THE JOURNAL OF ORIENTAL RESEARCH MADRAS ISSN: 0022-3301
(Founded by Mm. Prof. S. Kuppuswami Sastri) UGC CARE Group 1

Structural Break Analysis for Exchange Rate for the past 10 years in Reference to USD

[1]Shantanu Rastogi
MBA (Marketing and Human Resources), School of Business Management, IFTM University, Moradabad (U.P), +91 8882133666, Address: H-6, Lajpat Nagar, Moradabad – 244001, genuine.shantanu@gmail.com

[2]Dr. Nisha Agarwal
Professor, School of Business Management, IFTM University, Moradabad (U.P), Ph: +91 9897223962, nishaagarwal@iftmuniversity.ac.in

Abstract
Exchange rates are significant to an economy because of their impact on international commerce and the flow of financial resources between nations. These factors also have an effect on the way in which the Reserve Bank implements its monetary policy. The current paper shows how exchange rates are assessed, how the structural breaks in the exchange rate are measured and studied, and how these changes in the exchange rate affect the economy. The study analyzed 147 journals, books, and magazine articles. These publications originated from sources such as Research Gate, Google Scholar, Scopus, Science Direct, etc. The final screening found that the validity, external impacts, citations, and review procedure of 32 papers were relevant, and these are reflected in the study. The results of the study revealed that some previous studies had shown that the actions taken by monetary authorities in less stable economies were the cause of a structural break in the way exchange rates behaved. In more stable economies, monetary measures tended to keep the exchange rate stable, while other studies showed that sudden events in the economy, like war, were the cause of structural breaks in the exchange rate. It means that Structural Break Analysis for Exchange Rates helps an economy plan for the future by looking at the possible causes of such breaks.

Keywords: Exchange Rates; Structural Changes; Structural Break Analysis; Monetary Policy

1. Introduction

The rate at which the money of one country can be exchanged for the currency of another country is referred to the exchange rate (ER). The consistency of an economy's ER is a good indicator of the state of that economy. When the ER is steady, exporters and importers will be able to estimate how much profit they will make and will be able to invest properly in the "forward market". If "the exchange rate" is decreasing, then "foreign investors" will be hesitant to invest, and there will be numerous influxes & withdrawals of capital from and into the country (Jeelani, et al., 2019).

In any nation's overall monetary policy, a country's exchange rate as well as the system that governs it, are critical components. Its significance is even more, emphasized when considering economies that are currently in transition. This is because international financial institutions such as the European Bank for Reconstruction and Development (EBRD), the World Bank, and the International Monetary Fund are the ones that provide credit, and they do so on the condition that there is macroeconomic stability and a stable exchange rate (Kočenda,1999). Recent research conducted by Stock and Watson (1996) has uncovered a wealth of evidence suggesting that a significant number of macroeconomic variables are susceptible to structural instability. There is a possibility that fluctuations in currency exchange rates could occur as a result of one-time shocks caused by fundamental shifts in

the economies that underlie them or by actions made by "policy-making authorities." Throughout the period of shift, several critical acts that are carried out by the authorities are likely to either directly produce a kind of structural change or assist in bringing about such a change. A "structural break" in the development of an "exchange rate" could be a reflection of a shift in an "exchange rate regime" as well as an official revision of an exchange rate level.

1.1 Concept of Exchange Rate

The price at which one country's currency can be exchanged for another's is referred to as the exchange rate (when transactions are permitted).

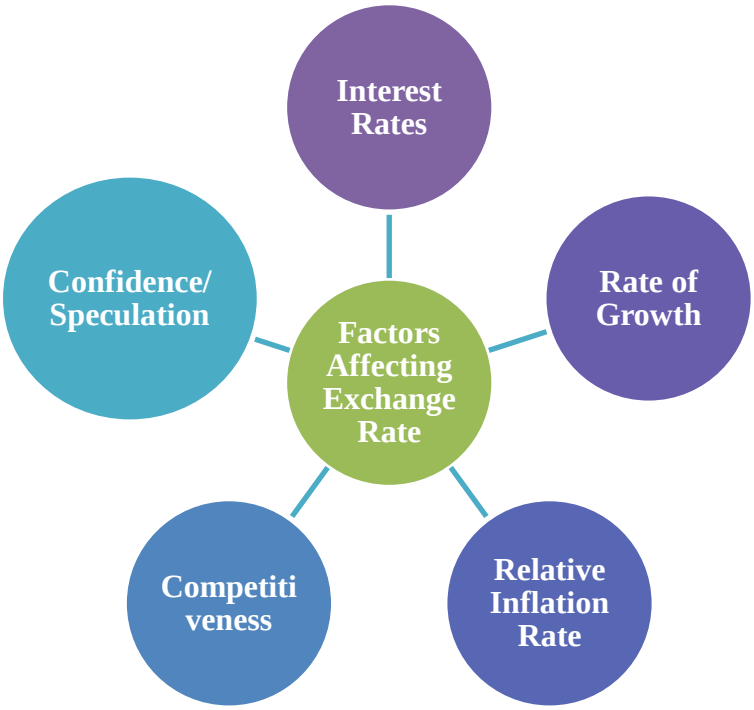

Figure 1 Factors Affecting Exchange Rate

It is a terminologically ambiguous statement to say that the exchange rate is either increasing or declining. It is more accurate to speak of shifts in the value of one currency compared to another. When someone talks about "exchange-rate depreciation," what they really mean is that the cost of foreign exchange in the country in question is going up, in other words, one unit of the nation's currency is now worth a lot less than it did in the past. This is because the price of foreign exchange in the country in question is going up. It should come as no surprise that when looking at things from the perspective of the home country, "an increase in the price of foreign exchange results in a fall in the price of that country's currency for the rest of the world" (Krueger,1983).

Source: https://www.economicshelp.org/macroeconomics/exchangerate/factors-influencing/

1.2 Concept of Structural Break Analysis

The most typical application of the structural break test is in time-series analysis, where it examines to see if the coefficients across datasets are consistent. To statistically establish if there is a break at a given point in a time series dataset, the dataset is split in half, and each half is checked against the other half and the full dataset. Whether a "new marketing campaign, activity, major event, acquisition, divestiture, etc.," have an effect on the "time-series data" can be tested by using the structural break

test to see if the "independent variables" have distinct effects on various segments of the populace. The structural break analysis is broken down into two distinct stages. The first step is an examination of whether or not the data in the time series are stationary. If the outcome of the test to determine the unit root turns out to be significant, then it is not essential to test for the existence of the structural break analysis. Since the data series would be considered stationary, meaning that neither the level nor the trend of the series would change over the course of the analysis. If, on the other hand, the outcomes of the "unit root test" show that they are not substantial, then it is necessary to determine whether or not the structural break was brought about by an external factor, such as a change in policy (Dube, et al.,2019).A structural break can happen in the economy for a variety of reasons, including war, a shift in government policy, or a similar occurrence.

1.2.1 Importance of Analysing Structural Break Analysis For Exchange Rate

I Failure to identify structural breaks might result in erroneous conclusions and faulty predictions.

II Finding structural breaks in frameworks can result in greater comprehension of the actual mechanisms underlying data changes.

1.2.2 Statistical Tests For Identifying Structural Breaks

There is no universally applicable test for detecting structural breaks, rather, the decision as to which test to use is influenced by a number of circumstances, making structural break testing a fertile topic for study. See below for a selection of the traditional tests that have done so much to advance the science of structural failure analysis:

I The Chow Test

One of the earliest tests that established a standard for structural break testing was Chow's (1960) experiment. Out-of-sample projections are assumed to be objective if the model's parameters remain unchanged.

II The Quandt Likelihood Ratio Test

The "Chow test" is extended by the "Quandt Likelihood Ratio (QLR) (1960) test," which calculates the "Chow test" at every potential break point in an effort to do away with the necessity to identify a break point.

III The CUSUM Test

When testing for parameter stability, Brown, Evans, and Durban suggest using the "CUSUM test." Parameter instability in the intercept term can be tested by using the CUSUM test for instability. The finest means to think of it is as a check for the stability of the variance in the residuals following regression.

IV The Hansen and Nyblom Tests

Further stability tests for Lagrange multiplier parameters can be found in Hansen (1992) and Nyblom (1989).

a) The Nyblom test compares the possibility that certain parameters are unstable with the "null hypothesis" where all parameters are constant.
b) The Hansen test extends the Nyblom test to check for parameter stability.

1.3 Relationship Between Structural Breaks and Exchange Rate

The majority of nations going through transition saw a break in exchange rates either just before or precisely at the same time as a significant alteration in the "exchange rate regime," despite the fact that a fundamental breach in the currency rate had already occurred for several countries some months earlier the "exchange regime" was altered. If one considers the change in regime to be endogenous, then the "monetary authority" did not perform in an optimal manner when it kept the prevailing regime in order, later the break appeared. This is because a break like this is a sign that the regime will fail in the future, so keeping the existing regime in place would have been counterproductive. On the other hand, it is quite possible that the monetary authority was unable to instantly notice the break in the pattern. To put up a "structural break" that had previously occurred, a "policy step" was taken in the structure of a "regime" transition or repositioning that occurred at some point after the "structural break". This step took place after the split. As a result, the action fetches the operation of a "regime" into conformity with the real growth of a "nominal exchange rate."

As a result, the data suggests that the actuality doesn't always conform to prevailing opinion and that policy shifts might not always correspond to structural breaks. A modification of the "exchange regime" was in accord with world changes in the majority of situations, excluding the issue of structural breaks, like as a change moved current "regimes" with regard to "regimes" with either higher flexibility or fixity, even though "regimes" in the center were preserved to the least. As adjustments typically headed to superior elasticity, like a shift may be seen as a reaction to the increasing "shock volatility" brought on by increased levels of global "capital mobility." A rise in the ease with which "international capital" may move around contributed to this instability (Kočenda,2005).

2. Systematic Literature Review

Fasanya, I. O., & Akinwale, O. A. (2022) examined the impact of currency fluctuations on ten (10) Nigerian stock market sectors from January 2007 through December 2018. Without considering structural breaks, the results demonstrated that only the financial services sector developed asymmetrically over the medium and long term, but with structural breaks, no sector's stock returns were asymmetrical. Findings highlighted the sector-specific responses to changes in the exchange rate. Hence, the research showed that no universal model exists for predicting stock market performance across industries, as different sectors have distinct reactions to changes in the value of the currency. Similarly, **Su, J. B. (2022)** utilized a "bivariate GJR-GARCH-MX-t model with a Structural break (SB)" to investigate the changes in the position of "five financial characteristics" across 3 US marketplaces as a consequence of the "shocks" from the "global financial crisis (GFC)" & subsequent "Quantitative easing (QE)" policies. An SB was observed in the oil and stock markets first because of the GFC and QE, but not in the FX (foreign exchange rate) market. On a similar note, **Chen, L., et al., (2021)** identified utilizing the "iterated cumulative sums of squares (ICSS) technique" and the "time-varying parameter structural Vector Auto Regression (TVP-SVAR) model" to examine how determinants affect exchange rates. Exchange rate returns demonstrated a regime reform-induced break. Further, the study revealed shocks to foreign exchange reserves, inflation, oil prices, & short-term interest rates have varied considerably. long-term and Short-term domestic & international currency rate factors vary. Interest rates, inflation, Exchange rates, oil prices, and foreign exchange reserves had a negative short-term association before August of 2015. Since August of 2015, China's "inflation-exchange rate" relationship has been positive. Structural breaks only affected "short-term interest rates." This study can help policymakers choose an exchange rate regime for long-term market efficiency.

While **Kashyap, S., & Kashyap, S. (2020)** examined Foreign exchange market volatility spillovers and structural breaks for the British pound (GBP), Japanese yen (JPY), Euro (EUR), and US dollar

(USD) in India, from 3rd January 1999 to 27th July 2018. Prior to this, the "Bai and Perron test" was used to determine the "structural break" times. The authors discovered strong evidence of structural breaks for each currency pair, with one for the USD, two for the EUR and JPY, and none for the GBP. Subsequently, the volatility was verified by using the GARCH (Generalized Autoregressive Conditional Heteroskedasticity) and "EGARCH models" on both the "full sample" and the numerous "sub-samples" delineated by the "structural breakdowns".

Similarly, **Liu, Y., et al., (2020)** examined the context of structural break detection on the vibrant link between "crude oil prices" & the "US dollar exchange rate." The empirical evidence suggested that fluctuations in the "confidence intervals of structural breaks" are particularly sensitive to shocks in the price of crude oil. The U.S. dollar's value can be affected by both sudden fluctuations in "oil prices" and the unknown future of economic policies. Given that the United States has emerged as a main "exporter of crude oil", and that the dollar seems to be the primary currency in the "international oil market", the diffusion of "price shocks" to the "U.S. exchange rate" becomes more nuanced. The "correlation" between the dollar's value and oil prices can often be negative. On a similar note, **Jeelani, S., et al., (2019)** aimed to study the interplay of the various macroeconomic variables that influence the INR/USD exchange rate (ER). The RBI website was mined for 40 years' worth of time series data on "ER (exchange rate), GDP (gross domestic product), inflation, interest rate (IR), foreign direct investment (FDI), money supply, trade balance (TB), and terms of trade (ToT)". By using Chow's Breakpoint Test, the study has also determined whether or not the model exhibits a structural break and found several such breaks between 2003 and 2009. India's large crude oil imports and the subsequent oil price increase produced an alarming TB imbalance, which in turn led to structural breaks or parameter instability during the period 2003–2009. On the other hand, **Onoh, J. O., et al., (2017)** conducted A study of time series data was conducted to determine if structural breaks exist in Nigeria's Ordinary Exchange Rate (OER), and the results showed there is an urgent requirement for further study of structural breaks in modeling and forecasting the volatility in the exchange rate. On a similar note, **Ojede, A., & Lam, E. (2017)** employed In order to learn what factors in a developing country's economy cause fluctuations in its currency exchange rate, researchers used "ARCH and GARCH (Generalized Autoregressive Conditional Heteroskedasticity) models" and minimal LM (Lagrange multiplier) unit root tests. According to the findings, the prediction that an increase in money supply leads to depreciation was greatly enhanced when structural break points in M2 and M3 were taken into account. Similarly, **Ümit, Ö. (2016)** reported the monthly "real exchange rate" data for the "fragile 5" nations, which seem to be part of the emerging market economies, from 2003-01 to 2015-10, Using standard "unit root tests" with "structural breaks," A "Lee-Strazicich unit root test," which allowed for two "structural breaks," suggested that it was the case, leading researchers concluded that the hypothesis holds true solely for "India". Similarly, the PPP hypothesis was not applicable for South Africa and India since their respective "real exchange rate series" were not stationary, as determined by the "Carrion-i-Silvestre (CS) unit root test," which permits for 5 structural discontinuities in the "time series". On a similar note, **Zarei, A., et al., (2015)** described How to Identify and Correct Structural Breakpoints in Time Series Data as a Persistent Research Problem in the Field of Finance. After applying the methodology presented in the study to four different data series, including 651 months of data from each nation, the results revealed that the system detected breakpoints properly, as further confirmed by graphs. It was therefore advised that the procedure might be useful for researchers to officially identify structural breakpoints as it significantly enhances the robustness of estimation of exchange rate behavior (apart from other financial variables). Similarly, **Cerrato, M., et al., (2013)** found that A serious discussion on the value of unit root tests in the face of structural breakdowns was sparked by the huge appreciation and devaluation of the US dollar in the 1980s. The empirical results demonstrated that the evidence in favor of the stationarity of the "real exchange rate" was stronger in the sub-sample period after 1980 for more than half of the quarterly series. On the other hand,

Beckmann, J., et al., (2011) reexamined the analysis of the dollar/yen exchange rate model empirical performance. The Authors analyzed the nature of a possible long-term correlation between currency values and underlying economic conditions and demonstrated that most transition points might be linked to either significant shifts in policy or individual economic developments. The results likewise demonstrated the relevance of macroeconomic fundamentals on the USD/JPY exchange rate, albeit in varying degrees and for varying horizons of time. On a similar note, **Kasman, S., Kasman, A., & Ayhan, D. (2010)** examined the authenticity of "PPP" for eleven Western and Central European nations, along with Turkey, Malta, and Cyprus utilizing the "LM unit root test," which allowed for 1 and 2 "structural breakdowns". Testing led the authors to determine that the PPP (purchasing power parity) hypothesis was supported when using the "US dollar" as the "foreign currency" in Turkey and Romania, and when using the "German mark" as the "foreign currency" in Turkey, Slovakia, Romania, Estonia, Croatia, Slovenia, and Bulgaria. On the other hand, **Kočenda, E. (2005)** searched for the highly significant "structural break" in the "exchange rate" for a collection of European shift nations if "structural breaks" in "exchange rates" were caused by "exchange rate policies" & found that breakdowns were typically connected with substantial changes in exchange rate regimes. Nevertheless, it was shown that some breakdowns were not caused by exchange rate rules. Thus, the dearth of synchrony between the "policy step" & "exchange rate regime" change suggested that the timing of the currency regime transition was imprecise. Moreover, because a "one-time break" might lead to conflicting outcomes, empirical research should account for "structural breaks" in "exchange rates". Similarly, **Kumar Narayan, P. (2005)** examined, with the use of a "panel unit root test" including structural breakdowns, whether or not "real exchange rates" across "17 OECD (Organization for Economic Cooperation and Development) nations" were cyclical. The PPP hypothesis was shown to be correct for real exchange rates computed using the US dollar as the base in the aforementioned countries. Still, it was found to be incorrect for real exchange rates computed using the "German mark" as the base. Denmark, Spain, Norway, Belgium, Switzerland, Netherlands, and Austria all confirmed the PPP theory.

3. Research Questions

I What is the concept and importance of structural break analysis?
II What is the Relationship Between Structural Breaks And Exchange Rates?
III What are the reasons for Structural Breaks in an economy?
IV What are the Factors Influencing Exchange Rates?

4. Methodology

A research method is a strategy for doing an empirical study. Examining how researchers do their work is one possible technique. Several research methods were examined, along with their underlying motives and approaches. The researcher needs to have a firm grasp of a variety of research techniques. The research relied on secondary data gathered from a variety of publicly available resources. One hundred and forty-seven (147) articles from various publications were analyzed. These papers were gathered from several online databases like Research Gate, Google Scholar, Scopus, Science Direct, etc. Moreover, the second screening resulted in the selection of seventy-nine (79) papers based on titles, keywords, abstracts, pertinent information, and submissions. The study takes into account the same accuracy, exterior effects, citations, and review process found in the 32 papers that passed the final screening. Figure 3 depicts the study's screening process.

ISSN: 0022-3301
UGC CARE Group 1

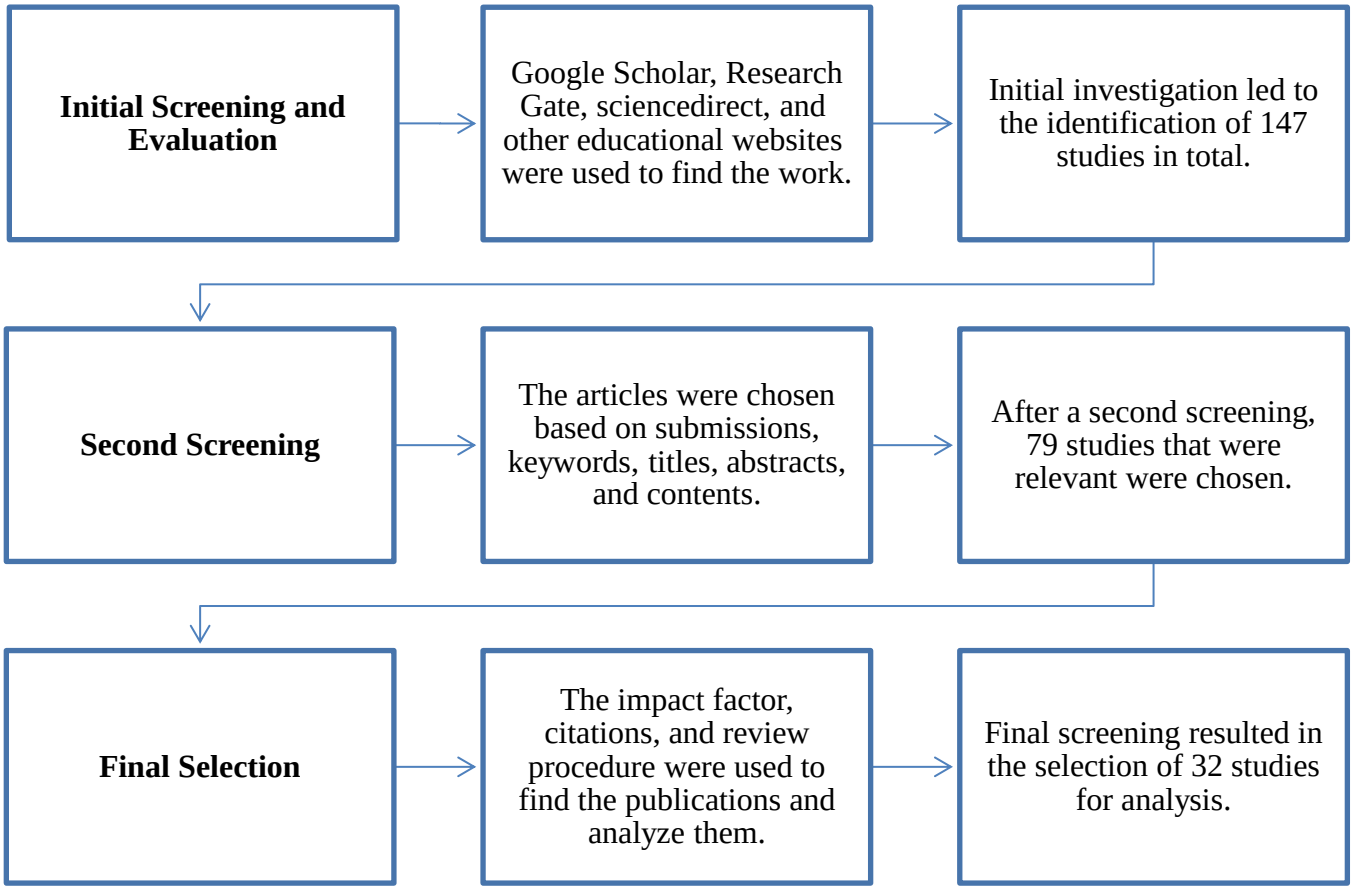

Figure 2 Screening Procedure

5. Discussion

Within the confines of the review study, several authors' points of view and findings from previously published research on the Structural Break Analysis for Exchange Rate for the past 10 years in reference to USD were investigated and evaluated. Many contributors gave their thoughts on exchange rates, exchange rate determinants, structural breaks, structural break analysis, and the relation between these two. A screening approach was taken in the study, in which the papers that were employed for the investigation were reviewed in detail. The inquiry uncovered a total of 36 articles that contained pertinent information. This section will go through a few of the reviews that were provided.

According to Akinboade and Makina (2006), the additive outlier model convincingly highlighted the significance of several unexpected structural breakdowns and provided support for the notion that the rand's bilateral real exchange rates are stationary. The novel outlier model, which attempted to imply progressive changes, as was to be predicted, detects only a limited number of breaks and does not support mean reversion. According to the findings of the research carried out by Hassan and Dantama (2017), the variables of interest rate and net foreign asset have a positive & statistically significant impact on the volatility of the exchange rate, whereas "the variables of fiscal balance, economic openness, and oil price have a positive but statistically insignificant impact on the volatility of the exchange rate". According to Dropsy (1996), two models of real exchange rate determination were investigated. These models included purchasing power parity and a generic monetary model. Significant empirical evidence of structural breakdowns for seven exchange rates was discovered. while Jain (2012) stated that the regression showed that almost 47 percent of variations in the dollar-rupee exchange rates were due to the variables that were included in the model ("foreign exchange

reserves, call rate, bank rate, and money supply, inflation differentials between a domestic and foreign country, index of industrial production, short run and long run yield differentials between domestic and foreign Treasury Bills"). On the other hand, the disparities in money supply and interest rates between India and the US did not have a particularly major role in determining the same. Byrne and Nagayasu (2010) discovered by using structural breaks, that several nations analyzed in order to evaluate the importance of structural alterations in a wider global context. This was done by using a global perspective. Although it provided evidence of the long-run link, European data revealed that the occurrence of structural breaks was not very frequent across nations and was, in fact, country-specific. This was despite the fact that the data themselves provided evidence of the long-run relationship. On the other hand, Breitung and Candelon (2005) used a "panel unit root test with structural breakdowns" in order to investigate the correctness of the "PPP" hypothesis for five different nations located in South and Latin America as well as Asia. According to the findings of the tests, the "PPP hypothesis" was correct for "countries" in Asia that made the transition to a system of variable exchange rates. Still, it was incorrect for nations in Latin and South America that selected a system of "exchange rates" that remained constant. By analyzing the authenticity of "PPP" for 6 Asian nations using the "Gregory-Hansen and co-integration tests with panel LM structural breakdowns," Narayan (2010) produced findings that strongly supported the validity of PPP. These results were acquired by analyzing the data. While modeling the exchange rate, Castle and Kurita (2021) stressed how important it was to give the facts the attention and consideration they deserved. Non-stationarity was dealt with carefully in order to build a theory-coherent, congruent, & "data-admissible empirical model" of the "dollar-pound exchange rate". "Non-stationarity" can take the form of "unit roots or distributional changes," and both of these types of non-stationarity must be treated. When estimating the exchange rate, it was important to stress both types of non-stationarity due to their combined significance. Exchange rate changes have the potential to bring about observable structural breakdowns in the returns of exchange rates. The findings pointed to a single point of differentiation in the sample (Chen, et al., 2021). Moreover, Chowdhury (2007) discovered that the structural break dates for the different indices seemed feasible, corresponding with the economic downturn that occurred in Australia in the early 1990s and the economic downturn that occurred globally in the early 1980s. In the previous research, the unit root tests that provided a concrete picture of the real exchange rate stationarity for major South Asian countries did not assume linearity (such as the ADF and PP tests), nor did they operate within a linear framework (such as the KPSS test). This allowed the researchers to rule out the possibility of structural breaks (Hoque & Banerjee, 2014). In order to guarantee that the calculated parameters were objective, the modeling technique was modified to take into account the influence of the structural break that was discovered. The "short-run model" found that a reduction in the spread would result in a reduction in the motivation for economic agents to engage in arbitrage transactions, which could result in a growth in the "economic agents' desire" to hoard cash. According to the results of the preliminary study, the exchange rate was powerful enough to adequately explain the movements in the foreign currency market (Onoh, et al., 2017).

6. Conclusion

In any nation's overall monetary policy, a country's exchange rate as well as the system that governs it, are critical components. Its relevance is, even more, emphasized when considering economies that are currently in transition. This is because "international financial institutions such as the World Bank, the International Monetary Fund, & the European Bank for Reconstruction and Development (EBRD)" are the ones that provide credit, and they do so on the condition that there is macroeconomic stability and a stable exchange rate.

Each nation going through a period of transition is required to go through a stage of "macroeconomic stabilization", which is invariably escorted by significant shocks to the foundations

of the macroeconomic system. The progression of economic growth is impacted both by the form of these disruptions and the severity of their effects. It is especially crucial for policymakers to do research regarding the effectiveness of stabilization measures in economies that are transitioning. Because of the "comparative openness and the close economic relations between transition economies in Central and Eastern Europe and between these countries and the European Union, the behavior of the trend of the exchange rate and the exchange rate regime play an important role in the economic development of the CEE countries towards sustainable growth" (Kočenda, 1999).

"In economic time series relationships, structural change is everywhere, and it can be very dangerous to ignore it. Inferences about how the economy works can be wrong, forecasts can be wrong, and policy suggestions can be misleading or even worse." -- (Hansen, 2001)

From the above statement and review of the literature, it has been found that structural break tests assist us in determining when and if there has been a major change in the data. Although structural break analysis has the potential to offer robust support for an argument—whether that argument is in favor of or against to causation—there are at least three criticisms that may be leveled against this kind of research. First, there is a possibility of making a post hoc ergo propter hoc fallacy due to the fact that the timing of a breakpoint is an essential component of the evidence. Two, or perhaps more than one, separate causal events might take place inside the same window of time. And last, there is the possibility of a time lag existing between the cause and the effect.

In addition, it can be argued that "structural break models" are an essential modeling tool that should be addressed as part of any comprehensive "time-series analysis". This is something that can be said since structural break models have been shown to be useful. There is a significant body of information that substantiates the existence of structural breaks in time series data as well as the negative effects that result from neglecting these structural breaks, just in the same way that "Pettenuzzo and Timmermann (2011)" demonstrated that including "structural breaks" in "asset allocation models" can advance "long-horizon forecasts" & that overlooking the breaks can result in significant reductions in welfare, these authors also show that including structural breaks can improve long-horizon forecasts. Inoue and Rossi (2011) demonstrated the significance of locating "parameter instabilities" for the purpose of enhancing the functionality of DSGE models (dynamic stochastic general equilibrium models). Therefore, dependable on the findings, the study suggests that in addition to performing Structural Break Analysis for Exchange Rates from time to time in order to understand the pattern or reason for sudden structural breaks in an economy, It is also important for the government to enhance its foreign asset holdings to maintain a "surplus or balance in the current account," & for the "Central Bank" to maintain a steady rate of interest in the "economy" so that a "stable exchange rate" may be realized.

References:

[1] Akinboade, O. A., & Makina, D. (2006). Mean reversion and structural breaks in real exchange rates: South African evidence. Applied financial economics, 16(4), 347-358.
[2] Beckmann, J., Belke, A., & Kühl, M. (2011). Cointegration, structural breaks and monetary fundamentals of the Dollar/Yen Exchange. International Advances in Economic Research, 17, 397-412.
[3] Breitung, J., & Candelon, B. (2005). Purchasing power parity during currency crises: A panel unit root test under structural breaks. Review of World Economics, 141, 124-140.

[4] Byrne, J. P., & Nagayasu, J. (2010). Structural breaks in the real exchange rate and real interest rate relationship. Global Finance Journal, 21(2), 138-151.
[5] Castle, J. L., & Kurita, T. (2021). A dynamic econometric analysis of the dollar-pound exchange rate in an era of structural breaks and policy regime shifts. Journal of Economic Dynamics and Control, 128, 104139.
[6] Cerrato, M., Kim, H., & MacDonald, R. (2013). Equilibrium exchange rate determination and multiple structural changes. Journal of Empirical Finance, 22, 52-66.
[7] Chen, L., Zhang, Z., Du, Z., & Deng, L. (2021). Heterogeneous determinants of the exchange rate market in China with structural breaks. Applied Economics, 53(59), 6839-6854.
[8] Chowdhury, K. (2007). Are the real exchange rate indices of Australia non-stationary in the presence of structural break?.
[9] Dropsy, V. (1996). Real exchange rates and structural breaks. Applied Economics, 28(2), 209-219.
[10] Dube, A. K., Fawole, W. O., Govindasamy, R., & ÖZKAN, B. (2019). Agricultural development led industrialization in Ethiopia: structural break analysis. International Journal of Agriculture Forestry and Life Sciences, 3(1), 193-201.
[11] Fasanya, I. O., & Akinwale, O. A. (2022). Exchange Rate Shocks and Sectoral Stock Returns in Nigeria: Do Asymmetry and Structural Breaks Matter?. Cogent Economics & Finance, 10(1), 2045719.
[12] Hansen, B. E. (2001). The new econometrics of structural change: Dating breaks in US labor productivity. Journal of Economic perspectives, 15(4), 117-128.
[13] Hassan, A., & Dantama, Y. U. (2017). Determinants of exchange rate volatility: new estimates from Nigeria. Eastern Journal of Economics and Finance, 3(1), 1-12.
[14] Hoque, A., & Banerjee, R. (2014). The stationarity of South Asian real exchange rates allowing for structural breaks. Australasian Accounting, Business and Finance Journal, 8(3), 45-54.
[15] Inoue, A., & Rossi, B. (2011). Identifying the sources of instabilities in macroeconomic fluctuations. Review of Economics and statistics, 93(4), 1186-1204.
[16] Jain, A. (2012). Exchange rate and its determinants in India. Available at SSRN 2177284.
[17] Jeelani, S., Tomar, J., Das, T., & Das, S. (2019). Testing structural break in the relationship between exchange rate and macroeconomic variables. Vision, 23(4), 442-453.
[18] Kashyap, S., & Kashyap, S. (2020). Dynamics of volatility spillovers with structural breaks in Indian foreign exchange market. International Journal of Business Innovation and Research, 22(4), 488-505.
[19] Kasman, S., Kasman, A., & Ayhan, D. (2010). Testing the purchasing power parity hypothesis for the new member and candidate countries of the European Union: Evidence from lagrange multiplier unit root tests with structural breaks. Emerging Markets Finance and Trade, 46(2), 53-65.
[20] Kočenda, E. (1999). Detecting structural breaks: exchange rates in transition economies. CERGE-EI Working Paper Series, (149).
[21] Kočenda, E. (2005). Beware of breaks in exchange rates: evidence from European transition countries. Economic Systems, 29(3), 307-324.
[22] Krueger, A. O. (1983). Exchange-rate determination. Cambridge University Press.
[23] Kumar Narayan, P. (2005). New evidence on purchasing power parity from 17 OECD countries. Applied Economics, 37(9), 1063-1071.
[24] Liu, Y., Failler, P., Peng, J., & Zheng, Y. (2020). Time-varying relationship between crude oil price and exchange rate in the context of structural breaks. Energies, 13(9), 2395.

[25] Narayan, P. K. (2010). Evidence on PPP for selected Asian countries from a panel cointegration test with structural breaks. Applied Economics, 42(3), 325-332.
[26] Ojede, A., & Lam, E. (2017). The impact of changes in monetary aggregates on exchange rate volatility in a developing country: Do structural breaks matter?. Economics Letters, 155, 111-115.
[27] Onoh, J. O., Mbanasor, C. O., & Duruechi, A. H. (2017). Testing for structural breaks in the Nigerian exchange rate using univariate time series analysis. International Journal of Social Science and Management Research, 3(4), 26-42.
[28] Pettenuzzo, D., & Timmermann, A. (2011). Predictability of stock returns and asset allocation under structural breaks. Journal of Econometrics, 164(1), 60-78.
[29] Stock, J. H., & Watson, M. W. (1996). Evidence on structural instability in macroeconomic time series relations. Journal of Business & Economic Statistics, 14(1), 11-30.
[30] Su, J. B. (2022). Structural change in the correlation, return and volatility spillovers: evidence from the oil, stock and exchange rate markets in the United States. Economic Research-Ekonomska Istraživanja, 35(1), 6918-6944.
[31] Ümit, Ö. (2016). Stationarity of real exchange rates in the "fragile five": Analysis with structural breaks. International Journal of Economics and Finance, 8(4), 254-270.
[32] Zarei, A., Ariff, M., Hook, L. S., & Nassir, A. M. (2015). Identifying multiple structural breaks in exchange rate series in a finance research. Pertanika Journal of Social Sciences and Humanities, 23(September Special Issue), 155-166.