known F-test to compare the null hypothesis of no cointegration, which is specified as $H_0: \phi_1 = \phi_2 = \phi_3 = \phi_4 = \phi_5 = 0$ to the alternative hypothesis of $H_0: \phi_1 \neq \phi_2 \neq \phi_3 \neq \phi_4 \neq \phi_5 \neq 0$. Nevertheless, whether

the variables are I(0) or I(1), this asymptotic F-statistic distribution is non-standard. Pesaran, M.H., Shin, Y. and Smith, R.J. (2001) compiled couple of kits of relevant critical values. In one kit, all variables are presumptively I(1), while in the other, all variables are presumptively I(0). This creates a band that may accommodate any combination of the variables being classified as I(1), I(0), or even fractionally integrated. It is assumed that no cointegration exists if the estimated statistic is beneath the lower threshold I(0), inside the belt of neutrality when it remains between the lower and upper boundaries, and cointegration exists when it remains above the upper threshold I(1).

Since F-statistic is larger than the upper threshold, co-integration exists in this paper as indicated in Table 2.

Table 2. ARDL Bound Test Outcomes

Test Statistics	**Value**	
F-statistic	7.108248	
Critical Value		
	Lower Bound I(0)	Upper Bound I(1)
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Source: Author's own calculation

The empirical evidence in Table 3 demonstrates that the Taka-Dollar exchange rate significantly reacts (-0.4581) negatively to the monetary shock. After one month this response turns to be positive (0.6072), and then dampens afterward. According to these results, monetary shocks cause a short-term change in the Taka-Dollar exchange rates. The present period's negative response, however, suggests that the BDT will not depreciate immediately as a result of the expansionary monetary policy. As opposed to that, it encourages BDT towards appreciation contemporarily. The outcomes of the financial shock on the BDT/USD exchange rate are positive in the second month and dampen after that, showing that the BDT/USD exchange rate overturns to depreciate and overshoot in the short date. This study's outcomes justify the overshooting hypothesis of currency depreciation as portrayed earlier in the sticky-price framework by Dornbusch (1976). Although this overshooting hypothesis occurs after one month.

Table 3. ARDL (5, 11, 12, 12, 10) model full information estimate based on AIC criteria

Variables	Lag order												
	0	1	2	3	4	5	6	7	8	9	10	11	12
Δs		0.9469 (7.111)	-0.3385 (–2.093)	0.3273 (2.174)	-0.4325 (-2.779)	0.3417 (2.956)							
Δm	-0.4581 (-5.551)	0.6072 (5.513)	-0.3089 (-2.722)	0.0058 (0.065)	0.0349 (0.408)	-0.0466 (-0.537)	0.2519 (3.132)	-0.1920 (-2.503)	-0.0108 (-0.138)	0.0736 (0.958)	-0.0499 (0.641)	0.1136 (1.995)	
Δy	-0.0249 (-1.473)	-0.0297 (-2.388)	-0.0058 (-0.426)	-0.0157 (-1.203)	-0.0093 (-0.738)	0.0328 (2.642)	-0.0132 (-1.082)	0.0064 (0.540)	0.0043 (0.356)	0.0033 (0.270)	0.0020 (0.163)	-0.0149 (-1.271)	0.0390 (2.393)
Δi	-0.0065 (-0.215)	0.0312 (0.763)	-0.0748 (-1.797)	0.0406 (0.911)	-0.0542 (-1.174)	0.0150 (0.321)	0.0839 (1.833)	-0.0650 (-1.330)	-0.0314 (-0.666)	0.1501 (3.221)	-.01925 (-3.900)	0.1799 (3.627)	-0.0880 (-2.521)
Δinf	-0.0065 (-1.602)	0.0005 (0.096)	-0.0013 (-0.170)	0.0026 (0.428)	0.0016 (0.255)	-0.0061 (-1.018)	0.0122 (2.085)	-0.0088 (-1.658)	-0.0044 (-0.890)	0.0044 (0.912)	-0.0032 (-1.039)		
C	0.8312 (4.340)												
CointEq(-1)		-0.1550 (-4.507)											

#Number underneath each coefficient inside the parentheses is the absolute value of t-ratio. The adjusted $R^2 = 0.9837$ and DW = 2.0074.

The study's findings demonstrate that Bangladesh's Taka appreciates as its relative income growth increases up to 4th month but in 5th month and after 7th and the following month Bangladesh's Taka depreciates as its relative income increases. In Bangladesh, there is a complicated relationship between income growth and currency depreciation that is influenced by a number of different economic factors. In general, income growth and currency appreciation are positively correlated, while income growth and currency depreciation are negatively correlated. In the long run Bangladesh Taka depreciation impacts income growth positively, but in the short run it has slight negative impacts on the income growth in Bangladesh (Khondker et al., 2012) . A relative increase in interest rate appreciates Bangladesh Taka initially then depreciates after one month, but this depreciation overturns in the 2nd month and this process of mixed response continues for 12 months. The coefficient of inflation varies, although this variation is not statistically meaningful. This means that, while executing foreign exchange transactions on financial markets, economic agents respond in the short run more to interest rate variables than to monetary variables.

$$s = 5.3643 + 0.13m - 0.17y - 0.08ir - 0.06\pi \quad (7)$$

Equation (7) shows that expansionary monetary policy causes Bangladesh's Taka to depreciate. This situation can be described as overshooting, although in short, it causes Bangladesh's Taka to appreciate initially. However, in the next month expansionary monetary policy depreciates Bangladesh's Taka. All other macroeconomic variables in this model cause Bangladesh Taka to appreciate both in the short run as well as long run. One percent increase in all three variables

(income, interest rate, and inflation) leads Bangladesh Taka to appreciate.

Conclusion

This study reassesses Dornbusch's (1976) sticky-price monetary model to exchange rate determination by using ARDL bound testing approach as well as ARDL Error Correction Model (ECM) to show the long-run relationship. The findings of this paper patronize the overshooting hypothesis of the Taka-Dollar exchange rates during the period from January 2010 to July 2022. Since various unit root test shows that variables incorporated in this study are not conclusive to determine whether all variables are I(0) or I(1), with the advantage of ARDL bound testing approach which incorporates both I(0) and I(1) variables, we conclude that in our empirical model long run relationship exists between exchange rate and macroeconomic variables considered in this study. In words, it is worth to determine the trend of BDT/USD movement in the long run using macroeconomic variables.

Furthermore, for the short-dated response, using ARDL (5, 11, 12, 12, 10) model estimation based on AIC criteria patronize the overshooting of BDT depreciation as outlined in Dornbusch's sticky-price framework of the monetary exchange rate (1976). Nevertheless, this overshooting phenomenon does not occur in the present month but in one month after. In addition, our model patronizes the overshooting of BDT depreciation in the long run.

In our re-assessment of Dornbusch's (1976) overshooting framework, we examine whether an overshoot of exchange rate depreciation over its long-run mean results from the shock of monetary supply. This model's findings show that the BDT will not depreciate immediately as a result of the expansionary monetary policy. As opposed to that, it encourages BDT towards appreciation contemporarily. The outcomes of the financial shock on the BDT/USD exchange rate is positive in the second month and dampen after that, showing that the BDT/USD exchange rate overturns to depreciate and overshoot in the short date. Bangladesh's Taka appreciates as its relative income growth increases up to 4^{th} month but in 5^{th} month and after 7^{th} and the following month Bangladesh's Taka depreciates as its relative income increases.

In fine, this study outcome shows that BDT overshoot both in short-date as well as long run and patronize the overshooting hypothesis outlined by Dornbusch in 1976.

References

[1] S. B. Amin, M. Murshed, and M. T. Chowdhury, "Examining the Exchange Rate Overshooting Hypothesis in Bangladesh: A Cointegration and Causality Analysis," *World J. Soc. Sci.*, vol. 8, no. 3, pp. 69–83, 2018, [Online]. Available: https://zantworldpress.com/wp-content/uploads/2018/10/6.-Maayesha.pdf

[2] E. Schaling and A. Kabundi, "The exchange rate, the trade balance and the J-curve effect in South Africa," *South African J. Econ. Manag. Sci.*, vol. 17, no. 5, pp. 601–608, 2014, doi: 10.4102/sajems.v17i5.727.

[3] S. D. Dutt and D. Ghosh, "An empirical note on the monetary exchange rate model," *Appl. Econ. Lett.*, vol. 7, no. 10, pp. 669–671, 2000, doi: 10.1080/135048500415996.

[4] P. Grossman, L. Niemann, S. Schmidt, and H. Walach, "Mindfulness-based stress reduction and health benefits: A meta-analysis," *J. Psychosom. Res.*, vol. 57, no. 1, pp. 35–43, 2004, doi: 10.1016/S0022-3999(03)00573-7.

[5] L. Sarno and M. P. Taylor, "Purchasing power parity and the real exchange rate," *IMF Staff Pap.*, vol. 49, no. 1, pp. 65–105, 2002, doi: 10.4324/9781315875606.

[6] P. Hooper and J. Morton, "Fluctuations in the dollar: A model of nominal and real exchange rate determination," *J. Int. Money Financ.*, vol. 1, no. C, pp. 39–56, 1982, doi: 10.1016/0261-5606(82)90004-3.

[7] P. M. Journals, I. M. Fund, and P. M. Journals, "The Monetary Approach to the Exchange Rate : Some Empirical," vol. 25, no. 1, pp. 48–75, 2014.

[8] J. A. Frenkel, K. W. Clements, and W. P. No, "Jacob A. Frenkel," no. October, 1978.

[9] E. Rates and S. Fischer, "American Economic Association," vol. 70, no. 5, pp. 960–971, 2014.

[10] T. Miyakoshi, "The monetary approach to the exchange rate: Empirical observations from Korea," *Appl. Econ. Lett.*, vol. 7, no. 12, pp. 791–794, 2000, doi: 10.1080/135048500444813.

[11] F. Exchange *et al.*, "On the Mark : A Theory of Floating Exchange Rates Based on Real Interest Differentials," vol. 69, no. 4, pp. 610–622, 2014.

[12] R. Meese and K. S. ROGOFF, "51_Jie1983.Pdf." 1983.

[13] D. E. Rapach and M. E. Wohar, "Testing the monetary model of exchange rate determination: A closer look at panels," *J. Int. Money Financ.*, vol. 23, no. 6, pp. 867–895, 2004, doi: 10.1016/j.jimonfin.2004.05.002.

[14] C. Karfakis, "Exchange rate determination during hyperinflation: The case of Romanian lei," *Appl. Financ. Econ.*, vol. 13, no. 6, pp. 473–476, 2003, doi: 10.1080/0960310022000020870.

[15] K. Rogoff, "Dornbusch's Overshooting Model After Twenty-Five Years," *IMF Working Papers*, vol. 02, no. 39. p. 1, 2002. doi: 10.5089/9781451845846.001.

[16] D. E. Rapach and M. E. Wohar, "Testing the monetary model of exchange rate determination: New evidence from a century of data," *J. Int. Econ.*, vol. 58, no. 2, pp. 359–385, 2002, doi: 10.1016/S0022-1996(01)00170-2.

[17] I. Forecasting, "Why is it so difficult to outperform the random walk in exchange rate forecasting?," *Appl.*

Econ., vol. 45, no. 23, pp. 3340–3346, 2013, doi: 10.1080/00036846.2012.709605.

[18] S. Bin Amin and M. Murshed, "An Empirical Investigation Of Foreign Aid And Dutch Disease In Bangladesh," *J. Dev. Areas*, vol. 52, no. 2, pp. 169–182, 2018, doi: 10.1353/jda.2018.0029.

[19] M. Bikram and S. Sunpreer, *Indentifying the relationship vetween cultural dimensions and consumer decision making styles*, vol. 4, no. 1. 2019.

[20] E. D. Mansfield and E. Reinhardt, "International institutions and the volatility of international trade," *Int. Organ.*, vol. 62, no. 4, pp. 621–652, 2008, doi: 10.1017/S0020818308080223.

[21] X. Gabaix *et al.*, "INTERNATIONAL LIQUIDITY AND EXCHANGE RATE DYNAMICS * I . Introduction We provide a theory of exchange rate determination based on capital flows in imperfect financial markets . In our model , ex- change rates are governed by financial forces because globa," *Q. J. Econ.*, no. February, pp. 1369–1420, 2015, doi: 10.1093/qje/qjv016.Advance.

[22] P. Alagidede and M. Ibrahim, "On the Causes and Effects of Exchange Rate Volatility on Economic Growth: Evidence from Ghana," *J. African Bus.*, vol. 18, no. 2, pp. 169–193, 2017, doi: 10.1080/15228916.2017.1247330