Journal of Advances and Scholarly Researches in Allied Education
Vol. 18, Issue No. 4, July-2021, ISSN 2230-7540

Linear and Nonlinear Relationship Between International Reserves and Economic Growth

Avantika[1]*, Dr. Anand Kumar[2]

[1] Research Scholar, School of Commerce and Management, Shri Venkateshwara University, Gajraula Distt. Amroha (U.P)

[2] Assistant Professor, School of Commerce and Management, Shri Venkateshwara University, Gajraula Distt. Amroha (U.P)

Email: akumarmuit@gmail.com

Abstract - This investigation employs both linear and nonlinear causality tests to probe the nature of the underlying causal link between the two variables. These findings inform our recommendation to the policymakers in the Indian government that they support efforts to develop and recover the oil and gas industry in order to realize the country's economic growth potential. foreign exchange reserves that developing countries have amassed. We achieve this by estimating the need for foreign exchange reserves using a panel smooth transition model, which relaxes two limiting hypotheses, homogeneity and time-stability. The central bank of a country is the custodian of the nation's foreign currency reserves, often known as international reserves (IR).

Keywords - economic growth, international reserves, Nonlinearity test, external- reserve, relationship

----------X----------

INTRODUCTION

Because developing nations' recent fast accumulation has altered global balances, it is crucial to comprehend the factors that drive their desire for international reserves. The American current account deficit has been more than compensated by the flow of official savings from developing economies, resulting in a worldwide interest rate decrease (Bernanke, 2005). Obviously, things are different now due to the financial crisis. Long-term interest rates are expected to rise as major industrialized nations ramp up budget deficits in an attempt to revive GDP. This means that the structure of the new global monetary equilibrium after the financial crisis will be affected by the rate of reserve accumulation (or deaccumulation).Even though there is a wealth of literature beginning with Heller (1966), the many empirical investigations on foreign reserves fail to account for the following. The world's foreign exchange reserves have climbed from $1 trillion in 1990 to $6 trillion in 2008, with the majority of the gain coming from emerging market economies, where reserves have increased by more than 20% annually since 2003.

To finance payment imbalances directly by intervening in exchange markets to impact the currency exchange rate and/or for other reasons, central banks keep a stockpile of foreign assets known as international reserves (Balance of Payments Manual, [International Monetary Fund], 2014). Gold, Special Drawing Rights (SDRs), foreign currency deposits and Bonds held by monetary authorities, Gold, and Reserve position at the IMF are all examples of international reserves or foreign exchange reserves.Since the year 2000, India has seen a tremendous increase in its foreign currency reserves due to the growing prices of its exporting oil. There were enough foreign reserves by the end of 2014 to cover roughly three years' worth of imports, up from only $12 billion in 2000. The inflation rate in 2010 was predicted to be 3.9%. The International Monetary Fund (IMF) expressed alarm over inflation and monetary mismanagement in India in 2010. IMF global economic predictions report issued in April 2014 anticipated 1.5% decline in India's economic growth and 1.2% increase in unemployment in 2015. This is why we decided to conduct our research in India.

The central bank of a country is the custodian of the nation's foreign currency reserves, often known as international reserves (IR). International reserves (IR) are a kind of reserve monies that may be transferred between central banks and monetary authorities in various countries. When transacting with these countries, IR are a valid means of exchange. Gold, SDRs, foreign currency deposits, bonds issued by central banks, and an IMF reserve position are all examples of a country's external assets, sometimes known as its international reserves (IR) (IMF). IR is defined as "those external

assets that are readily available and controlled by monetary authorities for direct financing of payment imbalances through intervention in exchange markets to affect the currency exchange rate and/or other purposes" in the sixth edition of the IMF's Balance of Payments (BOP) Manual (BPM6).

There has been a dramatic rise in the worldwide volume of IR during the last decade. Literature has continued to argue over whether or not a country's huge buildup of reserves is a response to repeated financial crises or a strategy for export competitiveness to achieve economic development. According to proponents of the international commerce idea, the two fields are inextricably linked. Since greater international trade activities result in more IR, the question of the prospective impact of IR on Econ comes logically as a corollary of the original question of the influence of IR on Econ. The bulk of international commerce consists of exports. Several researchers have already confirmed the favorable correlation between exports and economic growth: Tyler, Jung, and Marshall, and Anwar and Sampath. This suggests a possible link between IR and Econ. The linear link between IR and Econ has been empirically proved by several publications, including those by Gosselin and Parent Nneka, Aizen man and Marion (2004), Jahangir, Allam, Rahim, and Hakim. There is a wealth of published works that provide light on this topic.

LITERATURE REVIEW

Mohammad Kashif et.al (2021) Both linear and nonlinear causal links between cumulative IR and economic development (Econ) in India are explored. This research utilizes quarterly data from the first quarter of 1985 to the fourth quarter of 2014. Econometric tests including the augmented Dickey-Fuller (ADF) unit root test, the linear Granger causality test, the Johansen (J) cointegration test, the Brock (BDS) test, and the Hoekstra and Jones (HL) nonlinear Granger causality test were utilized in the research. The results of the investigation confirm the existence of a linear chain of causation operating in both directions. Bidirectional nonlinear causality between the variables is confirmed by the Hoekstra and Jones test. These findings show that India may be able to pursue a policy of reserves accumulation if the country's surplus reserves are invested in other sources like economic infrastructure projects and regional infrastructure development.

Ozan Sula et.al (2021) There has been a lot of research on the mechanisms through which reserves impact economic performance, but there hasn't been any empirical assessment of how reserve holders really fare. The purpose of this work is to address this void. Using data on 120 different countries' economic development and foreign reserves from 1981 to 2010, we draw conclusions about the impact of the former on the latter. We use dynamic panel data approaches to account for a broad variety of potential confounders and still demonstrate that foreign reserves contribute positively to economic expansion. Moreover, the benefit diminishes as the opportunity cost of maintaining reserves rises.

John MacCarthy (2021) The purpose of this article was to investigate the link between capital flight and GDP growth in Ghana. Three assumptions were put to the test using quarterly time series data from 1976 to 2020. The asymmetry in the connection between the variables was evaluated using non-linear autoregressive distributive lagged with unit root, co-integration, and Wald tests. It is hypothesized in the research that both positive and negative shifts in capital flight have major effects on GDP expansion. Capital flight and other macroeconomic factors account for around 75.28% of economic growth, the research found. Additionally, the model has a speed of 35.6% in reestablishing the short-run link to the dynamic long-long equilibrium. In order to diminish incentives for capital flight, the research suggests that government economic policymakers boost economic confidence by stabilizing economic circumstances in the nation. In addition, the government must priorities the development of plans to recover public monies stolen by corrupt public officials and stashed in overseas accounts, with the intention of reinvesting them in the economy and therefore promoting economic growth.

Awoderu, Babalola Kayode et.al (2017) Using time series data spanning from 1980 to 2014, this research examined the effects of Nigeria's foreign reserve on economic development and the implications for policy. Multiple Linear Regression, ANOVA, the Augmented Dickey Fuller (ADF) Test, and the Johansen Cointegration Methods were used to analyses the data. The data became stationary at the first difference, indicating integration of order one, according to the Augmented Dickey Fuller test. The Johansen Cointegration method was then used to look for evidence of long-term relationships between the variables, and the findings confirmed the existence of a correlation between foreign exchange reserves and GDP expansion. The estimated coefficient of the predictor variable, external reserve (EXTSV), was 3.42 in the Multiple Linear Regression analysis. A rise of one unit in Nigeria's External reserve led to an additional $3.42 billion in economic development. This has important policy implications, most notably that policies that increase the predictability of the quantity of foreign reserve should be supported. In addition, policy should aim for a permanent (long-run) growth in reserves rather than a short-term increase in exchange reserves. It was suggested that the government should priorities measures that result in a greater buildup of foreign reserves as a buffer against unanticipated times of macroeconomic instability or external shocks. Improving this situation may be accomplished in part by increasing exports while decreasing imports.

Kufre J. Bassey et.al (2019) Using quarterly data from 2011: Q3 to 2019: Q1 and a nonlinear autoregressive distributed lag (NARDL) framework that allows for the investigation of short- and long-run nonlinearities via positive and negative partial sum decompositions of the explanatory variable, this paper analyses the correlation between economic growth and reserve accumulation in Nigeria. Long-run asymmetry (cointegration) in the NARDL error correction model is confirmed by bounds testing (ECM). Regardless of the orders of integration of the variables, the OLS estimate yields a trustworthy conclusion. A negative change in reserve accumulation was calculated to have a long-term coefficient of 1%, which is statistically significant. According to the findings of the asymmetric cointegration analysis, a 1% drop in the reserve causes a 0.2% rise in GDP in Nigeria. Adjustment patterns from the original equilibrium to a new equilibrium after economic uncertainty are captured by the asymmetric dynamic multiplier. This indicates that attempts to test for the presence of a stable long-run connection between the two variables will be complicated by the assumption of long-run symmetry in cases where the underlying relationship is nonlinear. Overall, the nonlinear approach yields more trustworthy parameter estimates, indicating that the connection rests on the interplay between unexpected increases in production and natural declines in stockpiles.

RESEARCH AND METHODOLOGY

Data source:

The GDP to international reserve ratio (IR) and GDP growth (ECON) were employed as independent variables. To do this, we used time series data. We utilized quarterly data from the International Monetary Fund's International Financial Statistics and the World Bank's World Development Indicators for our analysis. We utilized the X11 adjustment procedure provided by the U.S. Bureau of the Census in 1965 to account for any seasonal influences on the data for these variables. The most important descriptive statistics for each variable are shown in Table.1. An international reserve may range from a low of 0.469707 billion US dollars to a high of 195.0520 billion US dollars, with an average of 51.66429 billion US dollars and a standard deviation of 69.21488 billion US dollars. The economy may expand by a maximum of 53.75181 billion US dollars or by a minimum of 10.24481 billion US dollars, with a mean of 22.97408 billion US dollars and a standard deviation of 14.35088.

Table 1: Descriptive statistics

	IR	ECON
Mean	51.66429	22.97408
Median	8.188460	15.20519
Maximum	195.0520	53.75181
Minimum	0.469707	10.24481
Std. Dev.	69.21488	14.35088
Observations	120	120

Note: ECON and IR represents economic growth and international reserves respectively.

Linear Ganger causality test:

By comparing two variables side by side, the bivariate Granger causality tests provide light on the nature of the link between them. If the values of X in the past assist to anticipate the value of Y, then Y is said to be Granger-caused by X, and if it doesn't, then X isn't Granger-caused by Y. The Granger causality test served as the foundation for our usage of the vector autoregression (VAR) model established by Sims (1980). Let the model of a bivariate VAR (vector autoregressive)

$$\Delta Y_t = \alpha_1 + \sum_{i=1}^{n} \beta_{1i}\, \Delta X_{t-i} + \sum_{j=1}^{n} \gamma_{1j}\, \Delta Y_{t-j} + \nu_{1t}$$

… (1)

$$\Delta X_t = \alpha_2 + \sum_{i=1}^{n} \beta_{2i}\, \Delta Y_{t-i} + \sum_{j=1}^{n} \gamma_{2j}\, \Delta X_{t-j} + \nu_{2t}$$

… (2)

The Hiemstra and Jones (1994) Nonlinearity Test

One issue that arises when using a linear method (like the Granger causality test) is that it has limited ability to discover nonlinear causal relationships. A variation of Granger's (1969) linear causality test was refined by Hiemstra and Jones (1994). They proposed using non-parametric estimators of progressive connection inside and across time series to conduct a non-linear version of Granger's causality test. The set L_t-1 includes a lagged vector of X_t with length L_x and a lagged vector of $Y_t$with length Ly; let $F(X_t|l_t\text{-}1)$ stand for the limited probability distribution of X_t given this set. Y is not meant to Granger-cause X if the distribution of current X-values remains unaffected if the vector of previous Y-values is removed from the information set. Hiemstra and Jones's null hypothesis may thus be stated as follows:

$$H_0:\ F(X_t|l_{t-1}) = F\left(X_t|l_{t-1} - Y_{t-ly}^{ly}\right) \text{ … (3)}$$

Here, Y_{t-ly}^{ly} represents the t –ly– length lagged vector of Y and

The null hypothesis given in equation (1) implies that for all **ϵ**> 0

$$Y_{t-ly}^{ly} = (Y_{t-ly}, Y_{t-ly+1}, \dots\dots\dots, Y_{t-1})$$

$$P(\| X_t^n - X_s^n \| < \epsilon | \| X_{t-lx}^{lx} - X_{s-lx}^{lx} \| < \epsilon, \| Y_{t-ly}^{ly} - Y_{s-ly}^{ly} \| < \epsilon) = P(\| X_t^n - X_s^n \| < \epsilon | \| X_{t-lx}^{lx} - X_{s-lx}^{lx} \| < \epsilon)$$

… (4)

For this purpose, we will refer to P(A|B) as the conditional probability of A given B, and... as the ultimate norm. According to Eq. (2), if the lagged Lx-length lagged vector of X_t is -closed, then the conditional probability that any two random n-length lead vectors of X_t are within distance will also be. As an added bonus, Hiemstra and Jones demonstrate that T-statistics exhibit a normal distribution when evaluated with Eq. (1):

$$T_{statistics} = \sqrt{q}\left[\frac{C_1(n+L_x, L_y, \epsilon)}{C_2(L_x, L_y, \epsilon)} - \frac{C_3(n+L_x, \epsilon)}{C_4(L_x, \epsilon)}\right] \sim Q(0, \sigma^2, n, L_x, L_y, \epsilon))$$

. (5)

Here,

$$C_1(n+L_x, L_y, \epsilon) = P\left(\| X_{t-lx}^{n+lx} - X_{s-lx}^{n+lx} \| < \epsilon, \| Y_{t-ly}^{ly} - Y_{s-ly}^{ly} \| < \epsilon\right),$$

$$C_2(L_x, L_y, \epsilon) = P\left(\| X_{t-lx}^{lx} - X_{s-lx}^{lx} \| < \epsilon, \| Y_{t-ly}^{ly} - Y_{s-ly}^{ly} \| < \epsilon\right),$$

$$C_3(n+L_x, \epsilon) = P(\| X_{t-lx}^{n+lx} - X_{s-lx}^{n+lx} \| < \epsilon),$$

$$C_4(L_x, \epsilon) = P\left(\| X_{t-lx}^{lx} - X_{s-lx}^{lx} \| < \epsilon\right).$$

Linear specification of international reserves demand

The literature is replete with discussions on the factors that influence the need for foreign exchange reserves, but no clear answer has emerged. There are two main types of these motivations: commercial and safety-based. The first line of reasoning is that governments stockpile foreign currency reserves to prevent a devaluation of their currency and preserve export competitiveness. The mercantilist point of view, on the other hand, emphasizes stockpiling foreign exchange reserves as a hedge against a fluctuating balance of payment.

We look at the connection between Aizen man and Lee's (2007) linear homogenous technique for explaining the need for foreign reserves, and the desire for such a thing. We will later relax the homogeneity and tamability assumptions and discuss why we feel it is necessary to offer a non-linear specification. In a single criterion, Aizen man and Lee (2007) examined the weight of cautious and mercantilist motivations.

Resit = β0 + β1P opit + β2Openit + β3ER V olatit

+ β4EX Growthit + β5P L. Devit + β6KAccit (1)

+ β7T OT it + β8C risisDum + ϙit

where N and T define the panel's cross-section and temporal dimensions, respectively, and I = 1, N and t = 1, T. Equation (1) shows that a faster rate of export growth is associated with a greater stock of foreign reserves driven by mercantilist concerns (EX Growth). Furthermore, the reserves are positively connected with the departure of the actual exchange rate from its PPP value if a nation retains reserves to influence its real exchange rate (PL Deviation3). When a country's actual exchange rate falls below its PPP value, the government often responds by hoarding reserves. However, a nation whose currency has been overvalued would build up its reserves in an effort to slow the pace of appreciation.

However, the degree of capital account liberalization (K Acc) and dummies that reflect two key balance-of-payment crises, the Mexican and Asian crises, are positively connected with reserves holdings prompted by precautionary concerns. Dummies are used to determine whether emerging economies have amassed sufficient reserves as a result of prior crises to weather any potential future ones.

Incorporating Population is a scaling variable measure to seize the size impact on foreign exchange reserves. Because reserves grow in tandem with the volume of a country's foreign trade, they tend to rise in tandem with the population. The conventional notion that countries keep foreign reserves equal to a certain number of months' worth of imports in case of a current account crisis is further supported by the correlation between reserve buildup and the import-to-GDP (Open) ratio (Heller, 1966, Frenkel, 1974). Since greater exchange rate volatility lowers the need for reserves, it has a negative relationship with re-serves. If nations are able to weather economic storms by adding to or subtracting from their reserves, then the terms of trade (TOT) will be positively connected with reserves.

Achieving a Critical Level of Foreign Exchange ReservesTo shed light on the need of foreign exchange reserves, we now propose the PSTR standard.

$Res_{it} = \alpha_i + \beta_0 X_{it} + \beta_1 Xit\ g\ (q_{it}; \gamma, c) + \varrho_{it}$ (3)

where N and T define the panel's cross-section and temporal dimensions, respectively, and for I = 1, N and t = 1, T to simplify the equation (3) Ith country at time t, Xit= It is assumed that the residual it is independent and identically distributed between zero and two. Let's start with a harsh transition (PTR model) like the one in Hansen's work to simplify our understanding of the process of transition. In this context, g(.) is a special kind of indicator function:

Simplifying the equation (3) Xit = [popit, openit, debtit, growthit, P ldevit, KAccit, T otit,] is the vector of explicative variables ith nation at time t. N and T determine the cross-section and temporal dimensions of the panel. It is believed that the residue isi.i.d. (0, σε2). Let's start with a harsh transition (PTR model) like the one in Hansen's work to simplify our understanding of the process of transition (1999). In this situation, g(.) is a kind of indicator function:

$$g(q_{it}; c) = \begin{cases} 1 & \text{if } q_{it} \geq c \\ 0 & \text{otherwise} \end{cases} \quad (4)$$

In this model, the transition mechanism between extreme regimes is very simple: at each date, if the threshold variable q_{it} observed for a given country is smaller than a given value, called the location parameter c, the international reserves demand of the country is defined by a particular model (or regime); this regime is different if the growth of the exportations is larger than this location parameter. More precisely, the coefficient of PL. Deviation is equal to β_0 if export growth is smaller than c and to $\beta_0 + \beta_1$ if export growth is larger. In our application, the coefficient $\beta_0$associated with slow or negative export growth is expected to be null orsmall and positive, whereas $\beta_0 + \beta_1$ prevailing in large exporter countries should be positive and higher. Indeed, the large exporter countries associated with high export growth are likely to manipulate their real exchange rate to support their export-led growth strategy. In this paper, we consider seven" candidates" for the threshold variable in order to test three different hypotheses: the precautionary versus the mercantilist motives as well as the US international position an explanation of the threshold effect.

DATA ANALYSIS

Unit root tests results:

It was determined whether or not all variables were stationary using the Augmented Dickey Fuller and Phillips-Perron unit root tests before doing the Granger causality test. You may see the outcomes in Table 2. In this table, we can see that the ADF t-statistics of the level term in IR and ECON were -1.49 and 1.40, respectively, at the 5% significance level, indicating that the null hypothesis of the series with a unit root cannot be rejected. More so, the t-statistics for IR and ECON after the first difference were -1.82 and -3.05, respectively. The Phillips-Perron unit root test yielded the same findings. After accounting for the effect of the first difference, the PP t-statistics for IR and ECON were -3.32 and -5.75, respectively. The results showed that the unit root hypothesis may be rejected with a probability of less than 5%. As a result, we know that variables are not considered stationary until after the first difference has been calculated. Therefore, the two first-differenced variables were subjected to a linear Granger causality test.

Table 2: Unit root tests results

Note: Figures in parenthesis are bootstrap p values; * denotes 1% significance level.

Nonlinear causality test results:

Tabulated in Table 3 is the BDS test outcome. A linear model of ECON and IR was shown to reject the null of the i.i.d residual at the 5% significance level across all dimensions. We then investigated the nonlinear causality test established by Hiemstra and Jones (1994) to determine whether or not there is a causality association between these two variables using these findings and comparing them to those obtained

Table 3: Nonlinear causality test results

	H:IR ⇏ Econ			H: Econ ⇏ IR	
$L_x = L_y$	CS	TS	$L_x = L_y$	CS	TS
4	-0.333	-3.446	4	0.126	1.301*
5	-0.367	-3.793	6	0.298	3.084*
6	-0.354	-3.659	7	0.312	3.226*
7	-0.321	-3.316	8	0.381	3.939*

Please take note that the nonlinear causality test yields lag orders as Lx = Ly. Four to seven months are chosen from quarterly records. Standardized test statistics (TS) and the difference between the two conditional probabilities (CS) * A critical value of 0.582 corresponds to a level of importance of 1%.

20 rising countries8 from 1980–2004 were used in the estimate. World Bank's World Development Indicators (WDI) and Penn World are the databases used. With the exception of Edwards' index of capital account openness, we followed the same methodical approach to variable construction as Aizen man and Lee (2007). (2005). Instead, we use the publicly available and more comprehensive index suggested by Lane and MilesiFerreti. An appendix is included with a copy of the data definitions for your

convenience. To their model, we included an extra explanatory variable consisting of the log of the ratio of short-term foreign debt to GDP (WDI database).

Identifying the threshold variables to represent the model's non-linearity is the last step before estimating a PSTR model. Remember that the following is the PSTR definition of the need for foreign exchange reserves:

$$Res_{it} = \alpha_i + \beta_0 X_{it} + \beta_1 Xit\ g\ (q_{it};\ \gamma,\ c) + \varrho_{it} \quad (1$$

We take a look at seven possible possibilities for the qit threshold variable. The first set consists of more locally focused variables, while the second set focuses on the macroeconomy of the United States. This is to see whether developing world central banks are affected by domestic macroeconomic conditions or by the US situation when making decisions to increase their foreign currency reserves.

Non-linear results of international reserves holdings

The coefficients are defined at each date and for each country as weighted averages of the values obtained in the two extreme regimes. Therefore, as mentioned in section II, the coefficients in a PSTR model can be different from the estimated parameters defined in the extreme regimes, i.e., the parameters β_0 and $\beta_0 + \beta_1$ in equation (6). So, for each model we first interpret the sign of parameter β_1, which indicates an increase ($\beta_1 > 0$) or a decrease ($\beta_1 < 0$) in the estimator along the increase in the threshold variable. In a second step, we will plot the evolution of each estimator to properly interpret the variation of the coefficient along the threshold variable.

The effect of the threshold variable on four determinants, PL. deviation, export growth, capital account and debt are reported for each model in tableWe only identified one transition function (r = 1) in models I, III, V, and VII, allowing us to simply interpret the impact as was previously described. Models II and IV do not have their findings included in Table 4 because r = 2 and r = 3. When there is more than one transition, we need the graph to examine the effects since we do not know the form of the transition function.

The model findings All of the economic processes that were outlined in the prior section are correct. The elasticity between foreign exchange reserves and export expansion, on the one hand, increases as one moves along PL. dev. To be more specific, central banks compensate for their currency's gain the farther the actual exchange rate is from its PPP value. We can verify or disprove the situation assuming three regimes by graphical analysis. The other estimators are unaffected by PL. dev, as was predicted.

Table 4: Impact of increase in the threshold variable on the coefficient

	Model I PL. dev	Model III K Account	Model V US macro-1	Model VI US macro-2	Model VII US macro-3
PL. dev	no effect	no effect	no effect	no effect	no effect
Export Growth	ɲ	ɲ	g	g	g
K Account	no effect	ɲ	g	g	g
Debt	no effect	g	ɲ	ɲ	ɲ

Instead, model III disproves the precautionary hypothesis, which holds that nations with more open financial systems should amass larger reserve buffers relative to their total foreign debt. Instead, we find that the estimator of debt falls, meaning that debt accounts for a smaller share of the variation in foreign exchange reserves. This is most likely due to a temporal effect rather than the impact of the capital account. It is true that the foreign debt ratio has decreased in most nations throughout the period, and that its flexibility has increased. In linear estimations, it is typical to find that debt does not explain foreign reserves. The openness of a country's capital account, however, is positively correlated with the elasticity between foreign exchange reserves and export expansion. More financially open economies are less likely to accumulate reserves to offset rising trade and currency prices.

Remember that the three US variables in models V–VII all act as threshold factors with a comparable impact. It turns out that the general economic climate in the US does have an impact on the variables used to predict export growth and debt. Once again, the stronger the US's position abroad, the less central banks will do to prevent the currency's depreciation (the lower the elasticity between international reserves and export growth). However, this is not the case when considering the elasticity of foreign exchange reserves and debt. Because the United States' standing in the world improves (when US macro 1 rises), developing economies borrow more heavily from the international capital market, which in turn increases the importance of debt in explaining international reserves. Unsurprisingly, the United States' standing in the world has diminished throughout that time. Therefore, the same logic applies, but the reader, in order to make sense of the historical progression, should read the table with a declining trend.

CONCLUSION

This research, in contrast to others, looked at the correlation between IR and GDP growth in both linear and nonlinear ways (ECON). Stationarity was analyzed by using the Augmented Dickey Fuller and Phillips-Perron unit root tests. After accounting for the initial variation, all of the variables were determined to be at constant levels. Our analysis of the data leads us to two hypotheses. First, in order to deal with the ever-changing cost of oil and the strain of global economic conditions, at each date and for each nation, the coefficients are calculated as the average of the values from the two extreme ranges. This research takes a nonlinear approach to the study of the changing composition of developing nations' foreign exchange reserves. In order to achieve this, we used a PSTR specification to estimate the need for foreign exchange reserves, which relaxes two limiting assumptions, namely, homogeneity and time-stability.

REFERENCES

1. Kashif, Mohammad & Singh, Satish &Thiyagarajan, S. & Maheshwari, Abhishek. (2020). Linear and Nonlinear Causal Relationships Between International Reserves and Economic Growth: Evidence from India. Asia-Pacific Journal of Management Research and Innovation. 16. 54-59. 10.1177/2319510X19898633.

2. Awoderu, Babalola Kayode et.al (2017) Policy Implications Of Long-Run Relationship Between External Reserve And Economic Growth In Nigeria ISSN 2309-0405

3. Kufre J. Bassey et.al (2019) On economic growth-reserve accumulation nexus in Nigeria: A nonlinear asymmetric cointegration estimation

4. Kashif, M. and Sridharan, P. (2015). International Reserves Accumulation and Economic Growth: Evidence from India. International Journal of Engineering and Management Research, 5(2), pp.583-589.

5. Wong, Y. S., Ho, C. M., &Dollery, B. (2012). Impact of exchange rate volatility on import flows: the case of Malaysia and the United States. Applied Financial Economics,22(24), 2027-2034.

6. Zahangir, M., Alam, D., & Rahim, M. A. (2013). Foreign exchange reserves: Bangladesh perspective. International Journal of Finance & Banking Studies, 2(4), 1–12.

7. Hakim, A. (2015). Estimating foreign exchange reserve adequacy. International Research Journal of Business Studies, 6(1), 63–72.

8. Malloy, M. S. (2013). Factors influencing emerging market central banks' decision to intervene in foreign exchange markets. (Working Paper No. 13/70). Washington, DC: International Monetary Fund.

9. Nneka, C. A. B. (2012). External reserves: Causality effect of macroeconomic variables in Nigeria: 1980–2009. Kuwait Chapter of the Arabian Journal of Business and Management Review, 1(12), 14–27.

10. Zahangir, M., Alam, D., & Rahim, M. A. (2013). Foreign exchange reserves: Bangladesh perspective. International Journal of Finance & Banking Studies, 2(4), 1–12.

11. Zhao W J. Appreciation of Real Exchange Rate and Transformation of EconomicGrowth Pattern: An Empirical Analysis Based on China's 1995-2012Provincial Panel Data [J]. Journal of International Trade,2014(03):131-143.

12. Cheng L Y, Li J K. Does the abnormal flow of international capital have a nonlinear effect on economic growth? ——Based on the perspective of exchange rate system and financial market development [J]. Study of International Finance, 2020 (04): 43-53.

13. Gonzalez A, Timo Teräsvirta, Dijk D V, et al. Panel Smooth Transition Regression Models[R]. Department of Economics and Business Economics, Aarhus University.2017.

Corresponding Author

Avantika*

Research Scholar, School of Commerce and Management, Shri Venkateshwara University, Gajraula Distt. Amroha (U.P)