An Empirical Analysis of India's Balance of Payments (1970-2014)

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Abstract: Empirical studies have shown that no country will survive in isolation; a country must interact with rest of the world. It is evidence that the Balance of Payments position in the country has reached an unviable proportion and it becomes a policy constraint in achieving government objectives. The Indian Balance of Payments position have been characterized by a high import bill, stagnated agriculture, high taste for foreign goods and services, continuous fall in the country's foreign exchange, inflationary pressure, inefficient manufacturing sector and emigration of inhabitant to other countries. The paper uses empirical analysis to examine the nature of India's Balance of Payments position from 1970-2014 by employing econometric techniques of Vector Error Correction Model (VECM). The data used in this paper is sourced solely from secondary source of Reserve Bank of India Database. The estimated results of VECM model shows a long run relationships between the variables (Balance of Payments, Exchange Rate, Foreign Reserves, and Index of Openness). The results also show that there are no shortrun relationships running from exchange rate, foreign exchange reserves and index of openness to balance of payments variable in the two models. However, it recommends in this study that the two countries should diversified their economies in order to have favourable balance of payments. It also recommends that the countries should try as matter of fact to minimise the over dependent on developed nations on their process of development. Recommendation is also given for these countries to use expenditure reduction and expenditure switching policies to achieving favourable balance of payments. It concludes at end of this study that a country must be cautions with any policy related balance of payments.

Keywords: Balance of Payments, Exchanged Rate, Foreign Exchange Reserves, Index of Openness, Exports, Imports, GDP and Vector Error Correction Model.

1. INTRODUCTION

The balance of payments can be defined as a systematic records of economic and financial transactions for a given period between residents of an economy and non-residents (rest of the world). Specifically, it records transactions in goods, services and income, as well as changes in ownership and other holdings of financial instruments, including monetary gold, Special Drawing Rights (SDRs) and claims on, and liabilities to the rest of the world.

International or external trade is the flow of goods and services across international boundaries. Exports refer to the movement of goods and services outside the country, while imports refer to the movement of goods and services into the country. Visible exports and imports refer to tangible goods such as crude oil, cocoa, machinery and textiles that are traded, while invisible exports and imports refer to intangible services such as banking, insurance and shipping services which accompany merchandise trade.

In the modern world, there is hardly any country which is self-sufficient in the sense that it produces all the goods and services it needs. Every country (like India) imports from other countries the goods or services that cannot be produced at all in the country or can be produced only at an unduly high cost as compared to the foreign supplies. Similarly, a country (e.g India) exports to other countries the commodities which those countries prefer to buy from abroad rather than produce at home.

There are both traditional and more novel causes of balance of payments crises. A traditional cause of balance of payments crises is a sudden and severe increase in a country's trade deficit. Such an increase

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might occur, for example, if bad weather drastically reduces production of key export crops and export earnings. Another classic case is one in which a steep rise in oil prices drastically increases a country's import bills, as case of India in 1990s as a result of oil shock of 1990 and 1991.

Predicaments in the external sector have been shown to have destabilizing effects on the domestic economy at large. Put in other words that disequilibrium in country's balance trade (or the overall balance of payments) can influence the way resources are allocated internally just as disequilibrium in the domestic economy translated in the form of unemployment or inflation, affects the external economy. The use of expenditure-switching and expenditure-reducing fiscal and monetary policies to affect prices, interest rates and exchange rates can be relied upon to bring the economy back on tract.

However, the balance of payments is one of the major indicators of a country's status in international trade. BOP accounting serves to highlight a country's competitive strengths and weaknesses and helps in achieving balanced economic growth. It can significantly affect the economic policies of a government and the economy itself. The cardinal aim of every government in India since from independent up till date is to get the balance of payments position right. This cardinal aim has inspired every major turn of policy; setting of bank rates, changes in taxes, regulation of incomes, the restructuring of industry, introduction of export rebates, control of money supply, level of local government expenditure, etc. Therefore, every country strives to a have a favourable balance of payments and maintains its long run sustainability.

The broad objective of this research against the above background is to empirically assess the nature of India's balance of payments using empirical Analysis. This research made use of time series analysis to establish a mathematical relationship between balance of payments and external sector variables. The past empirical studies were reviewed to test the theoretical proposition of balance of payments in these countries. Results presentations, description, analysis and interpretation are also considered in this study. Lastly, the recommendations are suggested at the end of this research work.

2. AN OVERVIEW OF THE INDIAN ECONOMY

India is located in Southern Asia, bordering the Arabian Sea and the Bay of Bengal, between Burma and Pakistan (CIA World Fact Book: India, 2008). Like Nigeria, India has a federal republic style of government. This means that it is a state in which, the powers of the central government are restricted and in which the component parts (states, colonies, or provinces) retain a degree of self-government; ultimate sovereign power rests with the voters who choose their governmental representatives (CIA World Fact Book: Notes and Definitions, 2008). India has the second largest population in the world after China.

In common with other oil-importing developing countries, India experienced a severe external shock in 1973 when oil prices quadrupled and again after 1979, when oil prices more than doubled. India was able to adjust to both shocks somewhat more easily than other oil-importing developing countries,

In late 1980's India was confronted with a grave fiscal and balance of payments crisis. To combat the critical situation Government of India launched an Economic Reform programmed in July 1991. The emphasis of the economic reform programmed was on attainment of macro-economic stability and shifting the Indian economy to a higher growth plan. The core of Indian's economic reform strategy has been to dismantle the central economic control exercised during the last four decades. Some of the key measures taken under the reforms policy were-(i) Controlling the fiscal deficit, (ii) Cutting and rationalizing corporate taxes and personal income tax, (iii) Abolishing industrial licensing, (iv) Encouraging foreign investment, (v) Liberalization of import rules and cutting import duties, (vi) Encouraging exports, and (vii) Deregulating the capital market.

India's balance of payments, which is built up of a large trade deficit sustained by large positive invisible inflows, is truly a miracle of the new service-oriented global economy. The liberalized environment has

made India's services attractive to the new IT dependent sector of the developed countries. The trade deficit is financed largely by net invisible earnings consisting of remittances from expatriates and software. The importance of invisibles in the BOP is increasing in the post reform period.

Foreign direct investment (FDI) has played an important role in the process of globalization during the past few decades. The rapid expansion in FDI by multinational enterprises since the mid-eighties may be attributed to significant changes in technologies, greater liberalization of trade and investment regimes, and deregulation and privatization of markets in many countries including developing countries like India. The widening gap of deficit in India's current account is always compensated by the surplus accumulated in capital account.

2.1. Theoretical Framework on Balance of Payments

In view of the importance of external sector to economic growth and development, especially in developing countries like India, a number of theoretical studies on the determinants of balance of payments have been carried-out. Prominent among balance of payments theories are Keynesian and Monetary theories of balance of payments. Within the Keynesian ideas we have several approaches which include Absorption Approach.

2.1.1. Absorption Approach

The original Keynesian balance of payments theory was the absorption model developed by **Alexander of the IMF**, in the early 1950s. As in all Keynesian models, the balance of payments, on current account, is analysed as a macroeconomic phenomenon in the goods market. The balance of payments (current account) will necessarily equal the difference between aggregate domestic output and aggregate domestic expenditure (with a surplus if output is larger and vice versa). This conclusion follows from a manipulation of the basic national income identity, which is that there are three ways of measuring national income: income, output (O) and expenditure (E), of which only the latter two are relevant here.

$$O = E \qquad (2.1)$$

The expenditure is defined as the sum of consumers' expenditure (C), investment (I), government expenditure (G) and exports (X) less imports (M) as presented below:

$$E = C + I + G + X - M \qquad (2.2)$$

(2.2) can be substituted into (2.1) to give;

$$O = C + I + G + X - M \qquad (2.3)$$

(2.3) can be arranged as;

$$X - M = O - (C + I + G) \qquad (2.4)$$

This piece of manipulation is the absorption approach. Alexander called (C + I + G) absorption rather than the more usual total domestic expenditure (TDE). The implication of the approach is simple. One should not seek to explain the balance of payments directly, rather one should look at the determinants of output and total domestic expenditure and the balance of payments will be automatically defined as a residual. Competitiveness, the exchange rate and any other factor will matter only in so far as it influences either TDE or output. These effects may be substantial or small but critically, they may be apparently perverse. A devaluation will increase expenditure, and may even reduce output (or output may already be at a maximum). In this case, a devaluation would worsen the balance of payments, irrespective of the size of elasticities. It is also interesting to note here that this approach has two basic implications, thus, it is common to see statements like;

1. Deflation can improve the balance of payments.

2. Devaluation can improve the balance of payments but only if it is 'made to work' by deflation (strictly, this assumes that output is fixed).

3. However, the obvious conclusion is not drawn unless we said that the balance of payments can only be improved if there is deflation.

2.1.2. *Monetary Theory of Balance of Payments*

The new so-called '**Monetary Approach'** to the theory of the balance of payments has been developing and gaining popularity in recent years as an alternative to the 'Elasticity Approach', the 'Absorption Approach,' and various other Keynesian approaches which may be termed 'The Foreign-income Multiplier Approach' and 'The Meade-Tinbergen-Keynesian Economic-policy Approach.'

The Monetary Approach to the balance of payments starts from the proposition that balance of payments disequilibrium involves an inflow or outflow of international money and hence must be treated as a monetary phenomenon requiring the application of the tools and concepts of monetary theory (Frenkel and Johnson, eds., 1976). This approach involves two major changes in theoretical orientation and formulation. The first is the simple tautological point that domestic money can either be created or destroyed by domestic monetary policy operating on the volume of domestic credit extended by the banking system or be imported or exported by running a surplus or deficit on accounts of the balance of payments other than the money account. The second and more subtle change is that international money flows are consequence of stock disequilibria, that is, differences between desired and actual stocks of international money—and as such are inherently transitory and self-correcting.

The formal monetary approach to balance of payments model based on Johnson (1976) specifies a money supply identity, a money demand function and an equilibrium condition. The model consists of the following set of equations:

$$M^s = L(R + D) \tag{2.5}$$

$$M^d = L(Y, P, I) \tag{2.6}$$

$$M^s = M = M^d \tag{2.7}$$

Where: M^s = money supply, R = international reserves, D = domestic credit, M^d = money demand, Y = level of real domestic income, P = price level, I = rate of interest, and M = equilibrium stock of money.

Equation (2.5) postulates that money supply is determined by the availability of international reserves and the level of domestic credit created by the country's monetary reserves, while Equation (2.6) sets out the real demand for money as a function of real income, the inflation rate and the interest rate. The monetary theory states that there is a positive relationship between money held and income ($\partial M^d/\partial Y > 0$) and money held and the price level ($\partial M^d/\partial P > 0$), and a negative relationship between money held and the interest rate ($\partial M^d/\partial I < 0$). Equation (2.7) above is the equilibrium condition in the money market. By combining Equations (2.5), (2.6) and (2.5), placing the variables in percentage changes, and isolating reserves as the dependent variable, we may write the reserves flow equation as follows:

$$\partial R = [L(Y, P, 1)] - \partial D \tag{2.8}$$

Equation (2.8) above is the fundamental monetary approach to balance of payments equation. It postulates that the balance of payments is the outcome of the divergence between the growth of the demand for money and the growth of domestic credit, with the monetary consequences of the balance of payments bringing the money market into equilibrium.

2.2. Empirical Framework on Balance of Payments

In view of the importance of external sector to economic growth and development, especially in developing countries, a number of theoretical and empirical studies on the determinants of balance of payments have been carried out. The objective here is to review some of these past studies as a guide to the choice of appropriate variables to be used in this study. It reviews the critical points of current knowledge and methodological contributions to the subject matter.

MacDougall (1961) in his paper on India's Balance of Payments explained that the balance of payments may well be the most important factor limiting India's economic development. He further elaborated that the shortage of imported materials is at present seriously holding up production and preventing anything like the full use of the nation's industrial capacity, labour and land. More imports could make possible an increase in production several times as great in value he concluded.

Mundell (1968) established that monetary policy is more effective than fiscal policy, in attaining external balance, basically because monetary policy improved both the current and capital accounts of the balance of payments. However, many latest studies related to this concept have been linked to the internal and external balance of Meade Tinbergen of 1950s. Assumable therefore, it was this focus on monetary policy and on the overall balance of payments position, coupled with the gradual realization with perfect capital mobility that the money supply ceased to be controlled by the monetary authorities even in the short-run that led Mundell and Johnson to develop the modern monetary approach.

Learmer and Stern (1970) noted that there are no well-defined criteria for choosing a particular functional relationship/specification. Rather, it is the researcher who decides what functional form to use (influenced by the theoretical position chosen), provided the choice is not harmful to the results obtained. He added that in view of developments in the area of econometric modelling and the fact that there is no universally accepted model of choice that can fit all or capture the dynamics in different countries; the models have undergone a number of refinements in recent times.

Gafar (1980) using Jamaica as a case study tested for the effect of devaluation on the balance of payments adjustment. Using the elasticity approach based on the **Marshall-Lerner's Condition** for exchange rate stability, he tested if devaluation is an appropriate policy tool for balance of payments adjustment. He estimated the price and income elasticity for import and exports of Jamaica including tourism. It was found that Marshall-Learner's Condition[1] was satisfied in two condition estimated; first when tourism was excluded from the model and the other when tourism was included. He therefore concluded that while devaluation is a useful policy device to correct balance of payment deficits, it could possibly produce contra dictionary effects of used in isolation of other monetary and fiscal measures. It is worthy of note that foreign exchange reserve is not inclusive in any of the two models estimated as it leads to high degree of correlation with the income variable.

Thirlwall and Hussain (1982) paper started with the preposition that for most countries the major constraints on rate of growth of output is likely to be the balance of payments position because this sets the limit to the growth of demand to which supply can adapt. They also ascertain that most countries, apart from the oil producing countries of the Middle East, can absorb foreign exchange without difficulty; and most cannot earn enough. According to them, it is true, of course that the world as a whole cannot be balance of payments constrained, for all the rest to be so. There cannot be many less developed countries that could not utilize resources more fully given the greater availability of foreign exchange.

Ajakaiye (1985) also using the elasticity approach analysed the impact of alternative combinations of import structures and rise short runs after analysing different bounds of import structures under alternative sets of price elasticity of demand for exports and imports in Nigeria. In his study, he concluded that devaluation might not work if the elasticity are such that relevant import structure does not hold. Devaluation

should be accompanied by a certain form of import restructuring. But in a case were actual import structure fails within the bounds where the sum of price elasticity of demand for exports and competitive imports plus the difference between the price elasticity of demand for non-competitive imports weighted by the share of non-competitive imports in the total, exceed one; the devaluation could work but structure of imports must be monitored on a continuous basis to ensure that it does not get out of hand; especially if elasticity are unstable.

Olutim et al (1986) adopted both theoretical and empirical approach to the issue of devaluation. On the theoretical grounds, they argued that be it from the perspective of relative prices (elasticity) approach, or the absorption approach, or even the monetary approach, neither offered a definitive guide as to when devaluation might be beneficial to a developing deficit country with internal adjustment problems.

Lessard and Williamson (1987) asserted that an explicit policy reorientation towards the liberalization of the Indian economy was adopted in July 1991 following a balance of payments crisis in late-1990. The task of operationalizing the interpretation of capital flight is complicated by the existence of legal restrictions placed upon the outflow of capital. Residents engaged in capital flight are unlikely to make a point of informing the compilers of balance of payments statistics of their actions.

Abebefe (1995) seemed to share his view that agricultural exports have a great role and potential for boosting export earnings as well as providing the needed diversification for the country's export structure. Thus, Abebefe explained that if effectively and adequately promoted, it can contribute immensely to meeting the then deficiency in the supply of foreign exchange in the country.

Chopra et al (1995) investigated that India initiated economic reforms to find the way out of the growing crisis. Structural measures emphasized accelerating the process of industrial and import delicensing and then shifted to further trade liberalization, financial sector reform and tax reform. They maintained that prior to 1991, capital flows to India predominately consisted of aid flows, commercial borrowings, and non-resident Indian deposits. Direct investment was restricted, foreign portfolio investment was channeled almost exclusively into a small number of public sector bond issues, and foreign equity holdings in Indian companies were not permitted they concluded.

Masih and Masih (1996) estimated their results by finding no causality for Philippines using cointegration and vector error correction method. In fact, they could not reject non- existence of causality for all six countries they studied. In another study, **Masih and Masih (1997)** discovered bi-directional causality in Korea and Taiwan.

According to **Paul (1996)** exchange rate control is the most widely used method for correcting disequilibrium in the balance of payments. Exchange controls according to him refers to the control over the use of foreign exchange by the control bank. Paul maintained that under this method all the exporters are directed by the apex bank to surrender their foreign exchange earnings.

Reddy (1999) held that the major cause of the conflict of values within the public service sector in India arises out of the dichotomy between the mores of a traditional society and those of modern organization. Reddy maintained that bureaucracy by its very nature is arranged in a way that people are recruited on merit, and promotions are given on the basis of set criteria; therefore, it is a system that is meant to be, dispassionate, objective, impersonal and impartial. India however according to him, has a traditional society where forces like caste, clan, familial relationship and personal preferences play a decisive part of life. Reddy said that the conflict originates from the Indian geopolitical system tries to implement a Weberian model of administration[2]; thus creating formative influences that exert such pressures on the individual.

Rose (2000) estimated a gravity trade model for 186 countries using a 5-year moving average of the variance of the nominal exchange rate return and discovers that exchange rate volatility has a significant negative impact on trade (estimates show that zero exchange rate volatility would have resulted in a 13

percent increase in trade). It was this seminal work of Rose that started the debate that countries participating in a currency union seemed to trade three times more than expected – even when one controls for the impact of exchange rate volatility.

Dhliwayo (2004) used data for the period 1980-1991 to investigate the monetary approach to balance of payments in Zimbabwe. His findings indicate a one to one negative relationship between domestic credit and the flow of international reserves. The empirical results validate the monetary approach to balance of payments in Zimbabwe. This implies that money plays a significant role in the determination of deficit in the balance of payments.

Gulzar and Feng (2007) conducted a research on how balance of payments can act as a constraint to the rate of growth of economic output in long-term in Spain within 1850 to 2000. They discovered that the Spanish rate of GDP growth was slightly above both the EU's growth rate, and the balance of payments-constrained growth rate, so that the foreign sector would have worked to some extent, although very mildly, as a constraint to the growth of the Spanish economy in the long run.

Vasquer, Javier and Chaquero (2007) proposed a methodology for analysing the effect of balance of payments liberalization on measures of poverty and distribution problems in Jamaica with a glossary look at both micro and macro simulation of the cost of rent seeking. In the application to Jamaica, they found that the reallocation of resources away from rent-seeking activities in the presence of exchange controls is significant and has large macroeconomic effects. Opening up of the current account has little effect on poverty, but liberalization of the capital account reduces poverty, especially amongst the very poor they asserted.

Imoisi (2012) carried out a multiple regression analysis using the ordinary least square (OLS) method for log linear form to ascertain the impact of the independent variables (exchange rate, inflation rate and interest rate) on the dependent variable (balance of payments). From his findings, it was observed that the explanatory variables appeared with the right signs and thus conformed to economic theory. However, it was discovered that out of the explanatory variables, only inflation rate was not statistically significant at 5% level of significance. Due to the findings, he recommended that the government should embark on efficient and effective expenditure switching policy or devaluation of Nigeria Currency (Naira), as devaluation of the country's currency will make exports cheaper and imports more expensive, thus, leading to a favourable balance of payments position in the country.

NASSCOM (2012) exhibited that the growth of software services earnings is a recent development in the reform period. India possesses huge manpower professionally equipped with software services potentials who find the way in earning foreign exchange by exporting the services. The NASSCOM data exhibited the growing share of software services in India's current account balance. In the data Total software services exports was only $754 million during 1995-96. The total software export contribution increased unbelievably in the years of economic liberalization. The earnings from software services multiplied several times within a decade of time, that is, it increased from $ 7556 million during 2001-02 to $ 60956 million during 2011-12. NASSCOM ascertained that the growth rate was steady and above 10% during every year despite the global challenges put forward by the so called financial crisis. Interesting thing according to NASSCOM is that the debit in this item is very narrow, say $1256 million during 2011-12 that declined from $2267 million during 2006-07. United States remained the major destination for software services exports from India NASSCOM concluded.

As putted by **Mathew and Jomon (2013),** India's balance of payments, which is built up of a large trade deficit sustained by large positive invisible inflows is truly a miracle of the new service-oriented global economy. The liberalized environment has made India's services attractive to the new IT dependent sector of the developed countries. Mathew stated that the trade deficit is financed largely by net invisible earnings consisting of remittances from expatriates and software. The importance of invisibles in the BOP

is increasing in the post reform period. Mathew also continued by explaining that a notable development found in the performance of India's current account is the growing contribution of the invisibles. Among the three components such as services, transfers and income, the largest surplus is generated by the services followed by transfers while income flow is greater from India adding net deficit in the BOP account as explained by Mathew.

Alexander (2013) in a study of Ghana BOP Monetary Approach from 1980-2010 using Dicker Fuller model. He found that inflation is statistically insignificant but 100% increase in domestic credit leads to 6.6% decrease in reserves, which implies that excessive generation of credit causes discrepancy in reserves. He concludes that though monetary variables are not solely responsible for the disequilibrium in balance of payments, factor such as government expenditure also play a role as he said.

Reserve Bank of India (2014) in its "**Macroeconomic and Monetary Developments Third Quarter Review 2013-14**" reviewed that in response to the adjustment of the rupee exchange rate, slowdown in imports particularly gold, as also improvements in global trade, India's trade deficit contracted for the sixth consecutive month in December 2013. Consequent upon the shrinking of the trade deficit, the CAD declined from 4.9% of GDP in Q1 to 1.2% of GDP in Q2 of 2013-14. The full year CAD is likely to be contained within the sustainable level of about 2.5% of GDP. This, along with renewed capital inflows, bolstered through the Reserve Bank's swap windows helped reduce external vulnerabilities and boost confidence. The report shows that the forex reserve loss earlier in the year has been more than recouped and near-term external vulnerabilities have been mitigated. However, according to this report the capital flows to EMDEs could moderate over 2014-15, there is no scope for complacency and the breather provided by a reduction in the immediate risks needs to be used for developing the resilience of the external sector over the medium term.

3.   ESTIMATION TECHNIQUES

This section gives a detailed account of the empirical estimation procedure that was undertaken, together with a sources of data collection. This study will employ an econometric techniques such as Vector Error Correction Model (VECM), impulse response, variance decomposition, among others.

The paper uses empirical analysis to examine the nature of India's Balance of Payments position from 1970-2014 by employing econometric techniques of Vector Error Correction Model (VECM). The data used in this paper is sourced solely from secondary source of Reserve Bank of India Database.

The implicit form of the model is:

$$\text{BOP} = f(\text{EXR, FER, OPNS}) \tag{3.1}$$

Where: BOP = Balance of Payments, ERX = Exchange Rate, FER = Foreign Exchange Reserves and OPNS = Index of openness. Note that the **index of openness = exports + imports /GDP**

A dynamic representation of the long run relationship of equation (3.1) above using a linear ordinary least squares regression model specified as error correction model, where all variables are found to be stationary or co-integrated at the first level of differencing is specified as follows:

$$d \ln \text{IBOP}_t = \beta_0 + \beta_1 d \ln \text{IEXR}_t + \beta_2 d \ln \text{IFER}_t + \beta_3 d \ln \text{IOPNS}_t + \beta_4 \text{ECM}_{t-1} + U_t \tag{3.2}$$

The coefficients β_1, β_2, and β_3 in equation (3.2) above are the elasticities of exchange rate, foreign reserves, and index of openness respectively. On a priori grounds, β_2 and $\beta_3 > 0$; while $\beta_1, < 0$.

However, VECM can be seen as a first-difference version of VAR model and is applied when each variable of regression is integrated with the same order, say, I(1). The Johansen VECM specification of above model is specified as;

$$\Delta X_t = \Sigma \Gamma_j \, \Delta X_{t-j} + \alpha \beta X_{t-k} + \mu + \varepsilon_t \tag{3.3}$$

Where variable X_t is an n vector of endogenous variables with same order of integration; Δ represents the first difference; k shows the lag length; Γ_j is an $n \times n$ matrix of coefficients to be estimated; and μ and ε_t are the intercept vector and error term, respectively. In addition, α is an $n \times r$ matrix showing the speed of correction and β is the cointegrated matrix. To understand the application of VECM more practically, take instance that we have two time series X_t and Y_t, it says that negative error correction terms would mean that when Y_{t-1} is above its longrun level then ΔY^*_{t*} will be negative, pulling Y back towards its longrun relationship with X. Note that before running VECM one needs to conduct three important tasks related to it, which are unit root test, lag selection and cointegration test. In this study, Augmented Dickey-Fuller (ADF) unit root test are used for test of stationarity, and the Johansen cointegration test is applied to investigate if the target I(1) variables exhibited long-term relationships. Under the Johansen test, both trace and maximum eigenvalue statistics are composed. However, impulse response and variance decomposition will be estimated in the VECM environment of this study.

4. CONVENTIONAL RESULTS

Tests such as stationarity test, lag selection and cointegration test are carried-out before running the VECM model. It further obtains the parameters/elasticities of the models specified earlier, evaluates the statistical significance of the value of the parameters obtained, and interpret the results. Analysis of impulse response and variance decomposition are also carried-out in this chapter. Model diagnostic checks are adopted tests to examine structural as well as parameter stability of the model. Note here that all data results of these tests are carried-out using **E-views version 8**.

4.1. Unit Root Test Results (ADF Unit Root Tests)

At levels the ADF test shows that the calculated t-statistic is less than the Mackinnon test statistic at 5%. This provides the basis for the accepting null hypothesis (H_0) that the variable (s) has unit root. In other way, at first difference the ADF test shows that the calculated t-statistic is greater than the Mackinnon test statistic at 5%. This provides the basis of rejecting null hypothesis (H_0) and accepting alternative hypothesis (H_1) that the variable (s) has no unit root.

4.2. Lag Selection Criterion Results

In the table below, the E-views' results of lags order selection suggested by different criteria are presented. As said earlier, in theory, it was said that the lower the value in each criterion the better the results. Note that the negative sign is considered in determine the lowest value of AIC, HQ, or other criteria. Consider the following table:

Table 4.1
Lag Order Selection Criteria Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	−184.5211	NA	0.115866	9.196151	9.363328	9.257028
1	38.48986	391.6290	4.79e-06	−0.901944	−0.066055*	−0.597560
2	61.48596	35.896*	3.49e-06*	−1.243218*	0.261382	−0.695325*
3	72.71153	15.33248	4.68e-06	−1.010318	1.162993	−0.218918
4	82.60716	11.58513	7.13e-06	−0.712544	2.129478	0.322363

* indicates lag order selected by the criterion.

In the above the star (*) indicates the optimal lags for each criterion. Therefore, in this case, the results shows that almost all the criterion suggested the lag should be up to two (−2) as indicated by star (*).

The test of cointegration used in this research is Johansen Test of Cointegration which estimated Eviews' results are presented below:

Table 4.2
Johansen Cointegration Test for India's Model

Maximum Rank/Number of Cointegrating Equation	Maximum Eigenvalue	Critical Value (Eigenvalue)	Probablity** (Eigenvalue)	Trace Statistics	Critical Value (Trace Statistics)	Probabity** (Trace Statistics)
0*	35.3262	27.5843	0.0042	65.0051	47.8561	0.0006
1	22.1726	21.1316	0.0356	29.6788	29.7971	0.0516
2	7.1278	14.2646	0.4742	7.5062	15.4947	0.5196
3	0.3784	3.8415	0.5384	0.3784	3.8415	0.5384

Eigenvalue test indicates 2 cointegrating equations. Trace test indicates 1 cointegrating equations at the 0.05 level.
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values.

The table 4.2 above presented the Johansen cointegration test for the model. Based on the Eigenvalue statistics there are two cointegrating in the model. While Trace statistics indicates that there is one cointegrating equation in the India's model. In a note shell all the tests of the two models found that there is at least one Cointegration equation in the variables meaning there is longrun relationship in the variables. The decision to either accept or reject Ho is presented under each table by E-views. Note that in the India's balance of payments model, we will adopt Trace suggestion of one cointegrating equation since Trace test has some advantages more than Eigenvalue.

4.3. Conventional Regression Results (VECM)

In order to determine the direction of causality, Vector Error Correction Model (VECM) approach allows us to distinguish between long run and short run causality. Error Correction Term (ECT_i) contains the long run information since it is derived from the long run cointegrating relationship. It should be noted that the coefficient of error correction term is a short run adjustment coefficient correcting long run disequilibrium in dependent variables in each short period. Consider the following VECM results of India's balance of payments model:

Table 4.3
Conventional Regression Results of India's balance of payments Model (VECM)

Endogenous Variables	Coefficients	Std. Error	t-values	P-values
C(1)/ECM$_3$	–0.7737	0.2671	–2.8967	0.0066
C(2)/BOP(–1)	–0.1703	0.2225	–0.7655	0.4494
C(3)/BOP(–2)	–0.1939	0.1745	–1.1113	0.2745
C(4)/EXR(–1)	8.3356	4.7117	1.7691	0.0861
C(5)/EXR(–2)	–4.9815	5.2949	–0.9408	0.3536
C(6)/FER(–1)	–1.2428	1.7147	–0.7248	0.4737
C(7)/FER(–2)	1.6183	1.6080	–1.0064	0.3216
C(8)/OPNS(–1)	–1.7865	4.1834	–0.4270	0.6721
C(9)/OPNS(–2)	–5.3759	4.0754	–1.3191	0.1962

Source: E-views version 8 (see Appendix),

Table 4.4 above presents the results of conventional regression of equations (2) specified in section three above. The C(1) or ECT_1 shows the speed of adjustment towards longrun equilibrium. It is also called one period lag residual of the cointegrating model. Therefore, the coefficient of error correction term is a short run adjustment coefficient correcting longrun disequilibrium in dependent variables in each shortrun period. The rule for accepting that the variables have longrun association is when C(1)/ECT_1 coefficient is

negative and statistically significant (using P-value). It is statistically significant when the P-value is less than 5% (by rejecting Ho). In the table above it confirms that there is longrun association between balance of payments variable (NBOP) and the external sector variables (exchange rate, foreign exchange reserves and index of openness). In the table, it is shown that the value of the coefficient of error correction variable (ECT or C(1)) of the India's model is –0.7737 with P-value of 0.0066. This indicates that about 77.37% of the disequilibrium is corrected/adjusted in one year. This shows that there is a longrun relationship running from external sector variables to balance of payments BOP. As stated earlier, the error term is the speed of adjustment toward equilibrium in the longrun in the model. The results also indicates that there are no shortrun relationships running from lags periods (–1 and –2) of all the external sectors variables (exchange rate, foreign exchange reserves and index of openness) to balance of payments. This is due to the fact that their respective probability values are all more than 5%.

4.4. Impulse Response Function and Variance Decomposition

The impulse response function can simply be defined as a shock to a VAR/VECM system. Impulse responses identify the responsiveness of the dependent variables (endogenous variables) in the VECM when a shock is put to the error term, such as U_1, U_2, U_3 or U_4 at equations of VECM model specified in previous section.

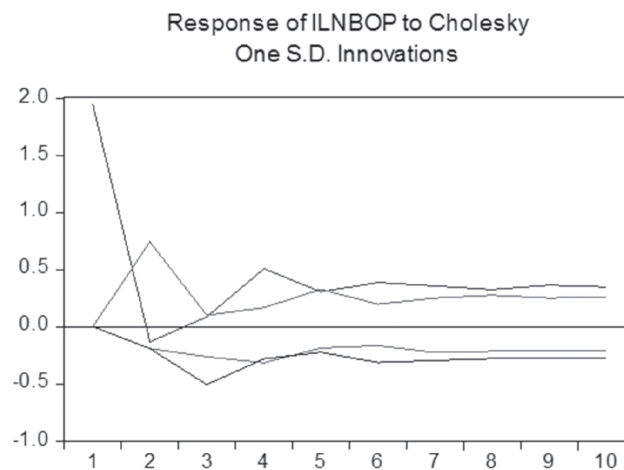**Response of ILNBOP to Cholesky
One S.D. Innovations**

Figure 1: Impulse Response Result

The results of impulse response in above figure show how BOP responses to one S.D positive shock to external sector variables change (shock). In the results, it shows that the responses of BOP to its own shock move all around positive quadrat in the graphical results, starts from value around 1.94 in year one (shortrun) and fluctuates around positive zero-points except for year 2 (shortrun) which is around value of –0.13. It also shows that BOP responses positively to exchange rate shocks in all years around zero-points values of average of 0.26 except for year one (0.00). Thus, the response of IBOP to foreign reserves shows movements around negative values in all years except in year one which it indicates no response (0.00). The last part of the result in above figure shows that the line moves all around negative values of around average of –0.29 except for first year which is around 0.00 (no response). In summary, the policy makers should bear in mind that BOP will response positively to its own shocks of average values around 0.38, positively to shocks of exchange rate of values around 0.26, both negatively and positively to foreign reserves shocks around zero-point values, and negatively to index of openness of average values of around –0.29 (see figure above).

Like in impulse response, the periods to be considered in variance decomposition analysis are 10 periods (years). In the variance decomposition as in impulse response we are considering both shortrun and longrun. One may assume that 1 to 5 periods may be consider as shortrun periods, while 6 to 10 years

as longrun periods. There also some situations where it considers a middle period (e.g year 5) as mid-term period. Consider the following diagram:
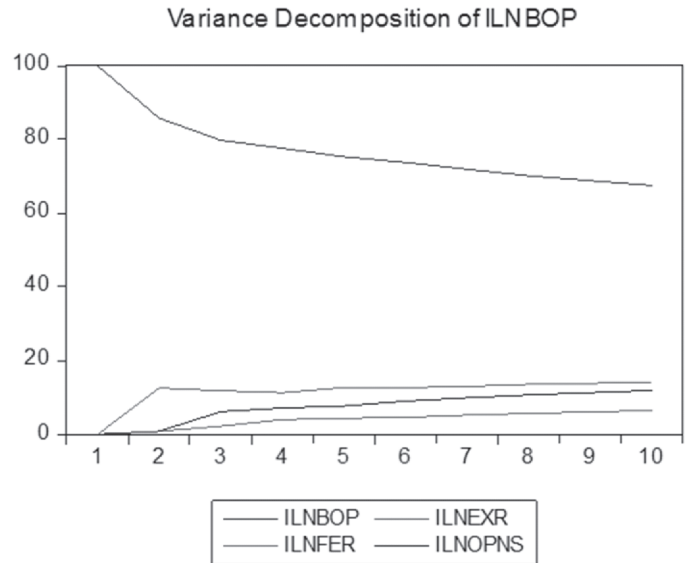

Figure 2: Variance Decomposition Results

The results in figure above show different contributions of each variable (in percentage) to the variation/ fluctuation (error variation) of balance of payments. The variance decomposition results show that an innovation/shocks/impulse to IBOP can account/cause about 85.82% of variation of the fluctuation in IBOP (own shock) in year 2 (shortrun period) and about 67.50% in year 10 (longrun period). In the shortrun, an innovation on exchange rate (IEXR) can cause 0.00% of the fluctuation of IBOP in starting year and about 13.55% in the longrun (year 8). However, the variance decomposition results in above figure show that a shock on India's foreign exchange reserves (FER) can account only 2.23% of the variation of IBOP in the third year (shortrun) and only about 5.21% in the seventh year (longrun). At the end, the contribution of index of openness (IOPNS) is about 6.15% in the third year (shortrun) and about 11.30% in year nine (longrun). In summary, the balance of payments (IBOP) contribution (own shock) has highest percentages in all years, while the contributions of foreign reserves are lowest in all years (see above figure).

The figure below shows that the India's BOP model is a stable model. This is due to the fact that at 5% level of significant, the recursive residuals of the model are within the ±2 s.e. bands (the two red lines).
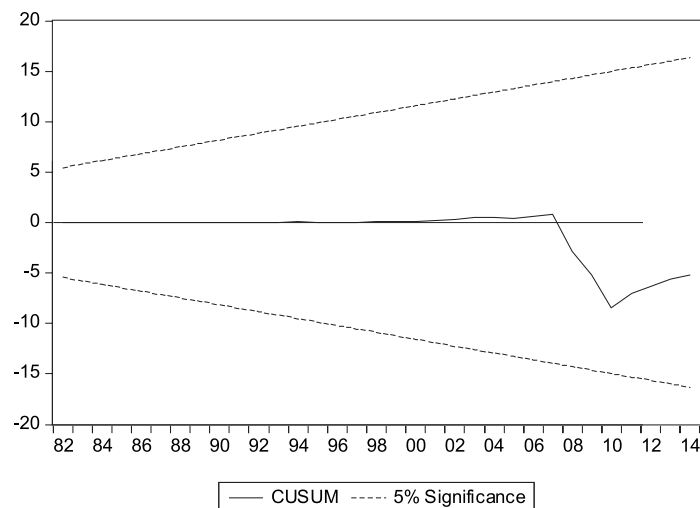

Figure 3: Stability Test Results

The stability test result above shows that up to the 2001 the recursive residuals evolve around zeros, then moves small to the positive quadrat till 2007 when it move to negative quadrat but very close to zero. In the 2010, the recursive residuals line down to its peak negative value very close to the lower band and move up-ward there-in but still within the negative band. In summary, based on Cusum stability test, the India's balance of payments model is the stable model and is capable for policy decision making and forecasting. In other words, the endogenous variable (BOP) is a stable variable that can be used by policy makers for forecasting.

5.   RECOMMENDATION AND CONCLUSION

In other words, to achieve a better foreign trade, exchange policy and promotion of balance of payments stability, this research work gives the following recommendations:

- The governments of these countries should take measures to break the overdependence on developed nations' resources and technologies in developing their economies. That is, they should initiate some means of developing their own should.

- Also, the government through the Apex Banks of these countries RBI should promote expenditure reducing policies by reducing money supply with a corresponding increase in interest rate and a fall in inflation rate to reduce demand for imported goods.

- It recommends in this study that the governments of this country should embark on efficient and effective expenditure switching policy through direct controls or devaluation of currencies (Naira and Rupees), as devaluation of the their currencies will make exports cheaper and imports more expensive, thus, leading to a favourable balance of payments position in these countries.

- As a matter of fact the Indian government should employ means of diversifying its economy, so as to get away from practices of mono-cultural economy.

- These countries are also recommend to take necessary action for reducing emigration of abled working class to the developed countries. For instance, India should minimise the practice of migration of people to developed countries (like US) for getting means of survival.

Conclusively, it said that international trade and balance of payments statistics are very useful for national economic planning and management. In view of the important role of the external sector in economic development, the need for timely and reliable statistical data on this sub-sector cannot be over-emphasised. Without reliable data on the external sub-sector, it is difficult to formulate appropriate policies aimed at promoting external trade. For instance, errors in external trade data can adversely influence Government policies regarding investment, trade liberalisation, exchange rates and a host of other factors that affect a nation's economic development programme. Therefore, at this end a cautions must be taken by government with regard to adopting any policy relating to balance of payments.

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