Macro-Economic Determinants of Balance of Payment in India

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Abstract: *This study investigates the impact of balance of payment on certain macro-economic variables like GDP, inflation, net exports, exchange rate etc in India between 1981 and 2013, using correlation and regression. It was found that all the variables except balance of payment, exhibited non-stationary. The results also indicate that balance of payment fluctuations in India could be caused by the balance of trade, exchange rate movement, inflation, industrial production and Gross Domestic Product (GDP). We concluded that balance of payment is significantly affected by all the above mentioned parameters but for exchange rate for which the impact turned out to be statistically insignificant*

Keywords: Macro Economic Determinants, Balance Of Payment, India, Gdp, Exchange Rate

1. Introduction

Balance of Payments (BoP), being a record of the monetary transactions over a period with the rest of the world, reflects all payments and liabilities to foreigners and all payments and obligations received from foreigners. In this sense, 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. Therefore, every country strives to a have a favorable balance of payments and maintains its long run sustainability. India's balance of payment position was quite unfavorable during the time of country's entry into liberalized trade regime. Two decades of economic reforms and free trade opened several opportunities that, of course, reflected in the balance of payments performance of the country (Mathew, 2013). The prominent factors on which the nation's balance of payments situation tends to depend are the balance of trade, exchange rate movement, inflation, industrial production and Gross Domestic Product (GDP). BOP crisis distorts the workings of the entire system (economy) because it creates disequilibrium between the supply and demand for money. BOP disequilibrium is a reflection of disequilibrium in the money market (IMF, 2000). Monetary disequilibrium produces adverse effect on the aggregate expenditure for goods and services (absorption) in the sense that, if the public has an excess supply of money it gets rid of it by passing its excess cash balance to foreign countries in exchange for goods and services. If the public desires to keep more money than it has in stock, it achieves it by reducing absorption and ultimately passes goods and services on in foreign countries in exchange for money. The above explanation raises several research questions; what are the causes and solutions of BOP fluctuation in India? Does currency depreciation induce relative price change, raising the domestic currency price of exports and imports and encouraging resources to move into the traded goods sector? This paper, therefore, attempts to evaluate the impact of macroeconomic variables like balance of trade, exchange

rate movement, inflation, industrial production and Gross Domestic Product(GDP) on the Balance of Payments situation prevailing in India. The rest of the article is organized into four sections: Section II contains the causes and trends of BOP fluctuations in India. The theoretical framework is present in section III. The methodology employed and estimation results are contained in section IV. Section V concludes with lessons for policy.

2. Determinants of Trend Balance of Payment in India

The staff note prepared by the IMF committee on Balance of Payment Statistics (IMF, 2000) reports that BOP problems are due to the disequilibrium in the physical flows, namely exports and imports of goods and services. Thus it could be analyzed on the basis of partial elasticity's of the exports and imports and the role of exchange rate in the adjustments of BOP to devaluation. In India, BOP fluctuation is motivated by factors such as money illusion, terms of trade, external debt servicing and exchange rate(devaluation) movement (Olaloku, 1979).

Table 1.1: Balance of Payment in India from 1981 to 2013(in billion)

Year	BOP (in billion)	Year	BOP (in billion)	Year	BOP (in billion)
1981-82	-22.53	1992-93	-8.81	2003-04	1439.93
1982-83	-12.70	1993-94	267.81	2004-05	1159.07
1983-84	-5.78	1994-95	181.60	2005-06	658.96
1984-85	8.67	1995-96	-40.50	2006-07	1636.34
1985-86	-4.42	1996-97	242.20	2007-08	3696.89
1986-87	-0.60	1997-98	166.53	2008-09	-971.00
1987-88	2.53	1998-99	182.45	2009-10	642.00
1988-89	0.98	1999-00	277.70	2010-11	595.00
1989-90	2.28	2000-01	276.43	2011-12	-685.00
1990-91	-44.71	2001-02	565.93	2012-13	207.00
1991-92	72.74	2002-03	820.37		

Source: Economic Survey (various years)

The "time series data" presented in Table1.1 indicates that BOP situation is worsening since 1981 but for the decade or so immediately following the post liberalization phase in Indian economy.

The balance of payments in India is under strain with current account deficit (CAD) widening to 4.6 per cent of GDP in the first half of 2012-13, after touching 4.2 per cent in 2011-12. The CAD is being financed by capital flows and not by running down reserves. However, a sizeable share of capital is in the nature of Foreign Institutional Investors (FIIs) investment that could moderate or even reverse if investors switch to risk-off mode. The balance of payments position therefore is more vulnerable, which has been reflected in high rupee volatility.

Though capital inflows increased, it fell short of fully financing current account deficit, resulting in draw down of foreign exchange reserves. The trade deficit increased to US$ 189.8 billion (10.2 per cent of GDP) in 2011-12 as compared to US$ 127.3 billion (7.4 per cent of GDP) during 2010-11. This increase of 49.1 per cent in trade deficit in 2011-12 was primarily on account of higher increase in imports relative to exports. Net invisible balances showed significant improvement, registering 40.7 percent increase from US$ 79.3 billion in 2010-11 to US$ 111.6 billion during 2011-12. Net invisible balance as per cent of GDP improved to 6.0 percent in 2011-12 from 4.6 per cent in 2010-11. The current account deficit widened to US$ 78.2 billion (4.2 per cent of GDP) as compared with
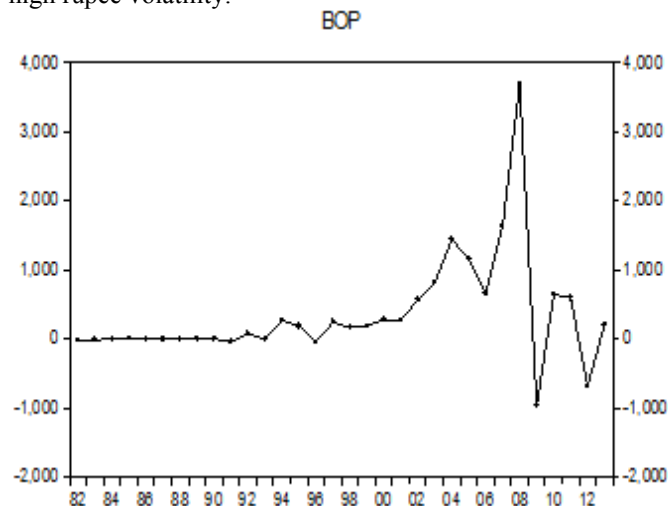

Figure 1: Graphical presentation of BOP (in billion) in India 1981-2013

SL. No.	Item	2007-08	2008-09	2009-10	2010-11 PR	2011-12 P	2011-12 H1 (April-Sept. 2011) PR	2012-13 H1 (April-Sept. 2012) P
1	2	3	4	5	6	7	8	9
I	**Current Account**							
1	Exports	166,162	189,001	182,442	256,159	309,774	158,202	146,549
2	Imports	257,629	308,520	300,644	383,481	499,533	247,739	237,221
3	Trade Balance	-91,467	-119,519	-118,203	-127,322	-189,759	-89,537	-90,672
4	Invisibles (net)	75,731	91,604	80,022	79,269	111,604	53,103	51,699
	A. Non-factor Services	38,853	53,916	36,016	44,081	64,098	30,409	29,572
	B. Income	-5,068	-7,110	-8,038	-17,952	-15,988	-7,587	-10,510
	C. Transfers	41,945	44,798	52,045	53,140	63,494	30,281	32,637
5	Goods and Services Balance	-52,614	-65,603	-82,187	-83,241	-125,661	-59,128	-61,100
6	Current Account Balance	-15,737	-27,914	-38,181	-48,053	-78,155	-36,433	-38,973
II	**Capital Account**							
	Capital Account Balance	106,585	7,395	51,634	63,740	67,755	43,490	39,989
i.	External Assistance (net)	2,114	2,439	2,890	4,941	2,296	640	15
ii.	External Commercial Borrowings (net)	22,609	7,861	2,000	12,160	10,344	8,388	1,726
iii.	Short-term debt	15,930	-1,985	7,558	12,034	6,668	5,940	9,511
iv	Banking Capital (net)	11,759	-3,245	2,083	4,962	16,226	19,714	14,899
	of which: Non-Resident Deposits (net)	179	4,290	2,922	3,238	11,918	3,937	9,397
v	Foreign Investment (net)	43,326	8,342	50,362	42,127	39,231	17,087	18,608
	of which: A. FDI (net)	15,893	22,372	17,966	11,834	22,061	15,741	12,812
	B. Portfolio (net)	27,433	-14,030	32,396	30,293	17,170	1,346	5,796
vi	Other Flows (net)	10,847	-6,016	-13,259	-12,484	-7,008	-8,278	-4,769
III	**Errors and Omission**	1,316	440	-12	-2,636	-2,432	-1,338	-653
IV	**Overall Balance**	92,164	-20,080	13,441	13,050	-12,831	5,719	363
V	**Reserves change**							

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US$ 48.1billion (2.8 per cent of GDP) in 2010-11. Net capital inflows were higher at US$ 67.8 billion (3.6 per cent of GDP) in 2011-12 as compared to US$ 63.7 billion (3.7 per cent of GDP) in 2010-11, mainly due to higher FDI inflows and NRI deposits. As the capital account surplus fell short of financing current account deficit, there was a drawdown of reserves (on BoP basis) to the extent of US$ 12.8 billion during 2011-12 as against an accretion of US$ 13.1 billion in 2010-11. As per the latest available data for the first half(H1- April-September 2012) of 2012-13, India's balance of payments continued to be under stress. This is reflected in the higher current account deficitin H1 (April-September) of 2012-13 than the corresponding period of the previous year, mainly due to worsening of trade deficit reflected in sharper decline in exports than the imports and lower invisibles surplus. The net capital flows in absolute term, were also lower during H1 of 2012-13 vis-à-vis the corresponding period of 2011-12 (Table 1.2). (Economic Survey 2012-13).

The paper titled 'Macroeconomic Determinants of Balance of Payments in Namibia" by Eita and Gaomab, Mihe Heinrich (2011) investigates macroeconomic determinants of the balance of payments in Namibia for the period 1999 to 2009. The investigation was conducted through co integrated vector auto regression methods. The investigation reveals that fiscal balance, GDP and interest rate are the main determinants of balance of payments in Namibia. Increase in GDP and interest rate causes an improvement in the balance of payments. The positive effect of GDP on balance of payments suggests that expansion of export has a

positive impact on current account and the overall balance of payments. More increased export potential through the development of new products and services should be encouraged. The positive impact of interest rate on balance of payments suggests that interest rate can be used as a policy tool to ensure favorable capital account and for improved balance of payments. An improvement in the fiscal balance is also associated with an improvement in the balance of payments. This implies that policymakers need to assess the forecast of SACU receipts in order to ensure readiness proactively when these receipts decline to avoid a possible macroeconomic, fiscal and balance of payments instability.
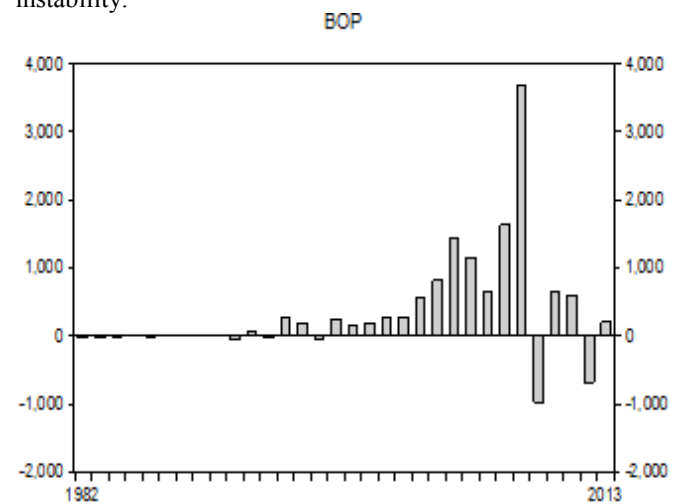

Figure1.2: BOP Dynamics in India (1981-2013)

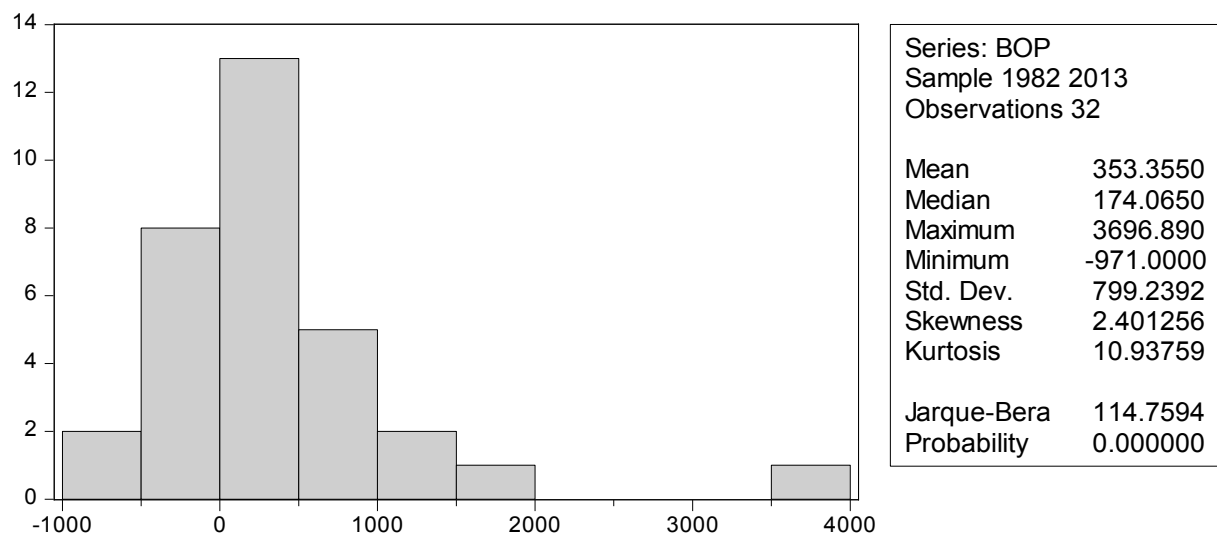| Series: BOP	
Sample 1982 2013	
Observations 32	
Mean	353.3550
Median	174.0650
Maximum	3696.890
Minimum	-971.0000
Std. Dev.	799.2392
Skewness	2.401256
Kurtosis	10.93759
Jarque-Bera	114.7594
Probability	0.000000

Figure 1.3: Descriptive statistics of level data (1981-82 to 2012-13)

In an attempt to identify the impact of BOP in India, the vulnerability of the economy to external shocks, Exchange rate , inflationary effects, balance of trade, Gross Domestic Production and industrial production have remained the focal issues. BOP adjustment through exchange rate changes relies upon the effect of the relative prices of domestic and foreign goods on the trade flows with the rest of the world (Thrillwall, 2004). This relative price, or terms of trade is defined by the ratio of export and import prices in domestic currency from the point of view of the country as a whole, the terms of trade represents the amount of imports that can

be obtained in exchange for a unit of exports or the amount of exports required to obtain one unit of imports. The terms of trade may vary both because of change in the prices expressed in the respective national currencies and because of exchange rate changes. Thrillwall (2004) noted that depreciation in the exchange rate at unchanged domestic and foreign prices in the respective currencies makes domestic goods cheaper in the foreign markets and foreign goods more expensive in the domestic market.

Sodersten (1989) contents that devaluation tends to make imports more expensive in domestic currency terms, which are not matched by a corresponding rise in export prices. This implies that the terms of trade will deteriorate. Deterioration in the terms of trade represents a loss of real national income and can lead to BOP crisis because more units of exports have to be given to obtain one unit of imports. Hence, the terms of trade effects caused by devaluation lowers income. A devaluation of currency causes an increase in the import prices and general price level. This initiates reduction in the real value of wealth held in monetary form such that the real value of cash balance is reduced leading to unfavourable BOP.

The monetary approach to the balance of payment sees the monetary implications of exchange rate depreciation as being absolutely crucial. But depreciation becomes unnecessary provided sufficient time (that is financing) is available for automatic correction to occur. According to this approach the mechanism by which depreciation affects the BOP is by raising the domestic price level and thereby increasing the demand for nominal money balances (Ikhide, 1993).

Mihe Heinrich'S paper investigates macroeconomic determinants of the balance of payments in Namibia for the period 1999 to 2009. The investigation was conducted through cointegrated vector autoregression methods. The investigation reveals that fiscal balance, GDP and interest rate are the main determinants of balance of payments in Namibia. Increase in GDP and interest rate causes an improvement in the balance of payments. The positive effect of GDP on balance of payments suggests that expansion of export has a positive impact on current account and the overall balance of payments. More increased export potential through the development of new products and services should be encouraged. The positive impact of interest rate on balance of payments suggests that interest rate can be used as a policy tool to ensure favourable capital account and for improved balance of payments. An improvement in the fiscal balance is also associated with an improvement in the balance of payments. This implies that policymakers need to assess the forecast of SACU receipts in order to ensure readiness proactively when these receipts decline to avoid a possible macroeconomic, fiscal and balance of payments instability.

Nwani, Vincent M.(2004) in the study 'Determinants of Balance of Payment Fluctuation in Nigeria' investigates the long-run determinants of balance of payment dynamics in Nigeria between 1981 and 2002, using econometric method of cointegration and error correction mechanism. It found that all the variables except balance of payment, exhibited non-stationary. The results also indicate that balance of payment cointegrated with all the identified explanatory variables, suggesting that balance of payment fluctuations in Nigeria could be caused by the level of trade openness, external debt burden, exchange rate movement and domestic inflation. The authors concluded that a reduction in fiscal deficits, an increased domestic production through private investment, inflation targeting and regulated capital market integration are the panacea to the negative fluctuation in the Nigerian balance of payment.

The messages from the review above are many. First BOP can be caused by many factors, notably, monetary, fiscal and structure of factors. Second, in an economy like India that is already beset with trend of unfavourable balance of payment (BOP). It would appear more reasonable to analyse the impact of certain important macroeconomic variables on the balance of payments situation in India over the period of time (1981-2013). Finally, it would be better to incorporate all the possible factors into one model and disaggregate the variables to identify the exact points that deserve attention.

3. Theoretical Framework

A theoretical rational for the BOP variability is the disequilibrium between domestic income and expenditure. The absorption approach focuses on the fact that current account imbalances can be viewed as the difference between domestic output and domestic spending (absorption).

$$A = X – M – Y – A \qquad (1)$$

Understanding how devaluation affects both income and absorption is therefore central to the absorption approach to the balance of payments. If devaluation raises domestic income relative to domestic spending the current account will improve. Machup(1960) formalized this possibility in his article "Balance of Payments and the so-Called Dollar Shortage". He stated that if devaluation raises domestic absorption relative to domestic income the current account will deteriorate. Machup assumes that if the economy is below the full employment level, then there will be an increase in net exports following devaluation. It is however not clear whether the employment effect will raise or lower national income.

The elasticity approach holds that BOP problems are due to disequilibrium in the physical trade flows namely export and imports of goods and services. This approach can be analyzed on the basis of partial elasticities of the exports and imports and the rate of exchange rate in the adjustment of BOP to currency devaluation. Thrillwall (2004) showed that there are two direct effects of exchange rate changes on the balance on goods and services. The increases in the volume (Volume effect) of exports due to the increase in the price competitiveness of the exports and the decrease in the volume of imports due to the decrease in the price competitiveness of imports subject to the devaluation. The volume effect clearly contributes to improving the goods and services account. Due to the devaluation (Price effect) exports become cheaper measured in foreign currency and imports become more expensive measured in domestic currency. The price effect clearly contributes to the worsening of the goods and services account. If the suitable conditions on the elasticities are fulfilled the balance of payments ought to improve. However, it may happen that quantities do not adjust as quickly as prices, owing to frictions and reaction lags of both consumers and investors; it takes time for consumers in both devaluing country and the rest of the world to respond to the changed competitive situation. Due to these facts the balance of payments may again deteriorate before improving towards the new equilibrium points.

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(Quantity adjustment periodic is defined as the period in which both quantities and prices can changes)

Adopting the general framework of BOP as described by Kallon (1994), the simple open-economy LM model is employed to derive the long-run BOP equation. The equation is of the form:

$$Yt = \propto_1 r_t + \propto_2 g_t + \propto_3 Pf_t + \propto_4 Y_{t-1} (\propto_1 < 0; \propto_2, \propto_3, \propto_4 > 0) \quad (2)$$

Where equation (2) is the commodity market equilibrium, which is assumed to depend on the domestic interest rate (r), level of government spending (g), the relative price of imported goods (Pf) and the real income (Y) of the previous year.

On the other hand the money market equilibrium (LM) equation is of the form:

$$M_t = B_1 Y_t + B_2 Y_t + B_3 Op_t \quad (B_1 > 0, B_2, B_3 < 0) \quad (3)$$

That is money market equilibrium is assumed to depend on real income (Y), domestic interest (r) and the domestic inflation rate (OP). BOP equilibrium is assumed to depend on real income (Y) relative price of imported goods (Pf) and the differential between the domestic interest rate and the sum of the foreign interest rate and the expected change in the exchange rate(er). Hence, the BOP equilibrium equation is of the form:

$$BOP_t = \theta_1 Y_t + \theta_2 Pf_t + \theta_3 r_t \ (\theta_1 < 0, \theta_2, \theta_3 >)) \quad (4)$$

Where r" = f (r, fr, er) (where fr is foreign interest rate, er is exchange rate defined as domestic currency versus foreign currency and r is defined in equation (2) above).

4. Model Specification and Estimation Techniques

The search for a reliable BOP function continues to be an intensive activity. In India, very little is known about the contemporary relationship between BOP and other macroeconomics variables. The BOP function adopted in this study, therefore, combines the structuralist, monetarist, and fiscalist approaches. Given the structure of the Indian economy since financial deregulation and trade liberalization, (post 1991) as well as voluminous empirical evidence on Indian and other nations of the world, we specifythe following long –run BOP function.

$$BOP = \propto_o + \propto_1 EXR_t + \propto_2 INF_t + \propto_3 BOT_t + \propto_4 IPt + \propto_5 GDP_t + \propto tD_t + \propto_7 TOT_t + U_t$$

$$(5)$$

Where BOP = Balance of payment, EXR = Exchange rate (N/$), INF_t =Inflation Rate, TOT = Term of trade, BOT = Balance of trade (Export – Import), IP = Industrial Production, GDP = Gross Domestic Product , U = error term.

Yearly data were used to estimate equation (5) above and the estimation sample is 1981 through 2013. All the time series data employed were gathered from various publications such as monthly and annual reports and statistical bulletin (for various years)and augmented by relevant publications of the Reserve Bank of India and the international financial statistics of the IMF. The main question here is whether macro economic variables such as exchange rate, inflation rate, external debt, Industrial Production, GDP etc have an impact on BOP and how significant is the impact of above mentioned macro economic variables on the BOP in Indian context.

5. Model Results and Discussion

Table 4.1 presents the results of descriptive statistics of the concerned variables of the level data for the chosen time period of thirty two years (1981 - 2013).

Table 4.1: Descriptive statistics of level data (1981-82 to 2012-13)

	BOP	BOT	ER	GDP	INF	IP
Mean	353.355	-1526.22	45.8574	0.02866	73.8	76.1312
Maximum	3696.89	-33.5	83.0262	0.1016	167.6	172.2
Minimum	-971	-10348.4	10.3354	-0.9891	21.5	22.3
Std. Dev.	799.239	2673.62	23.3940	0.18695	42.0323	47.4894
Skewness	2.40125	-2.03231	-0.30931	-5.27547	0.54836	0.78462
Kurtosis	10.9375	6.23374	1.64093	29.2526	2.31556	2.35399
Jarque-Bera	114.759	35.9709	2.97299	1067.36	2.22835	3.83981
Probability	0	0	0.22616	0	0.32818	0.14662
Observation	32	32	32	32	32	32

Table 4.2: Correlation among selected variables

	BOP	BOT	ER	GDP	INF	IP
BOP	1	-0.03765	0.33212	-0.02002	0.29269	0.312929
BOT	-0.03765	1	-0.64796	0.226073	-0.8561	-0.88642
ER	0.33212	-0.64796	1	-0.175	0.938641	0.883806
GDP	-0.02002	0.226073	-0.175	1	-0.20492	-0.24937
INF	0.29269	-0.8561	0.938641	-0.20492	1	0.985918
IP	0.312929	-0.88642	0.883806	-0.24937	0.985918	1

Table 4.3 highlights the fact that balance of payments and GDP series are stationary at their levels 1(0), while other variables in our model namely Industrial production and Exchange Rate assumed stationarity at their first difference 1(1). Also, a result presented in Table 4.4 provides that balance of trade and inflation series are stationary at their second differences.

Table 4.3: Test of stationarity of data

Variable	t-Statistic	Probability
BOP	-4.60124	0.0009
D(BOT,2)	-13.6776	0.0000
D(ER,1)	-5.69971	0.0001
D(INF,2)	-10.0286	0.0000
D(IP,1)	-2.96383	0.0500
GDP	-5.73173	0.0000

Based on the above observations, the data was revised and Table 4.4 provides for the descriptive statistics of revised data with 30 observations.

Table 4.4: Descriptive statistics of revised data

	DBOT	BOP	DER	DINF	DIP	GDP
Mean	-51.884	378.086	2.41544	0.34666	4.97333	0.02772
Median	-25.505	182.025	2.0055	0.1	3.55	0.0626
Maximum	1927.1	3696.89	8.6264	7.7	19.1	0.1016
Minimum	-	-971	-4.6032	-4.6	0.3	-0.9891
Std. Dev.	802.197	820.190	3.25422	2.29162	4.22014	0.19321
Skewness	-	2.29215	0.06194	0.88539	1.80077	-
Kurtosis	10.5708	10.2751	2.98999	5.19750	5.88535	27.3634
Jarque-Bera	77.7658	92.4300	0.01930	9.95592	26.6204	871.964
Probability	0	0	0.99039	0.00688	0.00000	0
Observation	30	30	30	30	30	30

Table 4.5: Correlation Matrix

	BOP	DBOT	DER	DINF	DIP	GDP
BOP	1	0.185763	-0.53431	-0.12704	0.795373	-0.01773
DBOT	0.185763	1	0.000287	-0.29897	-0.05914	-0.48255
DER	-0.53431	0.000287	1	-0.00066	-0.54512	-0.04922
DINF	-0.12704	-0.29897	-0.00066	1	0.119937	0.409804
DIP	0.795373	-0.05914	-0.54512	0.119937	1	-0.05315
GDP	-0.01773	-0.48255	-0.04922	0.409804	-0.05315	1

The regression carried out to study the impact of the macro economic variables on Balance of Payment is also providing us with some interesting facts. Nearly seventy two per cent of the variations in BOP is explained through the various macro economic variables i.e., GDP, Exchange rate, Industrial Production, Inflation and balance of trade taken together. Also individually each of the following- balance of trade, inflation and GDP has significant impact (at 5% level) on the BOP. The Industrial Production is also having a significant impact on the BOP (at 1% level).

Regression results Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-344.464	186.8263	-1.84377	0.0776
DBOT	0.292408	0.116419	2.511677	0.0191*
DER	-19.845	30.03113	-0.66081	0.5150
DINF	-87.9497	39.57686	-2.22225	0.0359*
DIP	157.9442	23.50853	6.71859	0.0000*
GDP	1104.941	513.6921	2.150978	0.0418*
R-squared		0.76818		
Adjusted R-squared		0.719885		
F-statistic		15.90575		
Prob(F-statistic)		0.000001		

*Dependent Variable: BOP

The constant coefficients of the variables also reveal that exchange rate, external debt, inflation and trade openness relates negatively with BOP over time in India. Conversely, balance of trade, term of trade and real GDP maintained a positive relationship with BOP during the sample period.

6. Conclusion and Policy Lessons

Results from our empirical analysis provide support for the hypothesis that these variables are non-stationary except for BOP, and indeed, they are of random walk. Given the non-stationarity of these series the correlation was matrix was estimated. The evidence confirms that the exchange rate, balance of trade, industrial production, inflation rate and GDP have an impact on BOP in Indian scenario. In order to put the Indian economy on the path of sustainable growth and development as well as reduce balance of payment fluctuations, the government has to reduce target inflation and address the perennial external debt problem. Bearing in mind both, the practical problems associated with exchange controls, it seems reasonable to conclude that while exchange rate devaluation may in some cases, provide a useful short run tourniquet in the event of a balance of payments crisis, they do not generally offer a cost effective measure of correcting deficits. Indeed their principal effect is adverse and suppresses imports rather than the positive one of encouraging exports. The empirical evidence shows that these variables provide explanation for the fluctuation of BOP in India through time.

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