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# ***FINANCIAL CRISIS: THE INCREDIBLE HULK IN INDIAN ECONOMIC GROWTH AND EXTERNAL SECTOR***

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## **Abstract**

*This paper empirically examines the impact of current world-wide recession on India's growth. The data for this study were compiled from RBI and Central Statistical Organisation (CSO). The paper has applied regression technique with GDP as dependent variable, while exports, imports, FDI and FII were taken as independent variables. Prior to regression analysis, all the variables are tested for stationarity, applying Augmented Dickey-Fuller (ADF) test. The data sets were also tested for seasonality by applying auxiliary regression. Because of the problem of multicollinearity among the independent variables, three models, dropping one of the highly collinear variables, were estimated. The results suggest that financial crisis has adversely impacted India's GDP although imports, exports and FDI were found to have exercised stimulating influence through technological spillovers and other externalities. The paper suggests that recovery of global economy is extremely important for Indian economic growth although the effects of global slow down could be minimized through the use of stimulant fiscal and monetary measures.*

## **1. Introduction**

In the backdrop of surging world economy prior to 2007, generating euphoric optimism about future with the prediction of BRIC countries led economic growth in coming times, the onset of protracted recession, greatest ever after 1930s, through financial meltdown in US and elsewhere in early 2007, has knock on effect on such projections. International financial and trade flows have contracted at unprecedented rates for the first time in the past fifty years, with all advanced countries in deepest post World War II recession, with a job crisis intensifying across the board. The worst affected countries are the developing economies where a sharp fall in the export earnings and further pressure on current account and balance of payments were recorded, besides decline in workers' remittances, liquidity crunch and loss of confidence of consumers and investors. The most worrying offshoots of the crisis were the lower investment and growth rates and significant loss of employment. Much of the Asia, which was the engine of recent world economic growth, has also started manifesting the signs of a slowdown, cutting into the considerable economic progress accomplished in recent years. The growth forecasts for the fast emerging Asian economies such as India and China have also been downgraded by Asian Development Bank. The IMF growth forecasts have been revised significantly, for India -1.1 percentage points down to 6.9% real GDP growth, and China and Africa both down by -0.5 percentage points to 9.3% and 6.3% respectively (Dirk 2008). In view of this backdrop, this paper attempts to explore the impact of recession, in

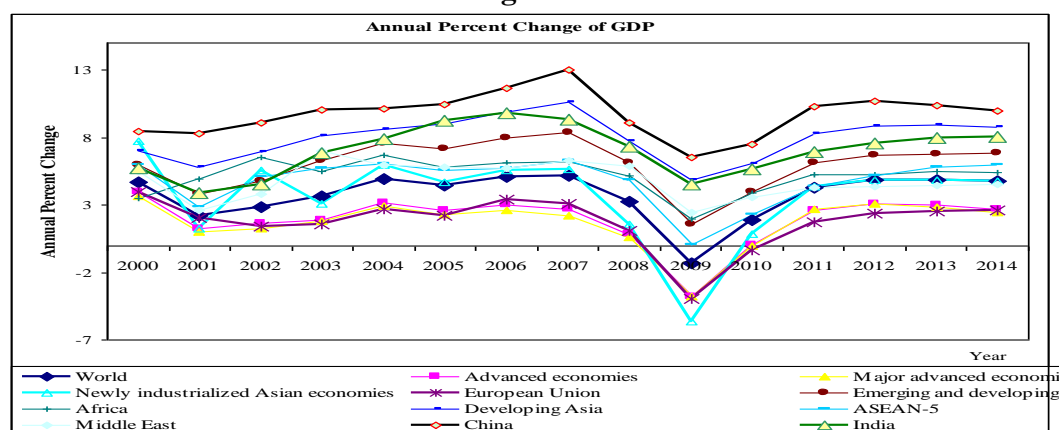
particular financial crisis, on Indian Economy. The paper has been organized in four sections. Section I deals with the general discussion on the impact of current recession on the world and Indian economy. Section II discusses data sources and methodology. Section III captures the impact of on-going recession on Indian economy through regression analysis, while Section IV sums up conclusions and policy inferences.

## SECTION – I: The Crisis and the World and Indian Economy

### 1.1 The impact on the world economy

First time after the Second World War, the world output and trade forecast by IMF has gone negative due to the present recession. Figure-1 suggest that the world output is projected to contract by 1.3 percent in 2009-10 with newly industrialised Asian Economies projected to be the worst hit with shrinking of their output by 5.6 percent. This is probably due to the fact that exports continue to act as the engine of growth for these countries. Since, exports of these countries as exposed to the Global Financial Crisis, the contraction of their growth rate seems inevitable. Advanced Economies' (G7 Countries) GDP is predicted to go down by 3.7 percent, while for European countries it is forecasted that GDP will decline by about 4 percent. Other important projections have come from the WTO, which have predicted that world trade, which has virtually collapsed in the second half of 2008, is likely to decline by as much as nine percent in 2009-10. These projections have gained strength from the fact that exports from world's major exporters, like Germany, Japan and China, have plummeted by more than 35 percent in the last quarter of 2008 (Kumar 2009).

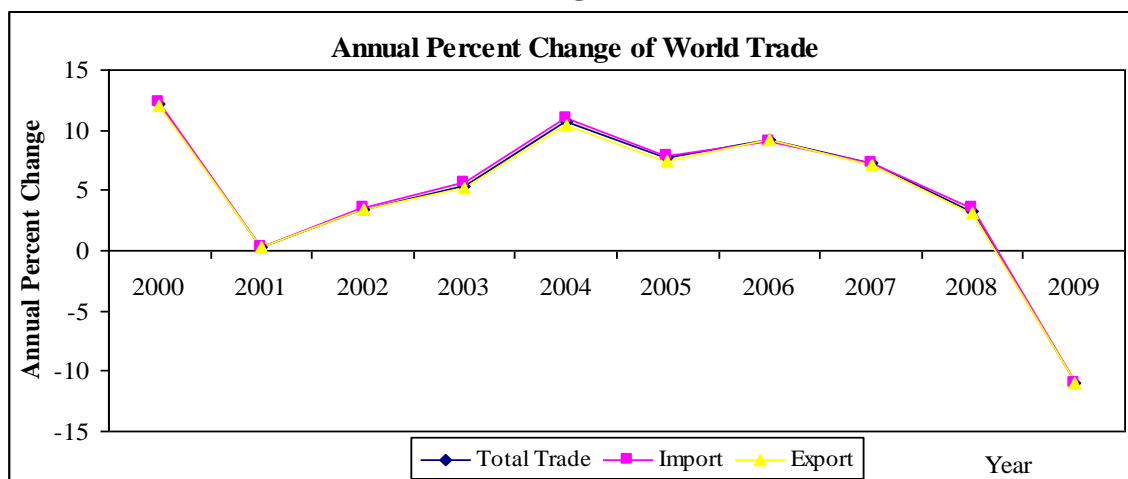
Figure-1



Source: International Monetary Fund, World Economic Outlook Database, April 2009

It is evident from Figure-2 that world's total trade comprising exports and imports has been projected to decline by about 11 percent in the financial year 2009-10.

**Figure-2**



Source: International Monetary Fund, World Economic Outlook Database, April 2009

The sharp decline in the world trade despite the staggering 11.9 trillion dollars stimulus put in place by the world economies did not seem to have helped so far. Any further decline in aggregate demand in US for foreign goods may lead to further decline in the world exports as she is the single largest importer of merchandize items and commercial services in the world. Besides, it might affect widespread unemployment and social stress in major exporting economies.

## **1.2 Impact on Indian Economy**

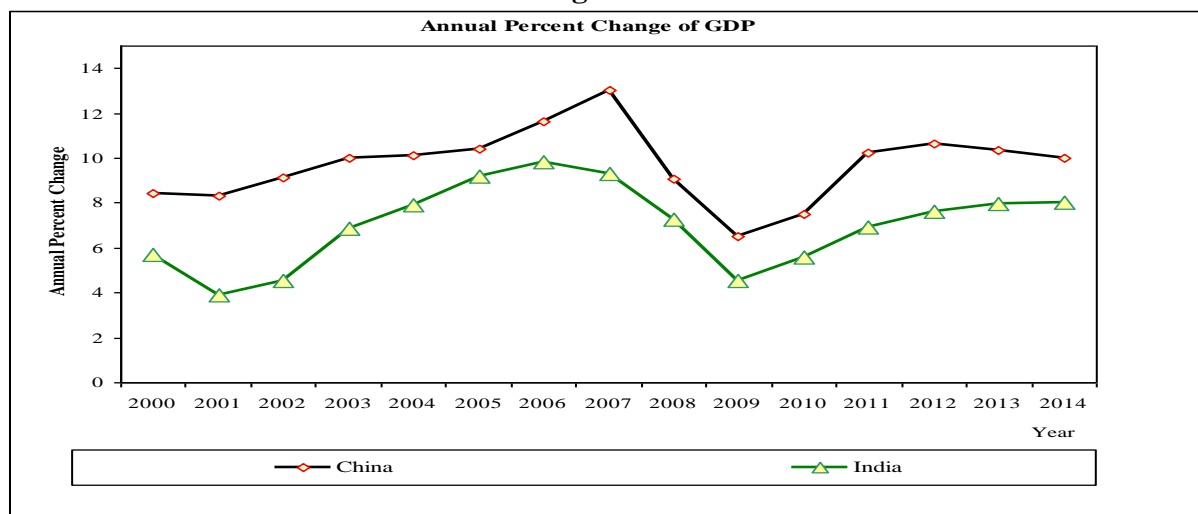
India's growth performance, since 2000, is highlighted in Table 1 based on RBI and Ministry of Finance Databases. The data suggest that economic growth in 2007–08 was high at 9 per cent despite the fact that the sub-prime crisis had already begun impacting the US and some other major economies. However, in the following quarters, the situation started looking grim with Government of India lowering its own projections of growth rate down to 6.7 per cent during 2008–09. Further, Table-1 indicates that agriculture & allied activities were projected to grow at 1.6 percent in 2008-09, while the figure for the previous year was 4.5 percent. Industrial sector growth rate was also projected to drop from 8.1 percent in 2007-08 to 3.9 percent in 2008-09. Service sector was projected to follow the same pattern.

**Table 1: India Growth Rates of Real GDP 2000-09 (%)**

Sector	2000–01 to 2007–08 (average)	2005– 06	2006– 07	2007– 08	2008–09 (Revised estimates)*
<b>1. Agriculture &amp; Allied Activities</b>	2.9	5.9	3.8	4.5	1.6
<b>2. Industry</b>	7.1	8.0	10.6	8.1	3.9
2.1 Mining & Quarrying	4.9	4.9	5.7	4.7	3.6
2.2 Manufacturing	7.8	9.0	12.0	8.8	2.4
2.3 Electricity, Gas & Water Supply	4.8	4.7	6.0	6.3	3.4
<b>3. Services</b>	9.0	11.0	11.2	10.7	9.7
3.1 Trade, Hotels, Restaurants, Transport, Storage & Communication	10.3	11.5	11.8	12.0	9.0
3.2 Financing, Insurance, Real Estate & Business Services	8.8	11.4	13.9	11.8	7.8
3.3 Community, Social & Personal services	5.8	7.2	6.9	7.3	13.1
3.4 Construction	10.6	16.2	11.8	10.1	7.2
Real GDP at factor cost	7.3	9.4	9.6	9.0	6.7

Source: RBI and \* Ministry of Finance, Govt. of India

Figure-3 illustrates India's growth performance in the new millennium as reported by IMF. It is evident that India's growth rate which was about 10 percent in 2006 has been declining since 2007 and has touched as low as 4.5 percent by end of year 2008.

**Figure-3**

Source: International Monetary Fund, World Economic Outlook Database, April 2009

Quarterly growth rate of India's GDP and its different components is reported in Table-2. Agriculture growth rate, as suggested by data in Table 2, in the 3<sup>rd</sup> quarter of 2008-09 is estimated to be negative at -0.8 percent, whereas the figure for the same period in the previous year stood at 8.1 percent. It may be mentioned that industrial growth during first quarter of 2007-08 was 9.2 percent, and it is projected to grow at 1.4 percent by the last quarter of 2008–09. Among all the components of the industrial sector, manufacturing is the worst affected and it is predicted to shrink by 1.4 percent at the end of fourth quarter of 2008-

09. Service sector which was growing at 11 percent in the first quarter of 2007-08 is estimated to grow at 4.2 percent in the third quarter and may slightly improve to 6.8 percent by the fourth quarter of 2008-09. Among the service sector, construction sector is predicted to grow faster than the previous year. This is because of the fact that India is experiencing demographic and urbanization pressure leading to acute shortage of urban housing which, in turn, has pushed up real estate prices, thus making it an attractive option for investment.

**Table 2: Quarterly Estimates of GDP 2007-08 and 2008-09 (% Change over previous Year)**

Sectors	2007-08				2008-09			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1. Agriculture & Allied Activities	4.3	3.9	8.1	2.2	3.0	2.7	-0.8	2.7
2. Industry	9.2	9.1	8.2	6.2	6	6.1	2.3	1.4
2.1 Mining & Quarrying	0.1	3.8	4.2	4.7	4.6	3.7	4.9	1.6
2.2 Manufacturing	10	8.2	8.6	6.3	5.5	5.1	0.9	-1.4
2.3 Electricity, Gas & Water Supply	6.9	5.9	3.8	4.6	2.7	3.8	3.5	3.6
3. Services	11	13.4	9.7	6.9	8.4	9.6	4.2	6.8
3.1 Trade, Hotels, Restaurants, Transport, Storage & Communication	10.8	10.3	10.3	11.8	10.2	9.8	10.2	8.6
3.2 Financing, Insurance, Real Estate & Business Services	13.1	10.9	11.7	13.8	13	12.1	5.9	6.3
3.3 Community, Social & Personal services	12.6	12.4	11.9	10.3	6.9	6.4	8.3	9.5
3.4 Construction	4.5	7.1	5.5	9.5	8.2	9	22.5	12.5
Real GDP at factor cost	9.2	9	9.3	8.6	7.8	7.7	5.8	5.8

Source: RBI and \* Ministry of Finance, Govt. of India

In regard of the Indian financial sector, it may be mentioned that though it is not overly exposed to the international financial arena, yet it has affected the domestic economy by three ways: lowering domestic liquidity, causing stock prices to fall and reducing Indian companies' access to overseas finance. With the drying up of overseas finances, there was increasing pressure on Indian money and credit markets (Subbarao, 2008). This is primarily due to the withdrawal of about USD12 billion from the market by foreign portfolio investors between September and December 2008. Commercial credit, both for trade finance and medium-term advances from foreign banks has dried-up which has had to be replaced with credit lines from domestic banks but at higher interest costs. Some of the funds borrowed internally were converted in dollars to meet the overseas debt servicing obligations of the corporate sector. However, fall in the market capitalisation of the companies due to fall in stock market indexes, constrained their capacity to have access to the domestic and foreign markets. This is also corroborated by the fact that the total value of deals (M&A and PE) announced in the first half of 2009 was US\$7.81 billion as against US\$ 23.02 billion and \$50.75 billion in 2008 and 2007 respectively. Cross-border M&A deal values have fallen

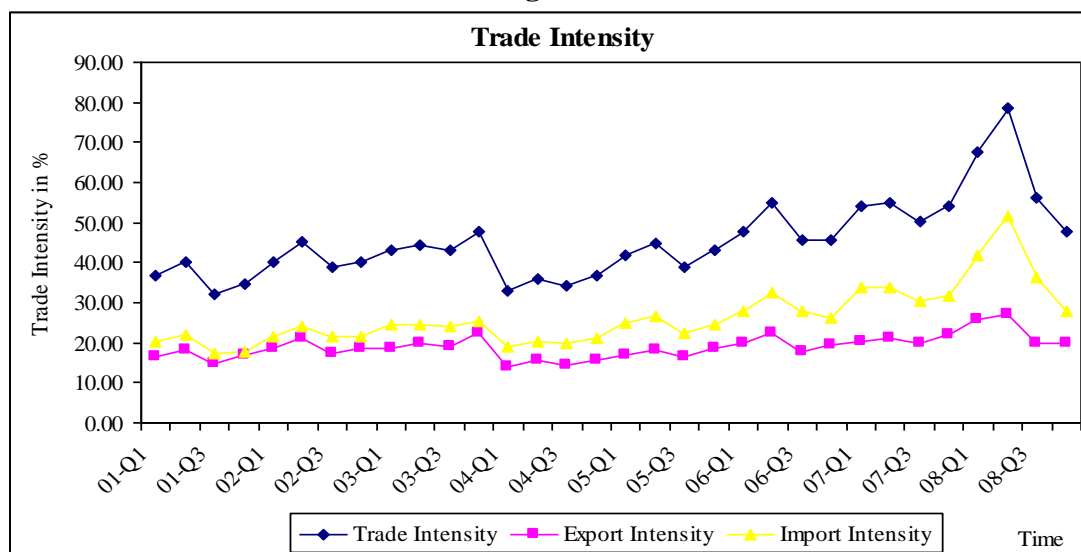
from US\$42 billion in the first half of 2007 and US\$12 billion in the first half of 2008 to just US\$1.4 billion in the first half of 2009 registering a fall of more than 85% over the same period last year. Reserve Bank's intervention in the forex market to manage the volatility in the rupee further added to liquidity tightening. Domestic deals, however, have continued to remain buoyant with deal values clocking US\$3.5 billion in the first half of 2009 compared to US\$4.3 billion in the first half of 2008 (Economic Times, July 31, 2009). The banking sector by and large, remained unaffected except for ICICI, which was partly affected but managed to prevent a crisis because of its strong balance sheet and timely action by the government, which virtually guaranteed its deposits. However, given the fact that the banks and other financial institutions wanted to minimize the possibility of losses, they started cutting back on credit due to uncertainty as is evident from the fact that there was a fall in the rate of growth of loans for the purchase of auto and consumer durables by 30 and 66% respectively over the year ending June 30, 2008. Direct housing loans, which had increased by 25 per cent during 2006-07, decelerated to 11 per cent growth in 2007-08 and 12 per cent over the year ending June 2008. Although low volume of loans during the crisis could be partly attributed to low demand, yet, it is the supply side which has played a major role in this regard. The losses suffered by non-banking financial institutions (especially mutual funds) and corporates, as a result of their exposure to domestic stock and currency markets, is another noticeable issue. Such losses are expected to be large, as indicated by the decision of the RBI to allow banks to provide loans to mutual funds against certificates of deposit (CDs) or buy-back their own CDs before maturity (Chandrasekhar and Ghosh 2008).

### **1.3 Impact on External Sector**

As demand declines in the importing countries, exports from trading partners are adversely affected. The IMF has estimated that imports of goods and services in advanced economies may decline by 12 percent in 2009 (World Economic Outlook, April 2009) which implies a significant decline in exports from developing economies. The Indian external sector may face the consequence of this development: first, there could be economic slowdown via multiplier process due to a sharp drop in export growth for the lack of external demand, as massive investment has already been undertaken in export-oriented sector with the rising trends in both merchandised and service exports before 2007-8. Secondly, given the share of exports at around 27% of GDP in 2<sup>nd</sup> quarter of 2008, the slowdown in exports may result in the disposal of exportable surplus in the domestic market which might affect the domestic economy. Third, changes in international oil price will have major impact on the Indian

economy as it accounts for one-third of India's Import with demand for petroleum products as price inelastic at least in the short run (Rakshit M 2009).

**Figure-4**



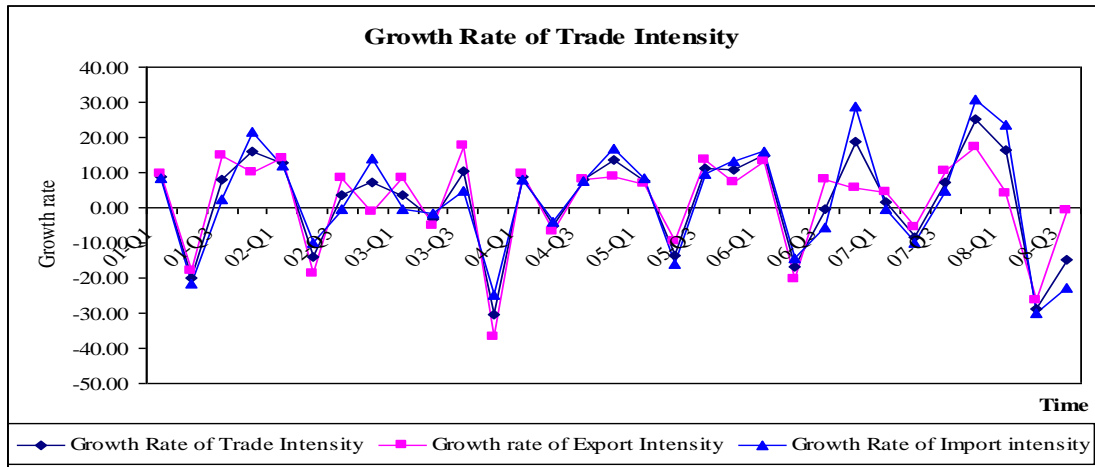
Source: Compiled by authors from RBI

Figure-4 highlights India's trade intensity<sup>1</sup> on quarterly basis since 2001. It elucidates that the trade intensity which was about 37% in the first quarter of 2001 has gone up to 78% by the second quarter of 2008. This is primarily because of the increase in import intensity attributable to sharp rise in international oil prices. International oil prices have almost doubled during this period. However, after the cooling down of world oil prices, import intensity had come down to about 28% by last quarter of 2008 and so had the total trade intensity. On export front, export intensity which was about 16% at the beginning of the financial year 2001-02, had gone up to about 27% by the second quarter of 2008. However, due to demand constraints in the world economy, as an offshoot of financial crisis, export intensity declined to 19.7% by fourth quarter of 2008. Quarterly growth rate of India's trade intensity is reported in figure-4. It is evident from Figure 5 that growth rate followed a cyclical pattern for total trade, export intensity and import intensity. All three growth rates followed almost same pattern. This is probably for the fact that India's external sectors depends heavily on the world economic scenario. It is evident from the Figure-4 that, India's export intensity which was growing at 17% at the end of last quarter of 2007 started registering negative growth of -26.3% by the second quarter of 2008.

<sup>1</sup> Trade intensity = total trade/GDP



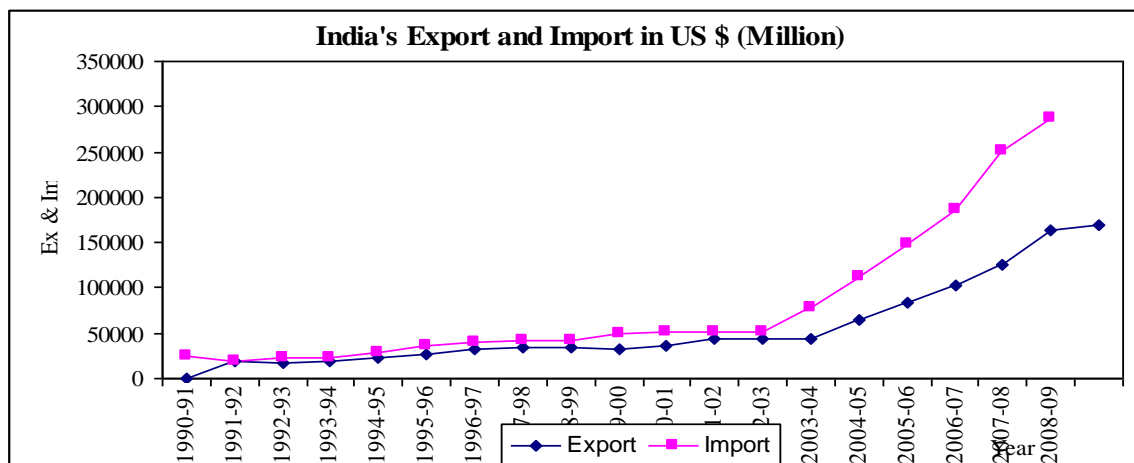
**Figure- 5**



Source: Compiled by authors from RBI database

In absolute terms (US \$) India's exports and imports has been growing (See Figure-6). The value of imports has always been greater than that of exports for each year especially after 2002-03. It is also evident that India's exports and imports went up significantly only after financial year 2002-03. The increase in exports and imports may be due to the dismantling of quantitative restrictions' on 715 items from April 1, 2001 (Economic Survey 2002) and India's increasing integration to the world economy especially after WTO agreements. Figure 6 also brings to the fore that after 2008, the exports have stagnated while imports have been on rise though at declining rate. Further, annual growth rates of India's exports and imports have registered a decline after 2007.

**Figure- 6**

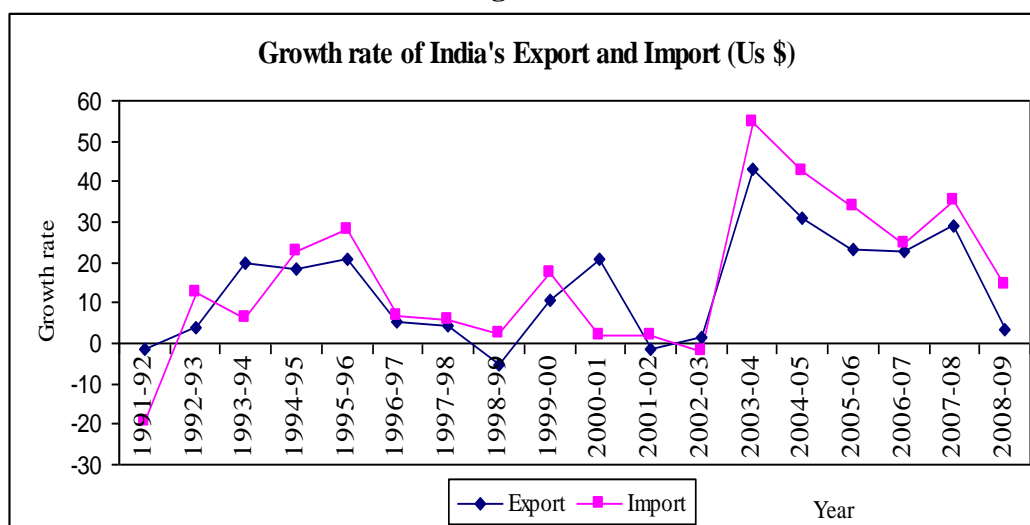


Source: Compiled by authors from RBI Database

In terms of growth rates of exports and imports, there has been a continued decline after the quantum jump in 2003-4 except for a brief recovery during 2006-08 as is highlighted by

Figure 7. The decline in growth rate of exports appears to be far steeper than that of imports after 2008-09.

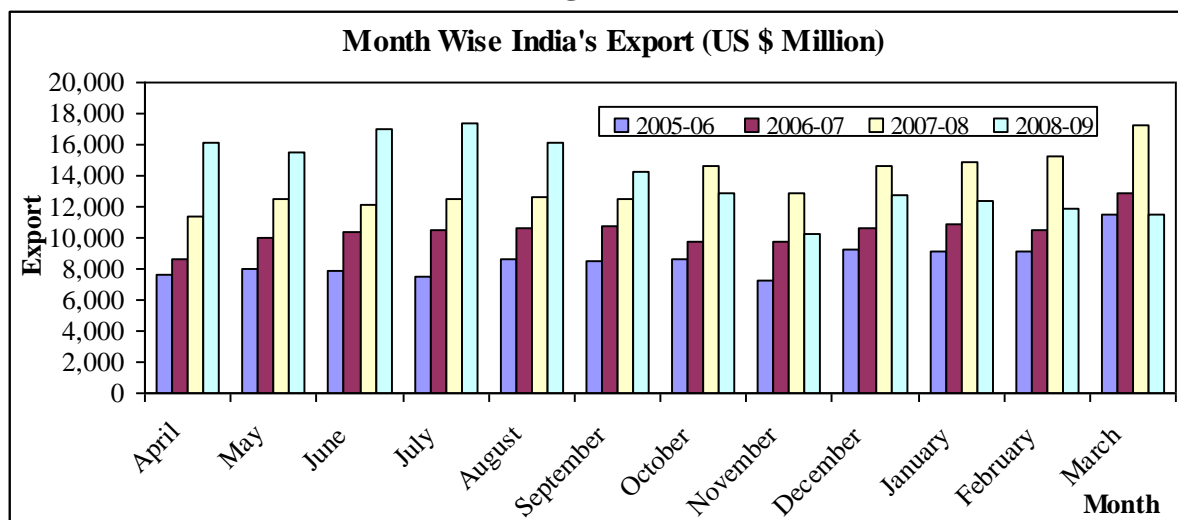
**Figure- 7**



Source: Compiled by authors from RBI database

India's exports (month-wise), since 2005-06 are reported in Figure-8. It can be observed from the Figure-8 during June to November 2007-08 that exports were only marginally higher than what they were during 2006-07. However, after November, an improvement in the same is noticeable.

**Figure- 8**



Source: Compiled by authors from RBI Database

Since October 2008-09, export is lower as compared to the previous year, and the gap has increased continuously. In February 2007-08, India's exports were US \$ 15221 million, where as for 2008-09 they stood at US \$ 11913 million. Till the month of September in the financial year 2008-09 export was higher than that of previous year. However, afterwards it

has been declining and less than the figures of 2007-08. The impact of the recession on India's external sector is expected for the fact that OECD countries, which account for almost 39% of the India's goods and services export are the hit by the current crisis. Same is true of Asia which accounts for 42.26% of India's exports. Looking at the data for balance of payments since 2000, there appears to be a visible impact of the current world-wide recession on India's foreign trade. India's foreign trade which had been steadily growing with imports moving up faster, started recording decline since the fourth quarter of 2007 with exports showing perceptible decline. The decline for imports, nevertheless, was found to be far more visible, albeit with a time lag i.e., impact more evident from the second quarter of 2008 to the extent that it fell even below the growth rate of exports. As could be seen from the data in Table 1 in Appendix I, the increasing trend in India's exports got reversed in 2007-08, as was happening world over. The decline in the export of primary products was found to be much more pronounced as compared to manufactured products. In the second half of 2008, this decline led to the growth rate of Indian exports going negative for all items with much more visible decline in the export of primary products. Among the manufactured products, the worst affected were the textile and textile products, although the deceleration in the growth rates of chemical and related products, engineering goods and gems and jewellery was also discernible after 2007-08. So far as invisibles are concerned, there was a noticeable decline in the export of services since 2007-08, however, decline in the transfers were found to be far more rapid. The inflows, in the form of incomes, (investment income and compensation of employees) were, nevertheless, found to be maintaining, by and large, a steady growth. In regard of the services, while there has been decline in the growth rate of all types of exportable services, the decline in the export of software services were found to be the much faster since 2007-08. They, in fact, had started recording negative growth after the second quarter of 2007-08. The exports of transportation, and to some extent, travel services were found to be not much affected by the current world-wide meltdown.

In regard of FII, it is evident from the RBI data that during 2007-08, net FII inflows into India amounted to \$20.3 billion out of which US\$11.1 billion were pulled out during the first nine and half months of calendar year 2008, of which \$8.3 billion occurred over the first six and a half months of financial year 2008-09 (April 1 to October 16). The trend continued till January-March 2009. As a result, the Sensex fell by approx. 60% from its closing peak of 20,873 on January 8, 2008 by October 2008 and there was a further fall in the following months. In addition, this withdrawal by the FIIs led to a sharp depreciation of the rupee. Between January 1 and October 16, 2008, the RBI reference rate for the rupee fell by nearly 25 per cent, even relative to a weak currency like the dollar, from Rs. 39.20 to the dollar to

Rs. 48.86. This was despite the sale of dollars by the RBI, which was reflected in a decline of \$25.8 billion in its foreign currency assets between the end of March 2008 and October 3, 2008. The increasing current account deficit, rapidly decreasing remittances from overseas Indians along with FII withdrawal and RBI's manoeuvring in foreign exchange market to manage the volatility in the rupee led to decline in foreign exchange reserves from US\$ 286 billion in September 2008 to US\$ 247.7 billion in November 2008, though by July 10 2009, these reserves started registering increase to become worth US\$ 264 billion (Macroeconomic Review, August 2009, RBI). There was, however, not much of the impact of recession on the FDI.

## SECTION –II: Data Sources and Methodology

For the purpose of this study, data on Gross Domestic Product, quarterly and annually, (GDP) have been taken from Central Statistical Organizations' (CSO) monthly abstract. For obtaining a consistent series of GDP, the data belonging to different base years were converted to single base year, using price correction factor. Data on export, import, foreign direct investment (FDI) and foreign institutional investment (FII) were compiled from Reserve bank of India's (RBI) monthly statistical abstract. Data for other countries and world as a whole were taken from the databases of International Monetary Fund, World Economic Outlook Database, April 2009. To find out whether the present financial crisis triggered in the west has significantly impacted the Indian economy, the present paper has applied regression technique. Since the crisis can probably affect India's GDP most likely via external sector, only the external sector variables are taken in this study. Although GDP is not solely determined by the external factors as internal factors such as labour, capital, domestic government policy also play significant roles in shaping it, yet the external sector is the focus of this paper. Therefore, only variables relating to this sector have been accounted for. The functional form of the model is given as:

$$GDP = f(Export, Import, FDI, FII, GDP_{t-1}). \text{-----}1$$

The estimable regression equation is given as:

$$LnY_t = \alpha + \beta_1 LnX_t + \beta_2 LnI + \beta_3 FDI + \beta_4 FII + LnY_{t-1} + \lambda D + \mu_t \text{-----}2$$

Where  $Y_t$  is the GDP at time period 't', X stands for exports, I stands for imports, FDI and FII stand for foreign direct investment and foreign institutional investment respectively. D is the dummy variable and it takes value of 1 for time period January 2007 onwards i.e the fourth quarter of financial year 2006-07, otherwise zero. The main reason for taking this threshold period is that since the beginning of 2007, the financial crisis had started manifesting itself. The  $\mu_t$  is the error term and represents the variables which are not

included in the model. Further details of the regression analysis and result are given in the 3<sup>rd</sup> section of the paper.

### SECTION –III: Regression Analysis: Discussion and Interpretation

Prior to regression analysis, all the variables were tested for stationarity, applying Augmented Dickey-Fuller (ADF) test. The test revealed that log of GDP and Log Export follows I(3), whereas FDI follows I(2) and FII follows I(0). This implied that GDP's and exports' third difference is stationary, FDI's second difference is stationary, and FDI is stationary at its level<sup>2</sup> (Appendix-II). Since different variables are stationary at different level, it is difficult to apply usual time series regression. Besides, a variable, stationary at third difference, will lose significant level of information. The problem of different variables being stationary at different levels may probably be attributed to seasonality<sup>3</sup> in the data. Therefore, the data set were tested for seasonality by applying auxiliary regression. The details of the seasonality test are given in the proceeding section<sup>4</sup>.

#### 3.1 Seasonality test

For seasonality test, all variables were transformed to their natural logarithm, except for FII for the fact that data for some quarters were negative. The auxiliary regression equation is given as

$$\nabla Z_t = \alpha + \sum_{i=1}^3 \beta_i S_{it} + \mu_t$$

Where  $Z_t$  is the variable under consideration,  $\nabla Z_t = Z_t - Z_{t-1}$  is the first difference of  $Z_t$ , alpha is the constant term and  $S_{it}$  is the seasonal dummy variable that takes the value of one for  $i^{\text{th}}$  quarter otherwise zero.  $\mu_t$  is the error term assumed to be stationary. The dependent variable is the first difference of  $Z_t$  is considered rather than the levels, in order to separate the stochastic trend in the series. The regression is performed for each of the variables for their full sample as well as two subset samples each with an equal number of observations. The regression results are reported in Table- 3.

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<sup>2</sup> The results of unit root test are and procedure of unit root test is given at the appendix.

<sup>3</sup> "Seasonality is the systematic, although not necessarily regular, intra-year movement caused by changes of the weather, the calendar, and timing of decisions, directly or indirectly through the production and consumption decisions made by the agents of the economy. These decisions are influenced by the endowments, the expectations and the preference of the agents, and the production techniques available in the economy" Hylleberg (1992, P-4).

<sup>4</sup> For a detail of advantage and limitations of seasonality test see Franses (1999), "Recent advances in modelling seasonality", Journal of economic Survey.

**Table-3: Auxiliary regression result for seasonality test**

Variable	Sample	$\alpha$	$\beta_1$	$\beta_2$	$\beta_3$	$R^2$	Adj $R^2$	F value
<b>Ln GDP</b>	Full	0.012*	-0.035**	-0.036	0.138*	0.479	0.423	8.30*
	1 <sup>st</sup> half	0.084	-0.031	-0.032	0.157***	0.358	0.320	2.29***
	2 <sup>nd</sup> half	0.026*	-0.105*	-0.039*	0.118*	0.991	0.989	439.48*
<b>Ln Export</b>	Full	0.112*	-0.131*	-0.042	-0.110*	0.417	0.356	6.42*
	1 <sup>st</sup> half	0.123***	-0.167**	-0.048	-0.090***	0.642	0.568	7.17**
	2 <sup>nd</sup> half	0.101**	-0.085	-0.045	-0.130**	0.356	0.301	2.03
<b>Ln Import</b>	Full	0.013	0.089***	0.056	-0.006	0.176	0.078	1.84
	1 <sup>st</sup> half	0.043	0.033	-0.002	0.020	0.092	0.042	0.40
	2 <sup>nd</sup> half	-0.017	0.153	0.114	-0.034	0.364	0.310	2.10
<b>Ln FDI</b>	Full	0.361	0.071	-0.043	0.068	0.093	0.047	1.032
	1 <sup>st</sup> half	0.143	-0.085	0.062**	-0.378*	0.424	0.369	0.478
	2 <sup>nd</sup> half	-0.061	0.405	-0.149	0.516	0.235	0.169	1.127
<b>FII</b>	Full	977.23	-5246***	605.52	-243.32	0.195	0.157	2.295***
	1 <sup>st</sup> half	-174	-1400**	332	1872***	0.474	0.342	3.605**
	2 <sup>nd</sup> half	2128.25	-9991.2**	879.25	-2359.2*	0.309	0.251	2.644***

Note: \*- 1% level of significance, \*\* - 5% level of significance, \*\*\* - 10% level of significance

The results of the auxiliary regression suggested that, the series GDP, export and FII exhibit substantial seasonal fluctuations while Imports and FDI witnessed mild seasonal fluctuations. The  $R^2$  value provides information of the extent to which variation around the mean values of the three seasonal dummy variables affect movements of  $Z_t$  around its mean. The regression result for the GDP indicated that seasonality accounted for about 48% of variation in the whole sample, 35% in the first half and 99% in the second half; and for exports it accounted for 42%, 64% and 36% for full sample size, first half and second half, respectively. Based on the above, all the variables were de-seasonalised<sup>5</sup> and then regression for equation-2 was performed. In order to avoid any possible autocorrelation problem, a time variable (T) was

<sup>5</sup>  $Z^@_i = Z_i * w_i$  where  $w_i$  is the seasonal weight for season "i", and  $Z^@_i$  is the de-seasonalised data.  $w_i$  is measured by applying moving average method. This can be done by the following five steps:

- Obtain the trend values by the moving average method. Since the data are quarterly, four-quarterly moving averages are found out.
- From this four-quarterly moving averages data, two-time period moving average is calculated. Lets name this data set as T
- After this, applying multiplicative model each figure relating to the time-period of original data is divided by the corresponding value of data set T. Lets name this as W.
- Next, arithmetic averages are computed after arranging the data set of W related to the different quarters. This will result in unadjusted weights ( $UW_i$ ).
- Adjusted weights are given by ( $w_i$ ): Unadjusted weights divided by Sum of the unadjusted weights.

$$\text{Mathematically: } w_i = \frac{UW_i}{\sum_{i=1}^4 UW_i}$$

also introduced in the regression, which took the value of 1 to 31<sup>6</sup>. Prior to regression analysis, multicollinearity test was conducted by applying correlation and the result suggested the existence of high degree of colinearity between exports and imports, exports and FDI, and imports and FDI. In order to overcome the problem of multicollinearity, three models were estimated and the results are reported in Table-7. Cochrane-Orcutt<sup>7</sup> (C-O) procedure has also been applied in order to take care of probable autocorrelation. The regression results, based on equation-2, are presented in Table-4.

### 3.2 Regression Results and discussion

The statistically significant F-value, reasonable high R<sup>2</sup> and close to two D-W statistics suggest that the model is good fit. The statistically significant coefficient of dummy variable with the value -0.141 in Model 1, as shown in Table-4 suggests that financial crisis has had negative impact on GDP. Similarly, for all the models, the coefficient of dummy variable was found to be negative and statistically significant. This suggested that, financial crisis, triggered in the west, has adversely impacted India's GDP. In Model-1, the coefficient of exports enters positively and found to be statistically significant. This suggested that export has contributed positively to the growth of India's GDP. Exports appear to have exercised stimulating influence over the economy probably through technological spillovers and other externalities (Bhagwati 1988). Existing empirical studies also suggest that expanded international trade increases the number of specialized inputs, driving growth rates as economies opens to international trade (Helpman 1991, Rivera-Batiz and Romer 1991, Romer 1990). Besides, there are other empirical studies that also support export led growth hypothesis (Love and Chandra 2005, László Kónya 2006, Dong and Zhang 2009, Awokuse 2007, Michaely 1977, Feder 1982, Marin 1992, Thornton 1996).

**Table -4: Alternative specifications with dependent variable: ln GDP**

Variable	Model-1	Model-2	Model-2
<b>Intercept</b>	0.850	0.733	7.820**
<b>Log Export</b>	1.139*	-----	-----
<b>Log Import</b>	-----	1.098*	-----
<b>FDI</b>	-----	-----	0.978*
<b>FII</b>	0.0001	0.0001	0.0001***
<b>Ln GDP<sub>t-1</sub></b>	0.003	0.008	0.126
<b>D</b>	-0.141***	-0.185**	-1.353*
<b>T</b>	-0.011**	-0.023*	0.0123

<sup>6</sup> The usual ADF test for unit root is not applicable for the seasonal data. One can apply HEGY seasonal unit root test (Hylleberg et al, 1999) to test the stationarity of variables. However, in this analysis, since our D-W statistics close to two, we have not tested for seasonal unit root.

<sup>7</sup> In the presence of autocorrelation, the original series  $Y_t$  is transformed using the following method:  $Y_i^* = Y_i - \rho Y_j$  Where,  $Y_i^*$  = Transformed data;  $Y_i$  = Original data at point t;  $Y_j$  = Original data at point j.  $\rho$  = Autocorrelation coefficient  $\rho = \sum (\mu_i - \mu_j)^2 / \sum \mu_i^2$ . After the data are transformed according to formula  $Y_i^* = Y_i - \rho Y_j$ , regression is performed on the transformed variables.

<b>R<sup>2</sup></b>	0.784	0.720	0.720
<b>Adj R<sup>2</sup></b>	0.653	0.639	0.664
<b>F value</b>	385.65*	369.02*	12.87*
<b>D-W</b>	2.03	1.92	1.89

\*- 1% level of significance, \*\*- 5% level of significance, \*\*\*- 10% level of significance

In Model-2, the coefficient of imports was found to be positive and statistically significant, implying that imports too have positively impacted India's growth. This is probably because India, primarily, imports machinery and oil which are used in the production process. In addition, imports are important vehicles for the transfer of technology and knowledge products which, in turn, promote economic growth (Frankel and Romer 1999, Romer and Cyrus 1996, Grossman and Helpman 1997). Probably, the growth in India is Export-based-Import driven. Therefore, import is having a positive and significant impact on economic growth of India. However, Export-based-Import driven growth hypothesis is beyond the scope of the current paper. However, this proposition needs further investigation.

In Model-3, coefficients of FDI and FII suggested that both of them have exercised positive and statistically significant impact on Indian economy, although the value of the coefficient of FII is weak suggesting a weaker link. While FDI's contribution to growth could be explored through capital formation and technology transfer (Blomstrom and Kokko 1998, Borensztein *et al.* 1995) along with accumulation of knowledge due to labour training and skill acquisitions (De Mello, 1999), the role of FII to promote growth could be attributed to the availability of funds for further expansion and fresh investments both in the domestic sector and abroad. The most frequently cited benefits of FDI are probably productivity spillovers to the host economy, resulting in higher growth. There are empirical studies that support this contention (De Mello 1999, Bende- Nabende *et al.* 2000, Durham 2004, Nair-Reichert and Weinhold 2001, Xu 2000, Caves 1974, Lipsey 1999, Globerman 1979), though the impact was found to vary across countries (UNTAD 1999, 2003; Borensztein *et al.* 1998, Bende-Nabende *et al.* 2001).

## SECTION - IV

### Conclusions:

1. As a result of recession, India's growth rate which was about 10 percent in 2006 has been declining since 2007. Consequently, the growth projection for 2008-9 has been lowered down to 6.7 per cent. A perceptible decline in the growth rates of all the sectors was found. Among all the components of the industrial sector, manufacturing was found to be the worst affected and predicted to shrink by 1.4 percent at the end of fourth quarter of 2008-09. Service sector which was growing at 11 percent in the first quarter of 2007-08 is estimated to grow at 4.2 percent in the third quarter and may



slightly improve to 6.8 percent by the fourth quarter of 2008-09. The recession has found to have affected the domestic economy by three ways: lowering domestic liquidity, causing stock prices to fall and reducing Indian companies' access to overseas finance. Fall in the market capitalisation of the companies due to fall in stock market indexes was also found to have constrained their capacity to have access to the domestic and foreign markets.

2. India's foreign trade which had been steadily growing with imports moving up faster, started recording decline since the fourth quarter of 2007 with exports showing perceptible decline. The decline for imports, nevertheless, was found to be far more visible, albeit with a time lag i.e., impact more evident from the second quarter of 2008 to the extent that it fell even below the growth rate of exports. In the second half of 2008, the growth rate of Indian exports became negative for all items with much more visible decline in the export of primary products. Among the manufactured products, the worst affected were the textile and textile products, although the deceleration in the growth rates of chemical and related products, engineering goods and gems and jewellery was also discernible after 2007-08. In regard of the services, while there has been decline in the growth rate of all types of exportable services, the decline in the export of software services were found to be the much faster since 2007-08. The exports of transportation, and to some extent, travel services were found to be not much affected by the current world-wide meltdown.
3. The results pertaining to dummy variable in all the models suggest that financial crisis has exercised negative impact on India's GDP.
4. Both, the exports and imports, appear to have had stimulating influence over the economy probably through technological spillovers and other externalities.
5. FDI and FII were also found to have positively impacted the growth of India's economy, although the impact of FDI was found to be much stronger.

### **Policy Measures:**

Given the increasing integration of Indian economy with rest of the world, the slow down of Indian economy is expected to be reversed only with the recovery of global markets. Until then, the only policy option before government of India and RBI is to stimulate the domestic demand through fiscal and monetary measures. While government of India could put more disposable income in the hands of the tax payers, RBI could stimulate the demand for credit by facilitating monetary expansion and reduction in the cost of borrowing through infusion of additional liquidity by cutting the CRR, lowering the SLR and unwinding the Market Stabilisation Scheme (MSS).. Both the policy measures, however, have their own limitations.

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## Appendix I

**Table-1 Sector Wise India's Export Performance (US \$ Million)**

Commodity / Year	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
<b>1- Primary products</b>	7126.20	7163.60	8706.10	9901.80	13553.30	16377.40	19686.00	27500.00	23200.00
<i>A- Agriculture and allied products</i>	5973.20	5901.20	6710.00	7533.10	8474.70	10213.80	12683.50	18400.00	16000.00
<i>B- Ores and minerals</i>	1153.00	1262.40	1996.00	2368.70	5078.60	6163.60	7002.50	9100.00	7200.00
<b>2. Manufactured Products</b>	34335.20	33369.70	40244.50	48492.10	60730.70	72562.80	84920.60	102900.00	100900.00
<i>A- Chemicals and Related products</i>	5885.90	6051.80	7455.30	9445.90	12443.70	14769.50	17335.50	21200.00	20500.00
<i>B- Engineering goods</i>	6818.60	6957.80	9033.00	12405.40	17348.30	21718.80	29567.20	37400.00	40700.00
<i>C- Textile and textile products</i>	11285.00	10206.50	11617.00	12791.50	13555.30	16402.10	17373.20	19400.00	17700.00
<i>D- Gems and jewellery</i>	7384.00	7306.30	9029.90	10573.30	13761.80	15529.10	15977.00	19700.00	17200.00
<b>3- Petroleum products</b>	1869.70	2119.10	2576.50	3568.40	6989.30	11639.60	18678.70	28400.00	24900.00
<b>4- Invisibles (a+b+c)</b>	328.83	371.10	417.20	526.84	687.50	901.72	1145.81	1486.04	729.70
<b>a) Services</b>	165.90	173.23	206.63	264.43	427.46	579.75	758.60	900.77	514.06
<i>i) Travel</i>	35.74	31.74	32.90	49.49	65.89	79.07	90.72	113.49	94.32
<i>ii) Transportation</i>	20.84	21.88	25.23	31.59	46.39	63.54	80.28	100.14	127.77
<i>iii) Insurance</i>	2.758	2.91	3.67	4.13	8.63	10.64	11.98699	16.39	11.31
<i>iv) G.n.i.e.</i>	6.64	5.23	2.91	2.37	3.96	3.16	2.49	3.30	7.91
<i>v) Miscellaneous of which</i>	99.93	111.47	141.91	176.85	302.58	423.32	573.12	667.45	272.75
<i>Software services</i>	64.56	76.37	95.52	126.19	175.22	237.26	311.82	403.00	28.14
<i>Business Services</i>	NA	NA	NA	NA	NA	93.78	191.76	167.71	152.69
<i>Financial Services</i>	NA	NA	NA	NA	NA	12.14	28.81	32.17	29.61
<i>Communication Services</i>	NA	NA	NA	NA	NA	15.87	20.97	24.08	9.96
<b>b) Transfer</b>	135.62	163.79	175.49	223.97	214.49	257.52	294.56	442.59	27.46
<i>i) Official</i>	2.57	4.65	4.47	5.43	6.09	6.73	6.35	7.53	4.13
<i>ii) Private</i>	133.04	159.14	171.02	218.54	208.40	250.78	288.21	435.06	23.33
<b>c) Income</b>	27.31	34.08	35.08	38.45	45.54	64.46	92.65	142.68	188.18
<i>Investment income</i>	26.01	32.82	33.92	37.17	40.91	62.66	88.72	138.08	174.99
<i>Compensation of employees</i>	1.302	1.26	1.16	1.28	4.63	1.80	3.93	4.60	13.19

Note: Data for 2008-09 is from April to February; G.n i.e stands for Government expenditure not included elsewhere; NA – Not available

Source: RBI

## Appendix: II

### Augmented Dickey Fuller Test

The Augmented Dickey Fuller (ADF) test is (Dickey and Fuller, 1981) based on the following regression:

$$\Delta X_t = \alpha_0 + \alpha_1 t + \beta X_{t-1} + \sum_{j=1}^k \gamma_j \Delta X_{t-j} + \varepsilon_t$$

Where  $\Delta$  is the difference operator and  $\varepsilon_t$  is the stationary random error. The null hypothesis is that  $X_t$  is a non-stationary series and it is rejected when  $\beta$  is significantly negative. The constant and trend terms are retained only if they are significantly different from zero. There are three possible models according to whether, the estimation take into account constant term and trend. The possible outcomes are: (1) when there is no constant and no trend; (2) when there is constant but no trend; (3) when there is both trend and constant. Only the negative coefficients are reported here, because a positive coefficient implies the series is explosive. The optimal number of lags,  $k$ , is determined by minimizing the Akaike information criterion. The present study used JMulTi statistical software to calculate the ADF statistics and to find the critical values. The critical values for unit root tests are -3.43, -2.86 and -2.57 without trend with intercept, and -3.96, -3.41 and -3.13 with trend and intercept, and -2.56, -1.94, -1.62 for without trend and intercept term constant at 1%, 5% and 10% level of significance respectively, (Davidson, R. and MacKinnon, J. 1993).

**Table-4: Unit root test at Levels**

Variable	Order of integration	ADF Statistics (Without C&T)	ADF Statistics (With C&T)	ADF Statistics (With C and Without T)
Log of GDP	I (3)	-1.06	-2.21	-2.32
Log of Export	I (3)	-0.43	-2.34	@
Log of Export	I (2)	@	-1.14	-0.42
FDI	I (1)	-0.71	-1.19	-0.71
FII	I (0)	@	-3.01	-3.43**

*Notes: The critical values for unit root tests are -3.43, -2.86 and -2.57 without trend with intercept, and -3.96, -3.41 and -3.13 with trend and intercept, and -2.56, -1.94, -1.62 for without trend and intercept term constant at 1%, 5% and 10% level of significance respectively, (Davidson, R. and MacKinnon, J. 1993). 'C' stands for constant and 'T' stands for trend. \* signifies statistically significant at 1 % level, \*\* signifies statistically significant at 5 % level, \*\*\* signifies statistically significant at 10 % level; @  $\beta > 0$*

**Table-2: Unit root test for first difference**

Variable	Order of integration	ADF Statistics (Without C&T)	ADF Statistics (With C&T)	ADF Statistics (With C and Without T)
Log of GDP	I (3)	-1.32	-3.01	-2.35
Log of Export	I (3)	-1.25	-3.10	-1.62
Log of Export	I (2)	-1.32	-2.24	-1.22
FDI	I (1)	-3.49*	-1.19	-1.01

Notes: Same as Table-4

**Table-2: Unit root test for second difference**

Variable	Order of integration	ADF Statistics (Without C&T)	ADF Statistics (With C&T)	ADF Statistics (With C and Without T)
Log of GDP	I (3)	-1.44	-3.11	-2.42
Log of Export	I (3)	-1.46	-3.11	-1.75
Log of Export	I (2)	-2.96*	-2.24	-1.21

Notes: Same as Table-4

**Table-2: Unit root test for third difference**

Variable	Order of integration	ADF Statistics (Without C&T)	ADF Statistics (With C&T)	ADF Statistics (With C and Without T)
Log of GDP	I (3)	-1.57	-3.87**	-2.54
Log of Export	I (3)	-2.56*	-3.14***	-1.94

Notes: Same as Table-4