CHAPTER II

REVIEW OF LITERATURE, METHODOLOGY AND DATABASE

This chapter is divided into two sections. Section A of this chapter reviews the earlier studies on the topic and Section B deals with the methodology and database of the study.

SECTION A

Review of earlier literature pertaining to the study will enable the researcher to identify the research gap and the direction of the present study.

Reviews Related with External Sector

Arvind Virmani\(^1\) (2004) argued that policy reforms over the last few decades has been motivated by the need to accelerate growth or equivalently to reverse a decline in growth rate. The economic literature on the determinants of growth has burgeoned and disagreement has followed consensus on the policy prescriptions that need to be followed to achieve this purpose. Sometimes the disagreement is exaggerated by the titans of

the profession, so as to distinguish themselves from those constituting the conventional wisdom.

The paper moves the focus from this “macro” debate to concrete issues of policy formulation and policy change and explores the links between policy and institutions in the context of economic reforms. Thus, successful introduction of new policies may require new institutions and the degree of success in changing policies may depend on the degree to which existing institutions are modified. The literature on Institutions and development has dealt with questions of grand design such as the constitution, the rule of law (personal safety), property rights and informal rules embodied in culture. These are matters that happen on a timescale of a quarter/half century or more and can be thought of as the “superstructure” of institutions. The quantitative work on institutions and growth has explored the linkage between these institutional issues and economic growth.

Apurba Kumar Chattopadhyay\(^2\) (2005) investigated the short run vulnerability of our external sector under the WTO regime. However, the steady inflow of FDI, the upward trend in the net invisibles and private

transfers have resulted in a surplus in India’s current account balance over the last couple of years, even though, the share of India’s export in the context of world export continued to remain at less than one per cent. The long-term impact of the WTO regime on the Indian economy will thus remain dependent on the success of the new foreign trade policy, which has emphasized the doubling of India’s share of global merchandise trade by 2009, with a thrust on employment generation.

Reddy. Y.V. ³ (2005) in his article “Overcoming Challenges in a Globalising Economy: Managing India’s External Sector” discussed the emerging trends in various aspects of external sector like merchandise trade, services, trade and current account, capital account, reserve management and exchange rate management. The study concludes that the recent experiences in many countries shows that, periods of impressive macro economic performance generate pressures for speedier financial liberalization since everyone appears to be a gainer from further liberalization, but the costs of instability that may get generated are borne by the country, the government and poorer sections.

Leonardo Vera⁴ (2005) presented a dual economy model of the fix-price/flex-price kind that explicitly allows for the existence of a government budget constraint in a fully open economy. Both the external and fiscal closures resemble very much the contemporary experience of several Latin American countries, where fiscal discipline and fixed exchange rate systems have been the norm. Thus, within the public sector, it is assumed that public investment is the adjustment variable, while foreign reserves variation adjusts the external balance. Short-run impacts of policy-induced variables and changes in exogenous external financing are analysed. Relevant trade-offs, especially between output and inflation, follow from an analysis in which the time perspective is rather short. However, in the medium term, some balancing forces in the economy can moderate the trade-offs.

Geethanjali Natraj and Pravakar Sahoo⁵ (2006) opined that the trade policy reforms constitute the core of economic reforms in India. They analysed the India’s external sector, highlighted the positive impacts of India’s trade policy reforms. The trends in India’s foreign trade, changes in


the composition and direction of India’s exports and imports have been examined in details in the paper. The study shows that, there has been a consistent increase in India’s exports and degree of openness to trade since 1991. Further, diversification of the export and import basket and markets have reduced the vulnerability of the economy to external shocks. India’s commitments to the WTO have also helped to compete in world markets and strengthen its external sector.

Jagdish Bhagwati\(^6\) (2006), in his book “In Defense of Globalization”, explained the sound economic principles and vivid examples rather than inflamed rhetoric, to show that globalization, when properly governed, is in fact the most powerful force for social good in the world today. Bhagwati carefully explains the fallacies that underlie many of the critics’ arguments, suggesting that there is a good reason why most globalization protesters come from rich rather than poor countries.

Exploring globalization’s ‘human face’ in great detail, the author demonstrates its beneficial effects on a variety of social issues including child labour, women’s rights, democracy, wage and labour standards, and

the environment. He concludes that, by focusing so much on globalization’s purported evils, the opportunities to focus on accelerating its achievements while coping with its downslides are missed.

**Reviews related with Foreign Direct Investment**

From the estimation of a model of derived demand for foreign capital by a profit-maximising multiple product monopolist for seven East and South East Asian countries, Lucas\(^7\) (1993) in his paper “On the Determinants of Direct Foreign Investment: Evidence from East and South East Asia” has found weak, evidence for an association between DFI and domestic market size. Export market size (GDP of major export markets for the country in question) is estimated to be somewhat more important. Labour costs were assumed to play a dual role in determining DFI; as they rise, ceteris paribus, DFI tends to be discouraged; but at the same time, as they rise in relation to the cost of capital, there will be a tendency to substitute DFI for labour.

On the assumption of rising marginal costs, the effect of a wage increases through the real wage component will outweigh that of

substitution in favour of higher capital intensity. Indeed, the elasticity of DFI with respect to the host country wages was found to be positive, whereas that with respect to capital costs were found to be generally weaker and in some cases negative. DFI was also specified as a function of domestic capital, with a positive association between foreign and domestic capital, but the estimated association was mixed. Time specific dummy variables, which were included to account for country-specific events, in particular years were found to be generally highly significant. In an extension of the model, the risk of currency depreciation and industrial disputes were accounted for Lucas found only very weak evidence to prove that host country’s production costs was related to that of the home country, that is, no systematic evidence was found to prove that of the home country, that is, no systematic evidence was found to prove that higher costs in other countries enhanced DFI flows to Asian host countries.

Kumar Sahoo\textsuperscript{8} (1999) made an attempt to empirically analyse the role of foreign and domestic firms in his paper “Foreign Direct Investment and Economic Development: A firm Level Analysis of Manufacturing Sector in

Post-Reform India”. The author took into account export orientation, import dependency, capital intensity, profit intensity, vertical integration, product differentiation and effective tax rate as the indicators for assessing their comparative roles in their total development effort. The data for these variables were collected from CMIE (1995) from its publication entitled “Statistical Profiles of 500 Corporate Giants”. The expected relationships were hypothesized for a particular variable between the two sets of data on foreign and domestic firms and were analysed to check if the data extended any support for the hypotheses, by using non-parametric test particularly Willcoxon matched pair rank test to draw inferences. The empirical analysis showed foreign firms to be relatively better export performer, less import dependent, less capital intensive and contributed more to the national exchequer.

Md. Shah Alam⁹ (1999) in his study on “Foreign Direct Investment and Economic Growth in India and Bangladesh: A Comparative Study” tried to make a comparison of Foreign Direct Investment (FDI) and Economic Development between India and Bangladesh. The study has taken

eight important macro-economic variables for the analysis. They were foreign direct investment, growth of gross domestic product, agriculture, industry, gross domestic savings, gross investment, export of goods and services, and import of goods and services. Of the variables, FDI was considered as a dependent variable and other variables were considered as independent variables. An analysis of the study was made by using bivariate analysis considering two points of view, that is, (1) dependence of the growth of gross domestic product of India and Bangladesh on FDI, and (ii) dependence of growth of other major sectors constituting the economy of the countries on FDI. The study pointed out that the growth rates of GDP of India and Bangladesh to some extent, depended upon FDI and influence of FDI on GDP in India was slightly more than that in Bangladesh.

The impact of FDI on other sectors had also been fluctuating between the countries for economic growth and development based on FDI. The study had pointed out some suggestions to attract more of FDI into India and Bangladesh.
Syed Aziz Anwar\(^\text{10}\) (1999) in his paper entitled “Reassessing Determinants of FDI in “Some Emerging Economies” tried to analyze the determinants of FDI in the emerging economies. The main objective of his paper was to cite evidence of FDI in some of the oft-quoted emerging economies and explore its determinants. In the light of the existing empirical studies, the study suggested the following econometric model to explain FDI in emerging economies.

\[
\text{FDI}_t = a_0 + a_1 \text{GDP}_{t-1} + a_2 \Delta \text{GDP} + a_3 (1/\text{GDP})_{t-1} + a_4 \text{XR}_t + U_t
\]

Where,

- \(\text{FDI}_t\) = Foreign Direct Investment in year \(t\),
- \(\text{GDP}_{t-1}\) = Gross Domestic Product in the previous year,
- \(\Delta \text{GDP}\) = Change in GDP in the year \(t\),
- \((1/\text{GDP})_{t-1}\) = Ratio of domestic investment to GDP in the year \(t-1\),
- \(\text{XR}_t\) = Exchange rate in year \(t\), and
- \(U_t\) = Effects of other variables or error term.

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Michael Howard and Arindam Banik\textsuperscript{11} (2001) in their paper on “Private Capital Inflows to the Caribbean: Trends, Assessments and Determinants” analysed the trends and determinants of private foreign direct investment in the Caribbean region. The data showed that net capital inflows have been significant in most countries since 1988. The sectors attracting most foreign investment were the natural resource industries, tourism, manufacturing and services. They developed the following model of the determinants of FDI in Trinidad and Tobago.

\[
\log \text{RFDI} = a + b_1 \log \text{RGDP}_t + b_2 \Delta \log \text{RGDP}_t \\
+ b_3 \log \frac{X}{GDP} + b_4 \log X_{rt} + u_t
\]

Where,

- $\text{RFDI}$ = real net foreign direct investment,
- $\text{RGDP}$ = real gross domestic product at factor cost,
- $\frac{X}{GDP}$ = ratio of exports of goods to nominal GDP,
- $X_{rt}$ = exchange rate,
- $u_t$ = random disturbance term.

The estimates of the above equation showed that the only significant variable was log X/GDP. This implied that neither the market size hypothesis nor the exchange rate explained FDI in Trinidad and Tobago.

Chandana Chakraborty and Parantap Basu\textsuperscript{12} (2002) have attempted to estimate the two-way link between foreign direct investment and growth for India by using a structural cointegration model with vector error correction mechanism. The existence of two cointegration vectors between GDP, FDI, the unit labour cost and the share of import duty in tax revenue is found, which captures the long run relationship between FDI and GDP. A parsimonious Vector Error Correction Model (VECM) is then estimated to find the short run dynamics of FDI and growth. According to them VECM model reveals three important features: (a) GDP in India is not Granger caused by FDI; the causality runs more from GDP to FDI; (b) trade liberalization policy of the Indian government had some positive short run impact on the FDI flow; and

(c) FDI tends to lower the unit labour cost suggesting that FDI in India is labour displacing.

Rudra Prakash Pradhan\(^{13}\) (2005) made an attempt to analyze the impact of globalization, argues that globalization is nothing but an increasing integration of economies around the world. However, the developments that have been taking place since the early 1990s are mainly with respect to free movement of only one factor input-capital, commonly known as Foreign Direct Investment (FDI), and free movements of goods, particularly from developed to developing countries. The paper, seeks to examine the inflows of FDI in the Indian economy during the decade 1990s. The study finds that the expansionary impact of FDI inflows in the Indian economy has been well managed during the globalization era. However, the critics say that India’s achievement in this front seems to be insignificant, when we compare it with the fastest growing economy China and several other South East Asian countries even after the South East Asian financial crisis in 1997-98. According, in the final section, the paper suggests some recommendations for the further improvements in the FDI inflows in the Indian economy.

Chandana Chakraborty and Peter Nunnenkamp\textsuperscript{14} (2006) have argued that the Foreign Direct Investment (FDI) has boomed in post-reform India. Moreover, the composition and type of FDI had changed considerably since India has opened up to world markets. This has fuelled high expectations that FDI may serve as a catalyst to higher economic growth. They assessed the growth implications of FDI in India by subjecting industry-specific FDI and output data to Granger causality tests within a panel of cointegration framework. It turns out that the growth effects of FDI vary widely across sectors. FDI stocks and output are mutually reinforcing in the manufacturing sector. In sharp contrast, any casual relationship is absent in the primary sector. Most strikingly, they found only transitory effects of FDI on output in the services sector, which attracted the bulk of FDI in the FDI-growth relationship suggest that FDI is unlikely to work wonders in India if only remaining regulations were relaxed and still more industries opened up to FDI. They found evidence to prove that industrial disputes and the prospects of currency depreciation did have a negative impact of DFI in Asia.

Shiralashetti. A.S and Hugar. S.S (2009) have empirically stated that capital is the life blood of any production and distribution activity, and it plays an important role among the factors of production. The need of capital arises not only at the beginning of the venture, but also throughout the life span of the venture. However, capital, especially when in short supply, can be the limiting factor for starting, expansion and diversification of a venture. In view of the economic crisis on the one hand, and the perceived importance of foreign capital in the economic development of the country on the other, the Government of India has been making continuous efforts to attract foreign capital during the post-liberalization period. The efforts include providing concessions in taxes, announcing tax holidays and increasing the investment cap in various sectors of the Indian economy. As a result of the continuous efforts by the Government of India, there has been steady rise in the inflow of foreign capital on the one hand, and overall progress in various sectors of the Indian economy on the other. According to the Reserve Bank of India (RBI), India has received total Foreign Direct Investment (FDI) inflows of $50.1 billion since 1991. There has been

tremendous progress in the various sectors of the Indian economy due to the inflow of foreign capital.

The GDP growth rate has crossed 9 per cent due to boom in manufacturing and service industries. Further, the Sensex points in Indian stock market have crossed 19,000 points on October 15, 2007. In addition, the foreign exchange reserves have crossed $204 bn at the beginning of May, 2007. In addition, there has been improvement in the employment position, standard of living, infrastructure development, health and hygiene, GDP and NDP due to FDI inflows in India.

The main objectives of the study were: 1) To examine the year-wise, country-wise, sector-wise and the RBI’s region-wise FDI inflows in India, 2) To examine the impact of FDI on the growth of GDP and contributions from various sectors of economy towards GDP, 3) To analyze the trends in exports, and 4) To examine the impact of FDI on employment position, inflation and stock market of India. The study was primarily based on secondary data collected from websites, journals and newspapers. Statistical tools like percentage, common size statements and trend analysis were used to analyze the data.
Srinivasan et al.\textsuperscript{16} (2010) used, Johansen cointegration technique followed by the Vector Error Correction Model (VECM) and Standard Granger Casuality test to investigate the causal nexus between Foreign Direct Investment (FDI) and economic growth in Association of South East Asian Nations (ASEAN) economies. The Johansen cointegration result establishes a long run relationship between FDI and Gross Domestic Product (GDP) for the five ASEAN economies, namely, Indonesia, Malaysia, Philippines, Singapore and Vietnam. The empirical results of VECM exhibits a long run causality running from GDP to FDI for Indonesia, Philippines and Singapore. For Malaysia and Vietnam, the results reveal long run bidirectional casual link between GDP and FDI. Besides, the evidence from standard Granger causality test for rest of the ASEAN economies shows that there was no causality between GDP and FDI for Brunei Darussalam and Lao People’s Democratic Republic. For Myanmar and Thailand, the test results show that there is a one-way short run Granger causal link from FDI to GDP and GDP to FDI, respectively.

Reviews Related with Foreign Exchange Reserves

Reddy. Y.V.\textsuperscript{17} (2002) in his paper attempted to analyse the following question: What are forex reserves? Why hold forex reserves and how did the policy evolve? What is the appropriate level of reserves? How does the current status appear in terms of indicators of adequacy of reserves? The author also focuses on several aspects of forex management such as the implications for quasi-fiscal deficit and communication policy of the RBI. The issues in regard to policy and management of forex reserves in India were posed in detail. The concluding part contains some random thoughts from a futuristic perspective

Ilapatnaik\textsuperscript{18} (2003) tried to explain that over the last decade, India engaged in substantial liberalization on the current account and the capital account. At the same time, a fully articulated policy framework defining the currency regime is not known in the public domain. In this paper, the author seek to characterize the nature of the currency regime, in the period after the Asian crisis. This is closely linked to better understanding the phenomenon of reserves accumulation of the recent years.


Akiko Terada-Hagiwara\textsuperscript{19} (2005) in his study focussed on the issues arising from rapid foreign exchange reserve accumulations in Asia. Greater attention is paid to People’s Republic of China and India for the significance of the accumulation fed by surges in capital inflows. The paper finds that sterilization interventions by the two economies appear to be effective in curbing credit growth, but the impacts appear to be limited and short-lived. In this regard, adjustments of exchange rate policies are called for to have more freedom in policy options, though incentives to live exchange rate fluctuations are still limited, and in fact that the currencies have been managed more tightly than before. Therefore, the paper argues that, while maintaining the current exchange rate practices with capital controls in place, domestic reforms should be pushed further to be ready for capital account convertibility and more exchange rate flexibility in the long-term.

Bogdan N. Glavan\textsuperscript{20} (2006) argued that the optimality of foreign exchange reserves has intensified recently, due to a seeming inefficient increasing of foreign reserves, especially in the developing world. This paper presents the state of this issue, challenging the conventional


perspective according to which foreign exchange reserves are needed in order to preserve the stability of exchange rates.

Vanleng Wang. Y.,\textsuperscript{21} (2006) observed that the sustained surpluses in the current and capital accounts of balance of payments are the main reason for the continuing rapid expansion of China’s foreign exchange reserves in recent years. However, flows in the formation of the renminbi exchange rate regime are the institutional root cause of the sustained high growth in foreign exchange reserves. Various theoretical misconceptions about the scale of foreign exchange reserves have swayed polices and contributed to its sustained fast growth. Sustained high growth of China’s exchange reserves, and its extraordinary large scale, carry tremendous risks.

Prabheesh K P. Malathy. D and Madhumathi, R.,\textsuperscript{22} (2007) by using cointegraion and vector error correction approach, estimated India’s demand for foreign exchange reserves over the period 1983-2005. The study results established that the ratio imports to GDP, the ratio of broad money to GDP, exchange rate flexibility and interest rate differential determine India’s long-run reserves demand function. Their empirical results show that reserve


accumulation in India is highly sensitive to capital account vulnerability and less sensitive to its opportunity cost. The speed of adjustment of coefficient of vector error correction model suggests that Reserve Bank of India has to engage in more active reserve management practices.

Abdul Jalil and Sheharyar Bokhari\textsuperscript{23} (2008) in their analysis by using monthly data on foreign exchange reserves from June 1995 to June 2005, found that in line with other country-specific studies, the opportunity cost of holding reserves played a greater role than reserve volatility in determining the level of reserves in Pakistan.

Their finding is in contrast with the hypothesis of increased capital mobility that is commonly set forth in explaining the precautionary motive for reserve holdings.

Recently, Shin-ichi Fukuda and Yoshifumi Kon\textsuperscript{24} (2010), analysed accumulation in foreign exchange reserves in developing countries. This paper explores the possible long-run impacts of this trend on


macroeconomic variables in developing countries. They analyzed a simple open economy model where increased foreign exchange reserves reduce the costs of liquidity risk. Given the amount of foreign exchange reserves, utility-maximizing representative agents decide consumption, capital stock, and labor input, as well as the amounts of liquid and illiquid external debt. The equilibrium values of these variables depend on the amount of foreign exchange reserves. A rise in foreign exchange reserves increases both liquid and total debt, while shortening debt maturity. To the extent that interest rates of foreign exchange reserves are low, an increase in foreign reserves also leads to a permanent decline in consumption. However, when the tradable sector is capital intensive, the increase may enhance investment and economic growth.

The study provided empirical support for their theoretical analysis using panel data from the Penn World Table. The cross-country evidence shows that an increase in foreign exchange reserves raises external debt outstanding and shortens debt maturity. The results also imply that increased foreign exchange reserves may lead to a decline in consumption, but can also enhance investment and economic growth. The positive impact on
economic growth, however, disappears when we control the impact through investment.

Reviews Related with External Debt

Arun Ghosh\textsuperscript{25} (1988) examined the nature of public debt in India and assessed the impact of public debt on the economy in general. For this study, the author taken the year 1986-87 to 1996-97 and collected the data from the Budget Document and RBI – Report on Currency and Finance. It has been concluded that he rapid increase in India’s public debt and the more rapid increase in the burden of interest on the government budget pose grave dangers to the orderly implementation of India’s plan programme of development, not only in the public sector but also in the private sector.

Malati Anagol\textsuperscript{26} (1992) analysed the changing profile of India’s external debt in terms of long-term debt, short-term commercial borrowing and total debt service payments. The authors have taken the period 1983 to 1991 and the data was collected from various issues of World Debt Tables, RBI Report on Currency and Finance, and Economic Survey and Amex


bank review. The author argued that the traditional norms to measure the liquidity requirements are not valid. The debt service is inadequate and misleading as a measure of the movements in cash inflows and outflows. The author applied the various indicators of debt service ratio, the most important are faltering of net transfers, excessive short-term debt, deteriorating debt service ratio. The study shows that, India is facing serious liquidity problem during this period and predicts that this liquidity problem may developed into a full fledged balance of payments crisis, when international interest rates increased, NRI deposits, decline and oil prices increased.

Krishnaveni, L.C., 27 (1993) examined the trends in gross fiscal deficit of both Central and State Government during the period 1980-81 to 1992-93. The author collected the data from various issues of Reserve Bank of India Bulletin. Various components of internal as well as external debt are evaluated using percentage method. The study concludes that the Indian economy would certainly proper in spite of heavy burden of public debt provided, the amount is utilized for development purposes. In addition, the debt service ratio of India is compared with some of the Latin American

countries and some of the East Asian Countries and it is found that the debt service ratio of India is in a better position compared to these countries. The author makes a few policy prescriptions for India; firstly, the immediate need is the preparation of cash – foreign exchange budget with details on size and should monitor the cash flows at macro level to smoothen any abrupt departure from the budgetary amounts. Secondly, India should go for low interest international credit. Commercial borrowing should be resorted to a limited sale. Borrowing units should be allowed to use foreign funds only for financing to import requirements.

Finally, the author concluded that the vicious cycle of larger debt service payments, larger balance of payments deficits, increase in money supply, consequent inflation, continued depreciation of rupee to maintain competitiveness of exports in recent years have distorted growth in the real sector. The vicious cycle can be broken through fiscal discipline, lesser borrowings, both internal and external and control of inflation by having tight control over money supply.
Tarapore S.S.,\textsuperscript{28} (1994) in his article on the role of an active debt management policy in the economic reform process, demanded the need for an effective debt management policy, which necessitates the need for effective secondary market. In the recent period, however certain significant steps had been taken to enable a strong secondary market for development. The move to market related rates of interest were the single most important measure, which wanted to strengthen the development of the secondary market. This enabled the primary and secondary markets to provide effective signals to each other.

Singh, Sachdena and Upadhya\textsuperscript{29} (1997) studied India’s external debt and compared India’s debt with other developing countries. After the third five year plan over reliance on funds from foreign had become marginal. The burden of external debt on people can be measured in relation to current earnings. In this connection, the Government of India and Reserve Bank of India had taken number of measures to check high internal debt. However, the success of such a strategy will depend upon the continuing process of


\textsuperscript{29}Singh, Sachdena and Upadhya (1997) “India’s External Debt – Retrospect and Prospect”, \textit{Third Concept}, p.22.
economic reforms. Emphasis on capital and technology had been largely responsible for the debt crisis.

Niranjan Chipalkatti and Meenakshi Rishi\textsuperscript{30} (2001) concentrated on the Indian capital flight at US $88 billion (in 1997 dollars) over the 1971-97 period, a sum that is roughly 20 Per cent of the US $448 billion real external debt disbursed to the country over the same time period. There is also evidence of a strong year-to-year correlation between debt inflows and flight-capital outflows. The paper explores the nature of this association between capital flight and external debt in the Indian economy.

Reviews Related to Balance of Payments

Douglas Purvis\textsuperscript{31} (1972) found that the effect of an economy’s growth on its balance of payments has been a subject which has received a good deal of attention in the recent literature in international economics. Much of this attention derives from general dissatisfaction with the theoretical and empirical aspects of the standard Keynesian analysis, which argues that, via the existence of a positive marginal propensity to import, growth in a


country’s income will lead to an increase in imports. Hence, the argument proceeds, for given exports, growth leads to deterioration in the balance of payments.

Richard H. Clarida\textsuperscript{32} (1985) investigated the choice theoretic, general equilibrium account of the balance of payments adjusted process and the determination of national price levels in a world comprised of countries populated by rational households.

Balance of payments adjustment dynamics arise in the equilibrium of this model from the precautionary saving behavior of risk-adverse households who self-insure against random productivity fluctuations by accumulating, via balance of payments surpluses in productive periods, buffer stocks of domestic money which can be drawn down to finance payments deficits, and thus, a less variable profile of consumption relative to output, when productivity is unexpectedly low. Precautionary saving is shown to exhibit the partial-adjustment-to-target behavior typically postulated in the monetary approach literature. The existence of a rational

expectations equilibrium in which the distribution of international reserves among central banks is stationary is established.

Graciela Laura Kaminsky and Carmen Reinhart\textsuperscript{33} (1996) analyzed the efficiency performance in the wake of the Exchange Rate Management and Mexican currency crises, the subject of balance-of-payments crisis has come to the forefront of academic and policy discussions. This paper focuses on the potential links between banking and balance-of-payments crises.

They examined these episodes for a large number of countries and found that knowing that there are banking problems helps in predicting balance-of-payments crises, but the converse is not true; financial liberalization usually predates banking crises, indeed, it helps predict them. Rather than a casual relationship from banking to balance-of-payments crises, the macroeconomic “stylized facts” that characterize these episodes point to common causes.

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Madalina Dumbrava\textsuperscript{34} (2006) argued that the foreign trade activity represents, on one side, the participation of one country to the international economic co-operation, on the basis of the labour international division as well as, on the other side, a factor of economic growth. The side of the payments balance shows to what extent a country depends on external relationship. The foreign payments balance is conceived as an instrument of economic analysis, reflecting the actual financial flows, which are being established. In the paper they were dealing with the forms in which the payments balance is made, as well as the recording principles for its data. By its own structure, the foreign payment balance emphasizes the debts and the commitments undertaken by a country, within a given period of time.

In the study the aspects such as the equilibrium of the payments balance; techniques meant to secure the equilibrium of the payments balance; and policies meant to secure the equilibrium of the payments balance are also approached as an attempt to clarify the subject.

Louis Be Duc, Frank Mayerlen and Pierre Sola\textsuperscript{35} (2008) described the monetary presentation of the Euro area balance of payments and its use. The monetary presentations involving non-bank residents on monetary developments. The paper explains in detail the principle underlying this approach, i.e. the link between the external counterpart of money, as reflected in the balance sheet of the banking sector, and the balance of payments. From a statistical perspective, it is shown that the monetary presentation of the balance of payments, which is based on international statistical standards, may be applied in any country or currency union. With regard to Euro area statistics, the paper elaborates on the practical implementation of the monetary presentation, while also describing a few approximations and remaining statistical challenges.

Finally, the paper assesses how the monetary presentation of the balance of payments has been used for analyzing monetary developments in the Euro area, and highlights the significant impact of balance of payments transactions on monetary dynamics in certain periods.

Khundrakpam, J.K. and Rajiv Ranjan (2009) employed an inter-temporal model on a constructed private consumption series, finds that the current account balance in India during 1950-51 to 2007-08 is inter-temporally solvent. This is an outcome of the developments during the period leading up to the payment crisis of 1991. Capital flows, however, still remain restrictive and appears to be biased against outflows. As a result, volatility in capital flows is less than what the expected change in fundamentals warrants and agents are not able to fully optimize and smooth their consumption. This involves loss of welfare and also restricts running of a higher but solvent current account deficit that can raise the level of investment and growth, while at the same time not guaranteeing the sustainability of an otherwise technically solvent current account balance. Thus, there appears to be case for further liberalization of capital flows, particularly outflows.

Liberalising the capital account has been one of gradualism, treating the liberalization as a continuous process rather than a single event. In this

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context, it is important to note that the Reserve Bank has significantly liberalized capital outflows in the recent period.

**Research Gap**

The above analysis clearly shows that there are many studies in India and abroad regarding a particular aspect of the external sector. A comprehensive study covering the various aspects of external sector is missing. A holistic study combining the various elements of the external sector and a critical study of the selected external sector variables is the need of the hour. To achieve this objective, the researcher has chosen this vibrant topic for the study.
SECTION – B

METHODOLOGY AND DATABASE

The Section B of this chapter deals with the methodology and database of the study. To analyse the objectives and to test the hypotheses, suitable research methodology has been adopted in the study.

Reference Period

The period of the study taken for analysis is 18 years (1990-91 to 2007-08). However, much emphasis has been given for India’s external sector after the economic reforms process initiated after 1991 to assess the impact of external sector reform on Indian economy.

Data Source

This study is completely based on secondary data, since it requires aggregate time series data over a period of time. The secondary data has been obtained from various published and unpublished sources.

National Sources

The information required for the study has been collected from Reserve Bank of India Bulletin, RBI-Report on Currency and Finance,

**International Sources**


**Data Analysis and Tools Used**

The collected data have been processed both manually and with the help of computer software systems, Microsoft EXCEL and Statistical Package for Social Sciences (SPSS) for the analysis of data and testing the hypotheses. The following, appropriate statistical tools have been used in this study.
The methodology adopted to analyse the dynamics of foreign investment are briefly presented as follows.

**Determinants of FDI in India**

The variables that generally determine the flows of FDI to a particular country or region are referred to as the determinants.

In the context of India, it is hypothesized that FDI flows into the country are determined by the following set of factors: the size of the market, the rate at which the market is growing, infrastructure development, domestic investment position, the extent of openness of economy, rate of foreign exchange and fiscal deficit.

**Domestic Market Size**

Most of the empirical studies have identified the domestic market size to have a critical impact on the inward flow of FDI into the country. The huge domestic market of India acts as a positive incentive for foreign investments in India. The market size has been proxies by the gross domestic product (GDP lagged one period).
**Change in Market Size**

In addition to the market size, the change in market size is a significant consideration entering into the choice-fusion of foreign investors to invest in any economy. A stagnant domestic market size, inter alia, may work out as a disincentive to the foreign investor. Theoretically, it is expected that expansion of domestic market would have a positive impact on FDI inflows. This variable is measured as: $\Delta GDP_t (= GDP_t - GDP_{t-1})$

**Infrastructure**

A critical mass of infrastructural development is imperative for foreign investors to realize ownership advantage in an alien market. Quite often in academic discussions, it has been held that infrastructural bottlenecks in our economy have slowed down the actual FDI flows as well as widened the gap between the actual and approved FDI inflows. For the present study the addition to the stock of infrastructural base has been structured as the combined expenditure of the centre and state Govts, on economic services which include expenditure on energy, transport and communication services, technology and environment, electricity, gas and water and other economic services. Growth and development of the infrastructural base is expected to encourage the inflow of FDI.
**Domestic Investment**

Another major factor attracting FDI inflows is the extent of domestic capital formation. Economies with higher capital formation are expected to be fertile grounds for attracting FDI. For the present study, this variable has been taken as Gross Fixed Capital Formation (GFCF lagged one period). A continued devaluation/depreciation of domestic currency is a priori expected to depress the profitability position of foreign investors. First, this may curtail the quantum of dividends, royalty, technical fees, etc. repatriated by them. Secondly, most of the FDI companies have high import-elasticity of sales. Hence, erosion of the value of domestic currency leads to high cost of production. Accordingly, this variable is expected to have a negative sign. For the present analysis, the exchange rate has been taken as number of rupees per unit of US dollar.

**Openness of Economy**

The degree of openness of economy is one more factor that is supposed to impact positively on the FDI inflows into a country. The conventional measure of openness is the percentage ratio of export plus imports to GDP.
Apart from these variables, in the context of India, the variable Fiscal
deficit is also expected to influence the inflows of FDI.

**Model Specification**

In the study, the model has been specified as follows:

\[ FDI = \psi_0 + \psi_1 GDP_{t-1} + \psi_2 \Delta GDP_t + \psi_3 GFCF_{t-1} + \psi_4 INF_{t-1} + \psi_5 OPN_t + \psi_6 XR_t + \psi_7 FD_t + \psi_8 D + \psi_9 (D \cdot OPN) \]

Where,

- \( FDI_t \) = FDI inflows to the country in time period \( t \)
- \( GDP_{t-1} \) = Last Year GDP Level
- \( \Delta GDP_t \) = Change in the GDP level between years \( t \) and \( (t-1) \).
- \( GFCF_{t-1} \) = Gross Fixed Capital Formation in period \( t \)
- \( INF_{t-1} \) = Incurrence on Infrastructure in \( (t-1) \) period.
- \( XR_t \) = Exchange Rate in time period \( t \).
- \( OPN_t \) = Degrees of Openness in Economy in period \( t \).
- \( FD_t \) = Fiscal Deficit.
- \( D \) = Dummy variable taking value of 1 for period 1980-81 to 1990-91 and 0 for the period 1991-92 to 2007-08.

**Trend Analysis**

One of the objectives of the present study is to analyse the growth pattern of various external sector variables in India. For this purpose, linear
trend models have been used to analyse the trend in the growth of Foreign Direct Investment, Foreign Exchange Reserves and External Debt.

\[ Y = a + b_t + U_t \]

- \( Y \) = Foreign Direct Investment
- \( Y \) = Foreign Exchange Reserves
- \( Y \) = External Debt

“\( a \)” is the constant to be estimated. “\( b_t \)” is annual absolute growth in the variables. “\( t \)” denote the time in years. “\( t \)” has taken values for 1,2,3, …. \( U_t \) is the disturbance term.

**Causal Connection Between Foreign Direct Investment And Economic Growth**

An attempt has also been made to analyse the direction of causality between Foreign Direct Investment and Economic growth.

**Concept**

A stationary series is identified by the presence of following properties:

- It fluctuates around a constant long-run mean.
- It has a finite variance that is time variant.
It has a theoretical correlogram that diminishes as lag length increases. If it is found that, a series do not have these properties, a non-stationary series can be transformed into stationary series with the help of integration, which is proposed by Box and Jenkins (1970).\textsuperscript{37}

**Integration Concept**

The concept of integration is employed to achieve stationary in any economic and series data. Engle and Granger (1987)\textsuperscript{38} have defined the concept of integration that a series with no deterministic component, which has a stationary, invertible, ARMA representation after differencing d times, is said to be integrated of order d.

Symbolically,

\[ X_t \sim I(d) \]

When d=0, the variable x will be stationary and for d=1, the first difference is stationary. The unit root test is used to determine the order of integration in order to know whether a series is stationary or not.


Unit Root Testing

The variable \( X \) may be tested for the presence of unit root as given as follows.

\[
X_t = \Phi X_{t-1} + \Sigma_t
\]  

(1)

Where \( \Sigma_t \) is generated from a white-noise process. The null hypothesis is as follows.

\[
H_0: \Phi = 1
\]

Dickey-Fuller Test

Dickey and Fuller (1981)\(^{39}\) have proposed a test statistic that is different from the conventional ‘t’ test statistic, for testing the presence of unit root. Dickey and Fuller have modified the equation (1) by subtracting \( X_{t-1} \) from both sides as,

\[
\Delta X_t = \gamma X_{t-1} + \Sigma_t
\]  

(2)

where, \( \gamma = \Phi - 1 \)

The equation (2) is a pure random walk and it is known as Dickey-Fuller regression.

\[ H_0 : \gamma = 0 \] implying that \( H_0 : \Phi = 1 \) integration the equation (1). Moreover, Dickey and Fuller have proposed two variants of DF regression for testing the presence of a unit root:

\[
\Delta X_t = \alpha + \gamma X_{t-1} + \Sigma_t \tag{2.1}
\]

\[
\Delta X_t = \alpha + \gamma X_{t-1} + \theta t + \Sigma_t \tag{2.2}
\]

The equations (2.1 and 2.2) allow for examining the presence of deterministic components, say deterministic trend (t) and drift (\( \alpha \)).

Dickey and Fuller have provided critical values of the t statistic separately for unit root testing under different forms of DF regression and for different sampling sizes. Economists have provided critical values for t statistic.

**Augmented Dickey-Fuller Test**

In order to get correct standard errors, Dickey-Fuller regressions are augmented by the inclusion of lagged dependent variables as given below:

\[
\Delta X_t = \gamma X_{t-1} + \sum \beta_i \Delta X_{t-i} + e_t \tag{3}
\]
\[ \Delta X_t = \alpha + \gamma X_{t-1} + \sum \beta_i \Delta X_{t-i} + e_t \]  
(3.1)

\[ \Delta X_t = \alpha + \gamma X_{t-1} + \theta t + \sum \beta_i \Delta X_{t-i} + e_t \]  
(3.2)

The statistic for \( \gamma = 0 \) is known as Augmented Dickey-Fuller (ADF) statistic. The use of appropriate critical values depends upon the deterministic components actually included in the DF regression.

**Unit Root Test Procedure**

The unit root test procedure begins with the detection of unit root in any economic series along with the presence of deterministic elements namely, drift and deterministic trend. It means that the unit root in a series \( X_t \) has to be tested with the drift plus time trend. If Ho : \( \gamma = 0 \) is rejected, it may be concluded that \( X_t \) has no unit root and then it may be called stationary series, if Ho = \( \gamma = 0 \) is accepted then, the presence of deterministic trend (\( \theta \)) integration model has to be tested. If Ho : \( \theta = 0 \) is rejected, the conventional 't' statistic can be applied for testing the null hypothesis of unit root. Subsequently if the conventional 't' statistic rejects the null hypothesis of unit root, it may be concluded that \( X_t \) has no unit root. If the conditional 't' statistic fails to reject the null hypothesis of unit root conditional upon the rejection of the null hypothesis of no deterministic
trend, then it may lead to infer that X_t has unit root. If given that γ = 0, \( H_0 : \theta = 0 \) is also accepted, then the time trend element in testing integration may be dropped out for further scrutiny. The dropping of time trend reduces DF regression models to the DF regression models with drift alone respectively.

The same procedure is repeated for detecting the presence of unit root in X_t series. What is different is that the unit root testing under the EF regression model is conditional upon the presence of drift only. If \( H_0 : \gamma = 0 \) is rejected, it may be concluded that X_t series and has no unit root has to be tested with conventional ‘t’ statistic for the presence of drift. If the conventional ‘t’ statistic fails to reject the unit root hypothesis, it leads to the conclusion that X_t series has a unit root. Given Ho: \( \gamma = 0 \) and Ho: \( \alpha = 0 \) is also accepted, and then the DF regression model without drift needs to be reestimated for further investigation.

As a result, the DF regression model with drift reduces to DF regression model. The DF regression model has to be again estimated. If Ho: \( \gamma = 0 \) is rejected, the X_t series has no unit root. If the null hypothesis of unit root is not rejected, then, it may be concluded that the X_t series has a process of I (1). The above outlined unit root procedure has to be repeated for the higher order case till the X_t series achieves stationary.
Co-integration

Co-integration is a different but a related concept to integration. More precisely, the concept of co-integration is developed from the notion of equilibrium relations between a pair of series. In Engle and Granger's use of the term, the equilibrium relationship may be causal, behavioral, or simply a reduced-form relationship among similarly trending variables. Engle and Granger (1987) have shown that if $X_t$ and $Y_t$ have I (d), the linear combination ($e_t$) will be stationary under a special restriction on the long run components of the series.

$$e_t = Y_t - \beta X_t$$

The error process ($e_t$) follows I( d-b) where b>0. Suppose that d = b = 1, the long run elements of $X_t$, and $Y_t$ cancel out each other and $e_t$ is I(1-1) implying that $e_t \sim I(0)$.

Co-integration Test Procedure

(i) Determine whether Y and X, are I (1). This is equivalent to determining whether they contain unit roots.

(ii) If they are both I(1), then estimate the parameters of the co-integration regression.
\[ Y_t = \beta_0 + \beta_1 + X_t + u_t \]

Test to find whether the estimated residual ‘u’ appears to be I(0) or not, using ADF test statistic.

(iii) If the Null hypothesis of unit root in \( u_t \) is rejected, then it may be inferred that there exists co-integration between \( Y_t \) and \( X_t \sim CI (1,1) \).

The co-integration explains the extent of deviations from the long – run equilibrium relationship in a non-stationary series.

**Standard Granger Causality**

The Granger Causality test is generally applied to detect the direction of causality between economic variables of interest. This causality test captures the effect of short run changes in one variable on the changes in other variables and vice versa. In functional form, the standard Granger Causality test is carried out with the following linear regression models.

Two null hypotheses tested are as follows:

\[
\Delta Y_t = \alpha_0 + \sum_{i=1}^{k_1} \beta_i \Delta Y_{t-i} + \sum_{i=1}^{\bar{k}_1} \theta_i \Delta X_{t-i} + e_t \quad (4)
\]

\[
\Delta X_t = \delta_0 + \sum_{i=1}^{k_1} \tau_i \Delta X_{t-i} + \sum_{i=1}^{\bar{k}_2} \phi_i \Delta Y_{t-i} + v_t \quad (5)
\]

a) \( H_0 : \theta = 0, \ i = 1, 2, 3, \ldots \ldots, \ K_1 \)
b) $H_0 : \Phi = 0, \ i = 1, 2, 3, \ldots, K_2$

It implies that $Y_t$ does not grangers causes $X_t$ in equation (5)

The standard F test is used to test the above null hypothesis.

**Error Correction Model for Granger Causality**

Granger (1986) and Engle and Granger (1987) have proposed the Error-Correction Model (ECM) as an alternative to the Standard Granger causality. The notion of error-correction is that a part of the disequilibrium from one period is connected with that of the next period. The ECM approach to Granger causality captures the impact of long run equilibrium on the short run dynamics, if the variables are co-integrated. For non co-integration between the variables, the equilibrium concept had no impact in the ECM approach to Granger's Causality.

For consistent and efficient estimation of error-correction models, Engle and Granger have proposed a two-step estimation procedure as given below.

**Step I:**

Estimation of residuals from the co-integrating regression of $Y$ on $X$ and $X$ on $Y$. 
\[ \hat{U}_{yx} = Y_t - \beta_0 - \beta_1 X_t \]

\[ \hat{U}_{xy} = X_t - \beta_0 - \beta_1 Y_t \]

**Step II:**

The lagged value of the residual terms obtained from the Step I is included as one of the explanatory variables in the Standard Granger Causality regressions as given below:

\[
\Delta Y_t = \alpha_0 + \sum_{i=1}^{k_1} \beta_1 \Delta Y_{t-i} + \sum_{i=1}^{k_2} \theta_1 \Delta X_{t-i} + \lambda_{yx} \hat{U}_{yx t-i} + e_i \quad (6)
\]

\[
\Delta X_t = \delta_0 + \sum_{i=1}^{k_1} \gamma_1 \Delta X_{t-i} + \sum_{i=1}^{k_2} \phi_1 \Delta Y_{t-i} + \lambda_{xy} \hat{U}_{xy t-i} + v_i \quad (7)
\]

Two null hypotheses are as follows:

a) \( H_0 : \theta_i = 0, \ i = 1, 2, 3, \ldots, K_2 \)

b) \( H_0 : \lambda_{yx} = 0 \)

It implies that \( X_t \) does not Grangers cause \( Y_t \) in equation (6)

a) \( H_0 : \Phi_i = 0, \ i = 1, 2, 3, \ldots, K_2 \)

b) \( H_0 : \lambda_{xy} = 0 \)

It implies that \( Y_t \) does not Grangers cause \( X_t \) in equation (7)
The null hypothesis of no impact of lagged equilibrium error in both equations is tested using the conventional ‘t’ statistic, while the null hypothesis of no Granger Causality is tested jointly with the ‘F’ test.

Lag Length Selection

The crucial problem of choosing an optimal lag length in the causality analysis is dealt in the present study using information criteria namely Residual Variance Criterion (RVC), Akaike's Information Criterion (AIC), Amemiya's Prediction Criterion (APC), Schwarz's Bayesian Information Criterion (SBIC) and Hannan's Criterion (HC).

The ECM approach to Granger Causality thus takes into consideration the problem of functional form specification and choice of lag length selection, which happen to be the weakness of the causality test discussed in the existing literature.

EVIEWS 4 and SPSS 10 package are used to examine the properties of time series data and investigating the long run relationship between Foreign Direct Investment and economic growth.
Student’s ‘t’ test

The following Student’s ‘t’ test has been applied to analyse whether the coefficient of correlation between FDI and FPI is statistically significant.

$$ t = \frac{r}{\sqrt{1-r^2}} \sqrt{\frac{n-2}{n}} $$

Determinants of Foreign Exchange Reserves

Determination of exchange reserves is a statistical procedure that attempt to assess the relationship between the dependent variable and two or more independent variables. The variables that generally determine the flows of Foreign Exchange Reserves to a particular country or region are referred to as its determinants.

The analysis of determinants of foreign exchange reserves consists of inflow of Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI), Non-Resident Indian Deposits (NRIs), External Assistance, External Commercial Borrowings and Current Account Balance. In order to find out the influence of the above variables on total foreign exchange reserves, the multiple regression of the following model is adopted.
Model Specification

The model for foreign exchange reserve’s determinants has been specified as follows:

\[ \text{FER}_t = \psi_0 + \psi_1 \text{FDI}_t + \psi_2 \text{FPI}_t + \psi_3 \text{NRID}_t + \psi_4 \text{EA}_t + \psi_5 \text{ECB}_t + \psi_6 \text{CAB}_t + \psi_9 (D) \]

FER\(_t\) = Foreign Exchange Reserves

FDI\(_t\) = Foreign Direct Investment

FPI\(_t\) = Foreign Portfolio Investment

NRID\(_t\) = Non-Resident Indian Deposits

EA\(_t\) = External Assistance

ECB\(_t\) = External Commercial Borrowings

CAB\(_t\) = Current Account Balance

D = Disturbance term variable taking value of 1 for period 1990-91 to 2007-08.

External Debt

The procedure followed to analyse the various aspects of external debt are as follows:

(i) Determinants of External Debt

The role of Government has been growing in its structure and size, particularly to meet the objectives of price stability, full employment, equity
and economic growth. The enhanced role of government has added to its fiscal responsibilities of raising additional revenue from various sources to meet the mounting pressure of public expenditure. The phenomenal changes in the Indian socio-economic and political scene made the public expenditure heavily increased. But the revenue of Government has not increased proportionately. Therefore, the Government went for borrowings. Such borrowings help to promote economic growth.

Obviously, the researcher arrived at a conclusion that the explanatory variables chosen for this analysis were population, fiscal deficit, expenditure, GDP, export and import which significantly influence the external debt. Moreover, the inter-relationship between these six explanatory variables and external debt were briefly discussed by theoretical support for this analysis.

With this background, one of the main objectives of the present study is to assess the influence of population, fiscal deficit, expenditure, GDP, export and import on external debt. These are considered as independent factors and external debt is considered as a dependent factor.
**Model Specification**

The model for external debt determinants has been specified as follows:

\[ Y_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + U_t \]

where,

- \( Y_t \) = External debt,
- \( X_1 \) = Population
- \( X_2 \) = Fiscal deficit,
- \( X_3 \) = Expenditure,
- \( X_4 \) = GDP,
- \( X_5 \) = Export,
- \( X_6 \) = Import,
- \( U \) = Stochastic disturbance term
- \( \beta_1, \beta_2, \ldots \beta_6 \) Regression coefficients.

**Balance of Payments**

The methodology adopted to analyse the various elements in the balance of payments consists the following procedure.

**Ratio Analysis**

In order to have a clear understanding of the importance of each of the individual item, the ratio analysis has been made use of.
Ratio of Current Account = \( \frac{\text{Current Account}}{\text{Overall balance of payments account}} \)

Ratio of Capital Accosunt = \( \frac{\text{capital Account}}{\text{Overall balance of payments account}} \)

**Index Number**

Index numbers are very useful in the study of a wide variety of economic problems. Economists use index numbers to study the changes in the current and capital account over a period of time.

\[ P = \frac{P_t}{P_b} \times 100 \]

**Chow Test**

To study the structural changes that might have occurred in the trends of the external sector between the pre-reform and of the post-reform period, a semi-log model. The framework of the model is

\[ \log Y = \beta_0 + \beta_1 t + U_t. \]

Y = FDI, Foreign Exchange Reserves, External Debt and Balance of Payment on Capital Account

\( \beta_0 \) and \( \beta_1 \) represent constants to be estimated \( (\beta_1 > 0) \)

\( t = \) Time in years represented by 1, 2, 3 ....
The growth rates were estimated for the pre-reform period (1980-81 to 1990-91) and for the post-reform period (1991-92 to 2007-08) and also for the whole period (1980-81 to 2007-08). Chow’s test has been carried out using the following $F$ – statistic.

$$F = \frac{S_5/K}{S_5/(N_1 + N_2 - 2K)}$$

where,

$N_1 =$ Number of years before economic reforms

$N_2 =$ Number of years after economic reforms

Degrees of Freedom = $(K, N_1 + N_2 - 2K)$

$S_5 = S_3 - (S_1 + S_4)$

$S_4 = S_1 + S_2$

$S_1 =$ Error sum of squares obtained in the first equation.

$S_2 =$ Error sum of squares obtained in the second equation.

$S_3 =$ Combined error sum of squares.

Computed F-Value is compared with Table ‘F’ for $K, N_1 + N_2 - 2K$ degrees of freedom. If computed ‘F’ value is greater than the table value, there are structural changes in post-reform period as compared with that of the pre-reform period.
Openness of Trade

Percentage share of exports in GDP is taken as export openness, while percentage share of import in GDP is the import openness of the country. But the percentage share of export plus import in GDP is considered as the measure of trade openness. Mathematically,

\[
O = \frac{(X+M)}{GDP} \times 100
\]

where,

\[O\] = Openness  
\[X\] = Export  
\[M\] = Import  
\[GDP\] = Gross Domestic Product