CHAPTER VII  
DETERMINANTS OF BALANCE OF PAYMENTS OF INDIA  

This chapter aims to examine the various factors affecting the balance of payments position of India covering the period 1980-81 to 2005-06. In this attempt, the relative importance of external factors and domestic factors (in particular the role of fiscal and monetary variables) has been quantitatively examined. 

For this purpose, the chapter has been divided into three sections. Section I examines the determinants of overall balance of payments position of India. Section II tries to identify the factors affecting one component of balance of payments viz. current account for the study period. Section III examines the determinants of capital account and its components covering the period 1990-91 to 2005-06 (time period dictated by changes in classification and compatibility of data). 

I  

It has been hypothesized that 

\[ \frac{BOP}{GDP} = f(\frac{ResM}{GDP}, \frac{FD}{GDP}, GGNP, TOT, ER, \frac{FER}{GDP}, WGDPI_{indx}, \frac{ED}{GDP}, D, OPEN, OP) \]  

The growth behaviour of these variables has been explained below: 

Data given in Appendix 7.1 shows that balance of payments as a percent of GDP (BOP/GDP) has almost witnessed a surplus during the whole period (i.e.1980-81 to 2005-06) except a few initial years. Variable reserve money supply as percent of GDP (ResM/GDP) has shown a fluctuating but increasing trend. ResM/GDP increased from 11.97 percent in 1980-81 to 16.3 percent in 2005-06. While variable fiscal deficit as percent of GDP (FD/GDP) increased from 5.11 percent in 1980-81 to 8.12 percent in 1990-91 and then decreased to 5.05 percent in 1996-97 and reached at a level of 4.17 percent in 2005-06. The variables growth rate of GNP (GGGNP) and external debt as percent of GDP (ED/GDP) showed increasing trend during the study period. Net barter terms of trade also improved from 60.21 in 1980-81 to 100.60 in 2005-06. The exchange rate(ER) has been depreciating and reached a level of Rs.48.39 per dollar in 2002-03 from Rs.7.909 per dollar in 1980-81. Openness ratio
(exports+ imports/GDP) (OPEN) increased from 13.23 percent in 1980-81 to 33.13 percent in 2005-06. The variable oil prices has shown a fluctuating but decreasing trend as the price of oil decreased from 97.68 dollar/barrel in 1980-81 to 54.99 dollar/barrel in 2005-06.

**Correlation Matrix Results**

Appendix 7.2 presents the inter-correlation matrix of the determinants of balance of payments position. It may be seen from Appendix 7.2 shows that balance of payments position is significantly and positively correlated with exchange rate (ER), foreign exchange reserves as percent of GDP (FER/GDP), world gross domestic product index (WGDP_{indx}), dummy(D) and openness ratio(OPEN). Variables, reserve money supply as a percent of GDP (ResM_{s}/GDP), fiscal deficit as percent of GDP (FD/GDP), growth rate of GNP (GGNP), terms of trade(TOT), external debt as percent of GDP(ED/GDP) and oil prices have non-significant correlation with balance of payments. Inter-correlation analysis reveals that correlation coefficient of ResM_{s}/GDP is significant with TOT, ER, WGDP_{indx}, ED_{GDP}, D, OPEN and oil price; of FD/GDP is significant with FER/GDP and OPEN; of TOT with ER, WGDP_{indx}, ED/GDP, D, OPEN and oil price; of ER with WGDP_{indx}, OPEN and oil price; of FER/GDP with WGDP_{indx}, D, OPEN; of WGDP_{indx} with D, OPEN and oil price and of ED/GDP with oil price and of D is significant with OPEN.

**Linear Regression Results**

Results of regression analysis run by taking the balance of payments as percent of GDP as the dependent variable and time and other factors (each) as independent variables given in Table 7.1 reveal that out of all the variables considered, only three variables i.e. TOT, FER/GDP and ED/GDP bears significant impact on balance of payments when taken along with the time variable.. All the three variables have theoretical expected signs. FER/GDP have positive and significant effect on balance of payments position. Variable TOT positively affects the balance of payments position thus revealing that if net barter terms of trade improve, balance of payments position also shows an improvement. Around 62 percent of variations in balance of payments are explained by terms of trade. ED/GDP carries negative and theoretically, correct sign thus indicating that external debt negatively influences the balance of payments position. However, out of the remaining non-significant
variables, the regression coefficient of time variable (trend coefficient) is positive and significant in case of six variables i.e. Res Mₖ/GDP, FD/GDP, GGNP, D, OPEN and oil price (OP). This indicates that though these variables do not turn out to be the significant determinants of balance of payments but time plays an important role in determining the BOP position when taken along with these variables. In other words, their effect might have been carried away by the time variable.

**Step Down Regression Results**

F values shown in the Table 7.2 are indicative of the fact that the regression as a whole is significant at 0.01 level. It implies that the variations brought into balance of payments by various independent variables are significant. This evidence of significant variations in balance of payments allows us to proceed further and to identify the more important factors influencing balance of payments position.

If we look at value of $R^2$ (coefficient of multiple determination), it ranges from 0.769 to 0.816 which shows that around 80 percent of variations in balance of payments is caused by various independent variables considered under study. Results of Step-Down Regression analysis reveals that out of all the 11 variables considered in the first iteration, oil prices was the most significant variable,, whereas WGDP$_{indx}$ was the least significant (on the basis of t- values). On dropping out the variable WGDP$_{indx}$ from the required equation and making recomputations, the new value of $R^2$ turned out to be 0.815 while the value of adjusted coefficient of determination increased from 0.67 percent to 0.69 percent. This indicates that dropping out of least important variable has not only lead to a slight improvement in adjusted $R^2$ but has also lead us to a relatively better equation. However, further deletion of least important indicator (i.e. exchange rate) in the second iteration, among the remaining variables resulted in no change in value of $R^2$ while the value of adjusted $R^2$ improved. By further deletion, the value of adjusted $R^2$ improves till iteration 5. Thus, iteration 5 offers the best set of predictors of balance of payments position.

As per the equation 5$^{th}$, five variables namely FD/GDP, FER/GDP, ED/GDP, D and oil prices significantly influence the balance of payments position of India as these variables turned out to be the significant variables in all the equations. All the significant variables have theoretically expected signs except D. However, two variables namely TOT and GGNP turned out to be non-significant thus indicating that
they have not influenced much the balance of payments position during the period under investigation. Variable FD/GDP exerts negative influence on BOP position. Coefficient of fiscal deficit is found to be statistically significant at 5 percent level with theoretically correct sign. Variable ED/GDP and OP also bears correct negative sign and are statistically significant, thus indicating that rise in external debt and increase in oil prices deteriorate the balance of payments position. While the variable FER/GDP positively and significantly affects the balance of payments position thus reflecting that increase in foreign exchange reserves of the economy leads to better BOP position of India.

To include the effect of trend, the variable time has been included in the final iteration of the model. After including time variable along with the significant five variables, the resulting multiple regression can be written as:

\[ \text{BOP/GDP} = 9.412 + 0.0571t - 2.553D - 0.00719\text{OP} + 0.196\text{FER/GDP} - 0.61\text{FD/GDP} - 0.000493\text{ED/GDP} \]

F-statistic=10.67, \( R^2 = 0.77 \), \( \bar{R}^2 = 0.69 \)

The final equation reveals that all the significant variables computed earlier are still the significant ones. Value of \( R^2 \) shows that around 77 percent of variations in balance of payments are due to these factors considered in the study. Variable dummy is the most significant variable, followed by oil price, FER as a percent of GDP and FD as percent of GDP respectively.

II

CURRENT ACCOUNT BALANCE AND ITS DETERMINANTS

It has been hypothesized that

\[ \text{CAB/GDP} = f(\text{TOT, ER, FD/GDP, GGNP, FCA/GDP, D, OPEN, ResMs/GDP, ED/GDP, OP, LCAB/GDP}) \]

The growth behaviour of the determinants is examined below:

Data given in Appendix 7.3 shows that variable current account balance as a percent of GDP(CAB/GDP) witnessed a persistent deficit during the whole period except experiencing surplus in three years (i.e. 2001-02 to 2003-04). Deficit increased
from 1.36 percent in 1980-81 to 3.16 percent in 1990-91 and declined to 1.24 percent in 2005-06.

Appendix 7.4 presenting the correlation matrix of current account and its various determinants, shows that CAB/GDP is significantly and positively correlated with six variables namely ER, GGNP, FCA/GDP, D, OPEN and LCAB/GDP while it is positively and non-significantly correlated with two variables i.e. TOT and ResM$/GDP. However, variables, fiscal deficit, external debt and oil price are negatively and non-significantly correlated with current account balance. Regarding inter correlation analysis, correlation coefficient of TOT is significant with exchange rate, GGNP, D, OPEN, ResM$/GDP, ED/GDP and OP; of ER with GGNP, FCA, D, OPEN, ResM$/GDP, OP and LCAB/GDP; of FD/GDP with FCA, OPEN and LCAB/GDP; of GGNP with FCA, D,OPEN , ResM$/GDP and LCAB/GDP; of FCA with D, OPEN and LCAB/GDP; of OPEN with ResM$/GDP and LCAB/GDP; of ResM$/GDP with ED/GDP , OP and of ED/GDP with OP.

**Linear Regression Results**

Results given in Table 7.3 show that out of 11 variables considered, individually four variables namely ER, ResM$/GDP,ED/GDP and LCAB/GDP are the significant variables explaining variations in current account balance. Variable ED/GDP (with theoretically expected sign) along with time exerts a significant and negative influence on current account balance while ER and LCAB/GDP have positive effect on current account balance. This suggests that depreciation of exchange rate improves the current account balance (or current account deficit decreases). Exchange rate along with time variable explains highest (i.e. 45 percent) variations in current account balance. However, the regression coefficient of time (t) is significant for three non-significant variables namely TOT, OPEN and OP, which indicates that their effect might have been carried away by the trend variable.

**Step Down Regression Results**

Table 7.4 shows that F-value is significant at 0.01 level. Value of $R^2$ ranges from 0.87 percent to 0.91 percent which implies that around 90 percent of variations in current account balance are due to the various independent variables considered in the study. Even after dropping out the least important variables successively, the value of adjusted $R^2$ remains unchanged (i.e. 0.84 percent) till iteration 4 and then decreases.
to 0.83 percent in iteration 5 (last one). This suggests that equation 4 can be taken as best equation. The reason being that after this iteration, there occurred a perceptible reduction in the explanatory power of the required equation.

As per equation 4\textsuperscript{th}, results of step-down regression analysis shows that six variables (i.e. ER, GGNP, FCA/GDP, D,Res\textsubscript{Ms}/GDP and ED/GDP) turned out to be the significant variables influencing the current account balance. All the significant variables have theoretically expected signs except the dummy variable. Even after dropping out the least important variables in the subsequent iterations, the signs of significant variables do not change. Variable ER have positive and significant effect on current account balance thus implying that depreciation in exchange rate will lead to improvement in current account balance (as depreciation in exchange rate will lead to increase in exports and decrease in imports, thus improving the trade balance and current account balance). Variables FCA/GDP and Res\textsubscript{Ms}/GDP have theoretically expected positive and significant effect on current account balance. This reveals that as the foreign currency assets increase, it will have positive impact on current account balance. While GGNP and ED/GDP negatively influence the current account balance thus implying that as economy grows, the current account balance deteriorates (or current account deficit increases). This relationship confirms the hypothesis that as economy grows, the demand for foreign based products (imports) in the domestic economy increases which will eventually lead to deficit in the current account. Dummy variable have theoretically unexpected sign thus indicating that liberalization and globalization measures undertaken in 1991 have negative influence on current account balance. The variable OPEN has negative but non-significant effect on CAB.

After including the time variable in the final iteration, the resulting multiple regression is as follows:

\[ \text{CAB/GDP} = -1.187 + 0.169t + 0.0000177\text{FCA/GDP} + 0.351\text{ER} - 2.93D - 0.000496 \text{ED/GDP} + 0.402\text{Res\textsubscript{Ms}/GDP} \]

\[ \hat{R}^2 = 0.875, \quad R^2 = 0.83, \quad F=17.96. \]

This equation shows that after the inclusion of time variable, the variable Res\textsubscript{Ms}/GDP turned out to be non-significant. Around 87 percent of variations in current account balance were explained by these independent variables.
Determinants of Components of Current Account

(1) Trade Balance

It has been hypothesized that

\[ TB/GDP = f(TOT, GGNP, FER/GDP, FD/GDP, ER, WGDP_{indx}, ED/GDP, OP, D) \]

The growth behaviour of the determinants is discussed below:

Data given in Appendix 7.5 shows that trade balance account has shown a continuous deficit during the whole period. Trade deficit increased (i.e. trade balance decreased) from 3.82 percent in 1980-81 to 4.02 in 1997-98 and then to 6.53 percent in 2005-06.

Correlation Analysis

Results of correlation matrix reveals that trade balance is significantly and negatively correlated with only one variable GGNP while it has negative and non-significant correlation with five variables namely ER, WGDP\(_{indx}\), FER/GDP, \( OPEN \) and OP. The trade balance is correlated positively and non-significantly with TOT, FD/GDP and ED/GDP. Regarding inter-correlation analysis, it has been observed that correlation coefficient of TOT is significant with ER, WGDP\(_{indx}\), ED/GDP and D; of FER/GDP with FD/GDP, ER, WGDP\(_{indx}\), D; of ER with WGDP\(_{indx}\), OP and D; of WGDP\(_{indx}\) with OP and D; of ED/GDP with OP; of OP with D.

Linear Regression Results

Regression results of different variables along with time given in Table 7.5 shows that variables GGNP, ED/GDP and OP have negative and significant effect on the trade balance and have correct signs. Variable FER/GDP along with time has positive effect which is theoretically expected thus implying that more foreign exchange reserves will help in improvement of the trade balance. Maximum variations in trade balance have been examined by oil prices (0.32 percent). All the remaining five variables turned out to be the non-significant variables. The regression co-efficient of time is significantly only in three equations. It is also significant in case of equation with exchange rate, which turned out to be non-significant variable.

Step Down Regression Results

Value of F-statistic is significant at 0.01 level which implies that variations brought in trade balance by various independent variables is significant (Table 7.6).
Value of $R^2$ (approximately 81 percent) in the first iteration indicates that nearly 81 percent of variations in the trade balance are caused due to all the nine variables considered together under study. Value of $\bar{R}^2$ is maximum in iteration 3 which implies that variables in the 3rd iteration are the best predictors of trade balance. After removing the least important or most non-significant variables (i.e. terms of trade and fiscal deficit respectively) in the 2 and 3 iterations, value of adjusted $R^2$ increases to 0.73 percent in iteration 3, which is termed as best predictor.

All the seven variables namely $\text{WGDP}_{\text{indx}}$, $\text{ER}$, $D$, $\text{FER}/\text{GDP}$, $\text{ED}/\text{GDP}$, $\text{OP}$ and $\text{GGNP}$ are the significant variables influencing the balance of trade.

The variable $\text{GGNP}$, $\text{ED}/\text{GDP}$ and $\text{OP}$ exert negative and significant influence and have theoretical expected signs while $\text{FER}/\text{GDP}$ and $\text{ER}$ have expected positive and significant effect on the trade balance. Variables $\text{WGDP}_{\text{indx}}$ and dummy are also the significant variables influencing the trade balance but have theoretically unexpected signs (negative). The negative sign of dummy variable can be justified on the grounds that after the liberalization process initialized in 1991, trade balance of India deteriorated and India faced continuous increasing trade deficit.

After including time variable in iteration 3, the resulting equation is as follows:

$$\frac{TB}{GDP} = 3.045 - 0.33t - 2.91 D + 0.261 \text{ER} + 0.0005 \text{ED}/\text{GDP} + 0.235 \text{FER}/\text{GDP} - 0.0323 \text{OP} - 0.100 \text{GGNP} - 0.17 \text{WGDP}_{\text{indx}}$$

(0.34)    (0.64) (3.09)**  (3.00)**    (2.57)**                (2.43)**               (1.76)           (1.37)            (0.73)

$R^2=0.811$, $\bar{R}^2=0.722$, F-Statistics = 9.10

Three variables (i.e. GGNP, $\text{WGDP}_{\text{indx}}$ and oil prices) turned out to be non-significant.

**Determinants of Components of Trade Balance**

(i) **Exports (Exp)**

It has been hypothesized that

$$\text{Exp} = f(\text{WGDP}_{\text{indx}}, \text{ER}, \text{Exp}(-1), \text{EUI}, \text{XP}_{\alpha}, D, \text{EP}, \text{TOT}, \text{ER}(-1), \text{WGDP}_{\text{indx}}(-1) \text{ExCr}, II_{\text{indx}})$$

The growth behaviour of the determinants is discussed below:

Data given in Appendix 7.7 shows that volume of exports of India showed continuous increasing phenomena during 1980-81 to 2005-06 (exports increased from
Rs.26319.83 crore in 1980-81 to Rs. 103376.6 crore in 1993-94 and further to Rs. 346154.4 crore in 2005-06). Regarding the trends of factors affecting exports performance, it has been revealed that exports unit value index (EUI) shows a fluctuating but increasing phenomena during the whole period while expenditure for export promotion (XPe) increased from Rs.399 crore in 1980-81 to Rs. 2742 crore in 1990-91 but these expenditures declined thereafter and reached at the figure of Rs.1121 crore in 2005-06(due to introduction of market reforms in external sector). Export Profitability (EP) has been increasing continuously from 1980-81to 1994-95[increased from 0.709 percent in 1980-81 to 0.818 percent in 1987-88 and further to 1.056 percent in 1994-95], but then showed a fluctuating pattern and reached at the level of 1.083 percent in 2005-06. Export Credit (ExCr) also showed a continuous increase during whole period except four years(1985-86, 1991-92, 1996-97 and 2001-02).

**Correlation Matrix and Linear Regression Results**

Results given in Appendix 7.8 shows that out of 12 variables, eight variables namely WGDP\(_{indx}\), ER, EXP\(_{lagged}\), D, EP, ER\(_{lagged}\), lagged WGDP\(_{indx}\) and ExCr shows significant and positive correlation with exports. While exports are non-significantly correlated with four variables namely EUI ,XPe, TOT and II\(_{ndx}\).

Regression results given in Table 7.7 reveals that of the six significant variables, four variables namely WGDP\(_{indx}\), lagged exports, lagged WGDP index and ExCr have theoretical correct signs while two variables namely EP and TOT do not have theoretical correct signs. Variable ExCr which has very high correlation with exports also bears a significant and positive effect (as per the theoretical expectations).TOT and WGDP\(_{indx}\) alone caused 92 percent and 91 percent variations in exports respectively. However, coefficient of time variable is significant and positive for other six non-significant variables thus indicating that that time plays an important role in determining the volume of exports when taken along with these non-significant variables.

**Step Down Regression Results**

Highly significant F-ratio reflects the acceptability of the model(Table 7.8) All the variables taken together helps to explain around 85 percent of variations in exports. After removing the most non-significant variables in the subsequent steps,
the value of adjusted $R^2$ improves till iteration 4. Thus it could be inferred from the fact that the variables in iteration 4 emerges as the best set of explanatory variables. Seven variables namely lagged exports, EUI, XPe, dummy, TOT, ExCr and IIndx turned out to be significant variables explaining variations in the exports. Variable lagged exports, dummy, ExCr and IIndx have significant and positive influence on exports. All these variables have theoretical expected signs. While two significant variables i.e. export promotion expenditures, terms of trade and export unit value index do not have theoretical expectations and assumes a negative effect on exports. Export promotion expenditures have shown a declining trend during the later years of this period due to which this variable exerts negative influence on volume of exports. However, remaining five variables namely EP, lagged WGDP_{indx}, ER, WGDP_{indx} and lagged ER turned out to be non-significant variables and do not have any significant influence with exports.

After including the time variable along with the significant variables, the resulting regression equation is as follows:

$$\text{Exp} = -37469.3 - 782.58t + 0.833\text{Exp}(-1) - 19.49 \text{XPe} + 348.24 \text{IIndx} + 2.77 \text{ExCr} - 497.69 \text{TOT} + 19697.31 \text{EUI} - 31690.0 \text{D}$$

\[ \begin{align*}
(2.18) & \quad (0.33) & \quad (6.83)^* & \quad (3.24)^* & \quad (2.44)^* & \quad (2.8)^* & \quad (1.72) & \quad (1.46)
\end{align*} \]

F-Statistics = 571.92, $R^2 = 0.85$, $\bar{R}^2 = 0.845$

The equation shows that after including the time variable, EUI and TOT turned out be non-significant variables affecting the exports. While lagged exports is the most significant variable, followed by XPe, IIndx and Ex crore All these variables taken together explain 85 percent of variations in exports.

(ii) Imports (Imp)

It has been hypothesized that

$$\text{Imp}=f(RPR, GNP, TOT, OP, ER, \text{Imp}(-1), D, \text{GNP}(-1), \text{ER}(-1), WGDP_{indx}, WGDP_{indx}(-1))$$

The growth behaviour of the determinants is examined below:

It can be observed from Appendix 7.9 that volume of imports increased drastically during the whole period. Imports increased from Rs. 50843.15 crore in 1980-81 to Rs. 516845.8 crore in 2005-06 (around 10 times increase). Relative Import price ratio (MPI/WPI) showed fluctuating but decreasing phenomena throughout the whole period.
Correlation and Linear Regression Results

Results of correlation matrix given in Appendix 7.10 between the various independent variables and volume of imports depicts that out of 11 variables, eight variables namely GNP, ER, lagged imports, D, lagged GNP, lagged ER, WGDP$_{\text{indx}}$ and lagged WGDP$_{\text{indx}}$ are significantly and positively correlated with the volume of imports. While two variables namely RPR and OP have negative and least correlation with volume of imports.

Results of linear regression analysis given in Table 7.9 shows that seven variables namely RPR, GNP, TOT, OP, lagged imp, lagged GNP and WGDP$_{\text{indx}}$ turned out to be the significant variables influencing the volume of imports. All the variables have theoretical expected signs. Variable RPR and TOT have significant and negative effect on imports. While the other four variables namely GNP, OP, lagged imp lagged GNP and WGDP$_{\text{indx}}$ have significant and positive effect on imports. Lagged imports (92 percent) and GNP (95 percent) caused the maximum variations in imports respectively. However, trend variable of three non-significant variables (D, ER and lagged ER) is significant at 1 percent level, which indicates that their effect might have been carried away by the trend variable.

Step Down Regression Results

The model appears to be well specified with fairly high values of $R^2$ and $\bar{R}^2$ and F. (Table 7.10). As the value of adjusted $R^2$ is maximum at iteration 5 which suggests that this equation gives us the best set of explanatory variables. Six variables namely GNP, TOT, ER, lagged imp, dummy and lagged ER bears a significant and theoretical expected effect on the volume of imports. Three variables namely TOT, ER and lagged ER negatively affect the imports while two variables namely GNP, lagged imports and dummy variable have the significant and positive effect on volume of merchandise imports. This implies that as the economy grows, volume of imports also increases. Variable TOT have negative and significant effect on imports which signifies that improvement in net barter terms of trade will reduce the volume of imports and in turn will have a positive impact on trade balance. Variable ER and lagged ER also satisfies the theoretical expectations and have negative influence on imports, thus implying that depreciation in exchange rate (or increase in exchange rate) will reduce the volume of imports in the economy and improves the trade
balance. However, the remaining five variables have non-significant effect on volume of imports when considered together.

After including the time variable, the resulting equation is as under:

\[
\text{Imp} = 43579.54 + 4720.36 \times 1 + 104926.2 D + 0.81 \text{Imp}(-1) - 6026.52 \text{ER} - 897.82 \text{TOT} + 0.16 \text{GNP} - 3.3 \text{ER}(-1)
\]

\( t \)-values: \(1.17\) \(1.42\) \(6.37\)** \(5.00\)** \(-4.59\)** \(-2.94\)** \(2.54\)** \(-2.09\)**

\( R^2 = 0.85, \quad R^2 = 0.84, \quad F = 454.83 \)

The results of the equation remains almost the same as all the earlier variables still remained significant. The most significant variable turned out to be the dummy variable, followed by lagged imports, exchange rate and net barter terms of trade. Value of \( R^2 (0.85) \) also suggests that 85 percent of variations in imports is caused due to these variables. This indicates that both the external and internal factors play role in determining the volume of imports.

(2a) Determinants of Invisible Receipts (Inv Rec)

It has been hypothesized that

\[\text{Inv Rec} = f(\text{WGDP}_{\text{ndx}}, \text{ER}, \text{RCPI}, D, \text{Inv Rec}(-1), \text{WGDP}_{\text{ndx}}(-1), \text{ER}(-1), I_{\text{ndx}})\]

The growth behaviour of the determinants is examined below:

It has been discerned from Appendix 7.11 that receipts from invisibles increased tremendously during the whole period (invisibles receipts increased from Rs. 22383.31 crore in 1980-81 to Rs. 77891.55 crore in 1991-92 and further to Rs. 295549.9 crore in 2005-06). Relative consumer price index (RCPI i.e. ratio of CPI of India to that of the world) also increased from 0.76 in 1980-81 to 0.81 in 1991-92 and then increased to 1.04 in 2005-06.

Correlation and Linear Regression Results

Results of correlation matrix in Appendix 7.12 shows that out of eight variables, seven variables (i.e. \(\text{WGDP}_{\text{ndx}}, \text{ER}, \text{RCPI}, D, \text{lagged Inv Rec}, \text{lagged WGDP}_{\text{ndx}} \) and lagged ER) are significantly and positively correlated with invisible receipts. While variable \( I_{\text{ndx}} \) has non-significant correlation with invisible receipts.

Linear regression results (Table 7.11) show that three variables i.e. \(\text{WGDP}_{\text{ndx}}, \text{lagged Inv Rec} \) and lagged \(\text{WGDP}_{\text{ndx}} \) are the significant variables influencing positively the invisible receipts. Around 86 percent of variations in invisible receipts
are due to changes in lagged $WGDP_{indx}$ alone. However, regression coefficient of time is significant for four non-significant variables namely ER, D, lagged ER and $II_{indx}$, indicating that the effect might have been carried away by the trend variable.

**Step-Down Regression Results**

Significant values of F-statistic confirms the acceptance of model (Table 7.12). When all the variables have been considered in the first iteration, these variables explain 87.6 percent of variations in service receipts. If the least important variables have been dropped out in the subsequent stages, the value of $R^2$ decreases marginally while value of $\overline{R^2}$ has increased and reached the maximum at iteration 5 which suggest that this iteration will give the best set of explanatory variables. Three variables namely lagged Inv Rec, dummy and Relative Consumer Price Index (RCPI) turned out to be significant variables influencing variations in service receipts. Out of these, two variables have expected correct signs. Variable dummy and lagged invisible receipts have positive and significant effect on receipts thus indicating that liberalization leads to increase in invisible receipts while positive relationship of lagged invisible receipts indicates that increase in past level of receipts will push up current receipts of services. However, the remaining five variables (i.e. IIndx, lagged ER, ER, WGDPlndx and lagged WGDPlndx) turned out to be non-significant when considered together.

Inclusion of time variable results in following multiple regression as:

$$\text{Inv Rec} = -146331 + 252.01t + 1.033\text{Inv Rec}(-1) + 42325.5D + 201830.2 \text{RCPI}$$

$$(-1.33) \quad (0.19) \quad (9.13)** \quad (3.22)** \quad (1.18)$$

$R^2=0.87, \quad \overline{R^2}=0.86, \quad F=187.00$

Variables lagged invisible receipts depicts the highest variations in invisible receipts as this is the highly significant variable followed by dummy.

**Components of Invisible Receipts**

2a.(i) **Travel Receipts (Trav Rec)**

It has been hypothesized that

$$Trav\ Rec=f(WGDPlndx, IGE_{indx}, Trav\ Rec(-1), D, ER, GNP, WGDPlndx(-1), ER(-1), GNP(-1), II_{indx})$$
The growth behaviour of the determinants is examined below:

It can be seen from Appendix 7.13 that travel receipts have grown rapidly. Travel receipts, which were Rs.3806.3 crore in 1980-81, rose to Rs. 5151.54 crore in 1990-91 but thereafter rose more rapidly exceeding to Rs.25916.91 crore in 2005-06. Travel receipts have been impressive, recording compound growth rate of 8 percent during the whole period. India’s government expenditure index (IGE’s Index) also witnessed a tremendous increase from just 7.3 percent in 1980-81 to 36.7 percent in 1991-92 which increased to 165.33 percent in 2005-06.

**Correlation and Linear Regression Results**

Correlation matrix results (Appendix 7.14) show that all the ten explanatory variables considered under study (namely WGDPindx, IGE’s index, lagged Trav Rec, D, ER, GNP, lagged ER, lagged WGDPindx and Lagged GNP) are significantly and positively correlated with travel receipts except IIndx.

Linear regression analysis given in Table 7.13 show that out of 10 independent variables, five variables (WGDPindx, IGE’s index, lagged Trav rec, GNP and lagged GNP) when taken along with time have significant impact on travel receipts. All these variables have theoretical expected positive sign. Alone IGE’s index caused 84 percent variations in travel receipts which implies that travel expenditures by government significantly affect the travel receipts. However, regression co-efficient of time is significant for four non-significant variables namely dummy, exchange rate, lagged exchange rate and infrastructure index, indicating that their effect might have been carried away by trend variable.

**Step Down Regression Results**

Value of coefficient of multiple determination ($R^2$) shows that around 90 percent of variations in travel receipts are due to the explanatory variables considered (Table 7.14). After dropping out the least important variables in the subsequent stages, the value of adjusted coefficient of multiple determination improves till iteration 5 and then starts declining. Value of $\bar{R}^2$ is maximum at iteration 5(i.e.0.877) thus suggesting that all the variables in this equation are the best predictors of travel receipts.
Out of all the 10 variables, three variables namely lagged GNP, ER and dummy turned out to be significant ones causing maximum variations in travel receipts. Dummy variable is positively and significantly affecting the travel receipts which implies that liberalization and globalization measures undertaken in 1991 has positive impact on receipts from travel. Lagged GNP is also positively and significantly influencing the travel receipts. However, coefficient of exchange rate is also found to be statistically significant at 0.01 level. All the remaining variables (i.e. WGDP index, lagged exchange rate, lagged WGDP index, lagged travel receipts, IGE’s index, GNP and infrastructure index) turned out to be non-significant when considered together.

After including the time variable, the resulting equation is:

\[
\text{Trav Rec.} = -2395.36 + 36.23t + 0.02079\text{GNP}(-1) + 728.28\text{ER} + 9016.96\text{D}
\]

\((-1.39)\) \((0.082)\) \((4.21)\)** \((3.46)\)** \((3.03)\)*

\[R^2 = 0.89, \quad R^2 = 0.86, \quad F = 172.00\]

These results show that all the earlier significant variables are still the significant ones. However, the most significant variable is lagged GNP, followed by exchange rate and dummy variable. This indicates that both the external and internal factors affect the receipts from travel account.

2a.(ii) Transportation Receipts (Trans Rec)

\[
\text{TransRec} = f(\text{Exp, I}_{\text{Indx}}, \text{D, Trans Rec}(-1), \text{ER, GNP, WGDP}_{\text{Indx}}, \text{WGDP}_{\text{Indx}}(-1), \text{ER}(-1), \text{GNP}(-1))
\]

The growth behaviour of the determinants is examined below:

Appendix 7.15 shows that exports on account of transport services have been rising substantially. Transport receipts at constant prices which were Rs. 1425.36cr in 1980-81 rapidly rose, recording Rs. 20827.32 crore in 2005-06. Transport export increased at compound growth rate of 11.21 percent during the whole period.

**Correlation and Regression Results**

Results of correlation matrix depicts that all the variables namely (Exp, D, lagged ER, GNP, WGDPindex, lagged WGDPindex, lagged ER and lagged GNP except IIndx) are significantly and positively correlated with transportation
receipts indicating correlation between the explanatory variables and exports on account of transport services.

While linear regression analysis given in Table 7.15 also shows that six variables are the significant determinants of transportation receipts. Out of six variables, five variables (exports, lagged Trans Rec, GNP, WGDP$_{\text{indx}}$, and lagged GNP) positively and significantly affect the receipts from transportation. However, exports cause maximum variations in transportation receipts ($r^2 = 0.86$). This shows that the volume of exports will eventually have a positive impact on receipts from transportation. While variable exchange rate shows negative effect on transportation receipts.

**Step Down Regression Results**

Fairly high value of F-statistic confirms the acceptability of the model which indicates that we can proceed further to find the regression estimates of the model (Table 7.16). Around 82 percent of variations in transportation receipts are caused by these explanatory variables. Value of $R^2$ is maximum at iteration 5 thus confirming that this equation gives the best set of explanatory variables.

Out of all the variables considered, four variables namely merchandise exports, lagged transportation receipts, WGDP$_{\text{indx}}$ and lagged GNP are the most significant determinants of transportation receipts. All significant variables satisfies the theoretical expectations. Variable merchandise exports have positive and significant effect on receipts from transportation indicating that increased exports lead to increase in transportation receipts from abroad. WGDP$_{\text{indx}}$ also have positive and significant influence with receipts thus showing that growth in the world economy will cause more exports from the domestic economy and hence increased the receipts from transportation. However, variables IIIndx, D, ER, GNP, lagged WGDP$_{\text{indx}}$ and lagged ER turned out to be non-significant variables and does not exert any influence on transportation receipts when considered together.

Inclusion of time variable will result in multiple regression equations:

\[
\text{Trans Rec. } = -6328.08 - 25.11t + 0.0744\text{Exp} + 0.0109\text{GNP}(-1) + 0.357\text{Trans Rec}(-1) + 186.84\text{WGDP}_{\text{indx}}(-1.59) \quad (-0.177) \quad (8.37)** \quad (6.28)** \quad (2.61)** \quad (2.59)**
\]

\[F= 599.12, R^2 = 0.81, \text{ } \overline{R^2} = 0.79.\]
The results seem to be similar as all the earlier significant variables are still the significant ones thus suggesting that seasonal variations in time do not affect the transportation receipts. However, exports is the most significant variable, followed by lagged GNP and lagged transportation receipts.

2a.(iii) Determinants of Insurance Receipts (Ins Rec)

It has been hypothesized that

\[ \text{Ins Rec} = f(\text{Exp}, \text{WGDP}_{\text{indx}}, \text{ER}, \text{GNP}, D, \text{GNP}(-1), \text{WGDP}_{\text{indx}}(-1), \text{ER}(-1), \text{Ins Rec}(-1)) \]

The growth behaviour of the variables has been discussed below:

Data given in Appendix 7.17 reveals that insurance receipts on this account have been growing though not rapidly. Receipts rose from Rs. 201.36 crore in 1980-81 to nearly Rs. 563.76 crore in 1993-94 and finally recorded Rs. 3488.68cr in 2005-06, fluctuating in between years. Over this period, insurance exports expanded at compound annual growth rate of 15.14 percent.

**Correlation and Regression Results**

Results of correlation matrix reveals that all the 9 independent variables viz. exports, \( \text{WGDP}_{\text{indx}} \), ER, GNP, D, lagged GNP, lagged \( \text{WGDP}_{\text{indx}} \), lagged ER and lagged insurance receipts are highly and positively correlated with insurance receipts. The determinants also have correlation with each other.

Linear regression results given in Table 7.17 also shows that seven variables namely Exp, \( \text{WGDP}_{\text{indx}} \), ER, GNP, lagged GNP, lagged \( \text{WGDP}_{\text{indx}} \) and lagged Ins Rec along with time are statistically highly significant variables and have hypothesized correct positive sign. Alone exports explained 94 percent of variations in insurance receipts. While dummy and lagged ER turned out to be the two non-significant variables but the time variable of these two variables is significant and positive.

**Step Down Regression Results**

F-statistic confirms that the model is significant at 0.01 level (Table 7.18). Value of \( R^2 \) shows that around 87 percent of variations are explained by various independent variables considered.
In the first iteration, all the explanatory variables are considered, and after dropping out most non-significant variables in the subsequent iterations, the value of adjusted $R^2$ improves which suggests that dropping out of the least important variable has not only lead to slight improvement in adjusted $R^2$ but has also lead us to a relatively more parsimonious situation. Evidently, results obtained through the iteration 5 gives the best set of predictors of the model. Variable exports, lagged ER and D are the three significant determinants of insurance receipts. Variable exports and lagged ER has hypothesized correct positive sign and are statistically highly significant implying that exports positively and are significantly affecting insurance receipts. Variable dummy also have positive and significant effect indicates that structural reforms initiated in 1991 has positive impact on insurance receipts.

Inclusion of time variable results in following equation:

$$\text{Ins.Rec} = 209.78 + 19.98t + 0.0148\text{Exp} + 58.43\text{ER}(-1) + 313.57D$$

\quad (2.79) \quad (0.97) \quad (16.17)** \quad (4.85)** \quad (2.13)**

$F=229.06, R^2=0.88, \bar{R}^2=0.87.$

These results reveal that exports are highly significant determinant of insurance receipts, followed by lagged exchange rate and dummy variable. All the significant variables explained 88 percent of variation in insurance receipts.

2a. (iv) Investment Income Receipts(Inv Inc Rec)

It has been hypothesized that

$$\text{Inv Inc Rec} = f(\text{FCA,D, WGDP_{indx}, ER,GNP, WGDP_{indx}(-1),ER(-1),GNP(-1),Inv Inc Rec(-1)})$$

The growth behaviour of the variables has been discussed below:

It has been discerned from the Appendix 7.19 that investment income receipts declined in most of the years from 1980-81 to 1996-97 but showed continuous tendency to increase afterwards. Receipts increased from Rs. 2858.62 crore in 1980-81 to Rs.3589.92 crore in 1994-95 and then to 21126.84 crore in 2005-06.

**Correlation and Regression Results**

Results of correlation matrix show that highly significant and positive correlation has been witnessed among all the independent variables (namely
FCA, D, WGDP\(_{\text{index}}\), ER, GNP, lagged WGDP\(_{\text{index}}\), lagged ER, lagged GNP and lagged Inv Inc Rec) and with the dependent variable.

Linear regression results given in Table 7.19 also confirms the above relationship thereby indicating that out of nine variables, six explanatory variables namely FCA, WGDP\(_{\text{index}}\), GNP, lagged WGDP\(_{\text{index}}\), lagged GNP and lagged Inv Inc rec are the significant determinants of investment income receipts. All the six variables have expected positive sign. Around 92 percent of variations in investment income are explained with lagged GNP during this period thus implying the role of economic growth in determining the investment income receipts. Coefficient of time variable is significant for two non-significant variables namely dummy variable and ER.

**Step Down Regression Results**

Value of F-test is significant at 0.01 level which confirms the acceptability of the model (Table 7.20). Value of adjusted \(R^2\) is maximum at iteration 5 which suggest that this equation gives the best set of explanatory variables. All the variables in this equation are important variables affecting the investment income receipts. Out of nine variables, three variables (viz. Lagged Inv Inc Rec, Lagged GNP and D) turned out to be the significant ones with theoretical correct positive sign while variable lagged ER is also significant, but with theoretical wrong sign (negative). This indicates that past levels of income (lagged GNP) and receipts from investment income receipts (Lagged Inv Inc Rec) in past years significantly and positively influence the current level receipts. Measures of liberalization and globalization also have positive impact on these receipts. All these variables taken together explained around 87 percent of variations in investment income receipts.

Inclusion of time variable results in the following equation:

\[
\text{Inv Inc Rec} = -4637.28 -549.39t + 0.673 \text{Inv Inc Rec(-1)} + 0.0135\text{GNP(-1)} + 2638.09D - 149.92 \text{ER(-1)}
\]

\(\text{F}=177.03, \ R^2=0.85, \ \bar{R}^2=0.83.\)

This equation shows that variable dummy and lagged exchange rate becomes non-significant variables. However, variable lagged inv income receipts is the most significant variable, followed by lagged GNP.
2a.(v) Private Transfer Receipts (PTR)

It has been hypothesized that

\[ PTR = f(\text{OP}, \text{ER}, \text{WGDP}_{\text{indx}}, \text{GNP}, \text{ER}(-1), \text{WGDP}_{\text{indx}}(-1), \text{PTR}(-1), \text{GNP}(-1), D) \]

The growth behaviour of the variables has been discussed below:

Data given in Appendix 7.21 reveals that receipts on this account though decreased in seven years but increased rapidly from Rs. 8437.66 crore in 1980-81 to Rs. 24093 crore in 1993-94 and then to 82197.44 crore in 2005-06.

**Correlation and Regression Results**

Correlation coefficient reveals that private transfer receipts are significantly and positively correlated with all the explanatory variables namely ER, WGDP\text{indx}, GNP, Lagged ER, Lagged WGDP\text{indx}, Lagged PTRRec, Lagged GNP and D except oil prices as receipts has low or non-significant and negative correlation with oil prices.

The results of linear regression analysis reveals that four variables namely GNP, lagged ER, lagged PTRRec and lagged GNP, turned out to be significant variables of private transfer receipts(Table 7.21). All these variables have positive (theoretically true) impact on receipts of private transfer from abroad. Alone 96 percent of variations in private transfer receipts are explained by lagged private transfers followed by 94 percent variations by lagged GNP. Coefficient of time variable is significant for two non-significant variables i.e. oil prices and dummy variable.

**Step-Down Regression Results**

By dropping out the least important variables, the value of adjusted \( R^2 \) improved till iteration 4(Table 7.22). Thus, iteration 4 can by chosen as the best equation holding the most important variables influencing private transfer receipts. After this iteration, there occurred a perceptible reduction in the explanatory power \( (R^2) \) of the regression equation. Around 87 percent variations in receipts are explained jointly by the three explanatory variables (viz. Lagged ER, Lagged PTRRec and OP).

Three variables OP, lagged ER and lagged PTRRec turned out to be the most significant variables affecting private transfer receipts. Lagged exchange rate and lagged private transfer receipts carries theoretical correct positive sign and are positively affecting the receipts while variable oil price though carries significant
relationship but do not have expected correct sign. Variables namely exchange rate, 
WGDP index, lagged WGDP index, GNP and lagged GNP and dummy appears as 
non-significant variables and are not influencing the private transfer receipts.

Multiple regression equation is as follows:

\[
PTR = -19391.1 + 599.51t + 197.68 \text{OP} + 871.75 \text{ER}(-1) + 0.44 PTR(-1)
\]

\[(-2.74)** \quad (0.85) \quad (2.27)* \quad (2.67)* \quad (2.91)*\]

\[F=216.08, R^2=0.87, \quad \overline{R}^2=0.86\]

The equation shows that all the three variables are still the significant variables
affecting the private transfer receipts. The most significant variable is lagged PTrRec
followed by lagged exchange rate and oil price respectively.

2a. (vi) Other Invisible Receipts (Ot Inv Rec)

It has been hypothesized that

\[Ot Inv Rec = f(\text{Exp}, \text{WGDP}_{\text{indx}}, \text{IGDP}_{\text{indx}}, \text{GNP}, \text{ER}, \text{Ot Inv Rec (-1)}, \text{WGDP}_{\text{indx}}(-1), \text{ER}(-1), D)\]

The growth behaviour of the variables has been discussed below:

Data (Appendix 7.23) shows that receipts on this account showed a continuous
increase during the whole period (receipts increased from Rs.5665.91 crore in 1980-
81 to Rs. 9489.66 crore in 1994-95 and then increased tremendously to Rs. 141992.2
crore in 2005-06). Industrial GDP index (IGDP_{indx}) also increased from 7.32 in 1980-
81 to 40.89 in 1992-93 and further to 188.76 in 2005-06.

**Correlation and Regression Results**

Value of correlation coefficient (r) is quite high for all the variables considered
which implies that other invisible receipts are highly correlated with all the
independent variables namely exports, WGDP_{indx}, IGDP_{indx}, GNP, ER, lagged Inv.,
lagged WGDP_{indx}, lagged ER, Lagged GNP, and dummy.

Linear regression results also confirms the above results(7.23) as all these
highly correlated variables also turned out to be significant determinants of other
invisible receipts (except lagged ER). All the variables have theoretical expected signs
except exchange rate and dummy. Variable exports is significant at 0.01 level and is
positively affecting the receipts on this account. This suggests that as the volume of
exports increase, it will lead to increase in inflows from other services from abroad. However, the coefficient of time variable is significant for non-significant variable lagged exchange rate.

**Step-Down Regression Results**

Value of F-test is significant at 0.01 level which confirms the acceptability of the model (Table 7.24). Value of adjusted $R^2$ is maximum at iteration 3 which suggest that this equation gives the best set of explanatory variables. All the variables in this equation are important variables affecting the other invisible receipts. Seven variables viz. lagged GNP,D,ER, lagged Other Inv Rec, WGDP$_{ind}$, lagged WGDP$_{ind}$ and lagged ER turned out to be the significant ones with theoretical correct sign. Around 88 percent variations in other invisible receipts are caused due to these variables considered.

With the inclusion of time variable, the resulting equation is as follows:

$$
\text{Ot Inv Rec} = 181755.9 + 6935.82t + 0.22\text{GNP}(-1) + 49174.04\text{D} + 4105.41\text{ER} + 0.63 \text{Ot Inv Rec}(-1) + 8389.27 \text{WGDP\_indx} + 4251.99\text{WGDP\_indx}(-1) + 3304.66 \text{ER}(-1)
$$

$$
\begin{align*}
(1.67) & \quad (1.43) & \quad (4.52)** & \quad (3.61)** & \quad (3.95)** & \quad (3.37)** & \quad (3.2) ** [\text{WGDP}_{\text{ind}x}] \\
(2.27)* & \quad (2.82)* & \quad \text{F}= 149.56, R^2 = 0.87, R^2 = 0.86.
\end{align*}
$$

The results do not change and all the variables still remained the significant variables affecting the other invisible receipts.

**2b. Determinants of Invisible Payments (Inv Pay)**

It has been hypothesized that

$$\text{Inv Pay} = f(\text{GNP, ED, ER, Imp, D, Imp}(-1),\text{ER}(-1),\text{GNP}(-1))$$

The growth behaviour of the variables has been discussed below:

Appendix 7.25 reveals that invisible payments have been continuously and rapidly increasing since 1980-81 except four years (i.e. 1985-86,1996-97, 2001-02 and 2003-04). These payments increased from Rs. 6601.67 crore in 1980-81 to Rs. 89151 crore in 1991-92 and then showed a tremendous increase and reached a figure of Rs. 157364.7 crore in 2005-06.
Correlation and Regression Results

Correlation results depicts significant and positive correlation of invisible payments with all the independent variables considered (namely GNP, ED, ER, merchandise imp, D, lagged imp, lagged ER and lagged GNP).

Linear regression results given in Table 7.25 also shows that only one variable i.e. external debt (ED) when considered along with time turned out to be the significant determinant of invisible payments. External debt alone explained 73 percent of variations in invisible payments. This implies that more external debt will be a burden on the economy which will lead to more payments on imports and more payments on services from abroad. However, coefficient of time variable is significant for four non-significant variables i.e. GNP, imports, dummy and lagged imports.

Step-Down Regression Results

Significant value of F-test suggests that the model is significant at 0.01 level (Table 7.26). Value of adjusted coefficient of determination (0.835) is highest at iteration 4 which implies that this equation will predict the best set of explanatory variables. Five variables namely ED, GNP, merchandise imports, lagged GNP, and lagged ER turned out to be the significant variables affecting the invisible payments. It is evident from the above results that the coefficients of the variable ED and merchandise imports are significantly affecting the service payments with proper sign (positive). The positive sign of these two variables is justified on the grounds that higher imports lead to higher amounts of shipping, transport and other insurance charges and higher amount of external debt will in turn lead to higher amount of interest payments. Thus, it implies that increase in merchandise imports and external debt would lead to increase in import of services. Variable lagged GNP and lagged ER are also statistically significant. This suggests that growth of the economy in the past years do increase the demand of imports of services in the economy from abroad.

After inclusion of time variable, the resulting equation is as follows:

\[
\text{Inv Pay} = -33716.2 - 13968.1t + 0.0242ED - 4328.24ER(-1) + 0.354GNP(-1) + 0.400GNP + 0.45 Imp
\]

\[
(0.66) (1.46) (3.14)** (2.99)** (2.98)** (2.57)** (1.51)
\]

\[F = 23.52, R^2=0.88, \bar{R}^2=0.84\]
This suggests that the results do not change and all the variables still remained the significant variables affecting the invisible payments with external debt as the most significant variable, followed by lagged exchange rate and lagged GNP respectively.

**Components of Invisible Payments**

2b. (i) Travel Payments (Trav Pay)

It has been hypothesized that

$$\text{Trav Pay} = f(GNP, FER, D, \ W{GDP_{ind}}x, \ ER, \ ER(-1), \ GNP(-1), \ Trav \ Pay(-1), \ W{GDP_{ind}}x(-1))$$

The growth behaviour of the variables has been discussed below:

Data (Appendix 7.27) reveals that travel payments have been continuously and rapidly increasing after 1992-93. Payments increased from Rs. 355.35 crore in 1980-81 to Rs. 1385.96 crore in 1990-91, which rose further to Rs. 7565.51 crore in 1998-99 and finally reached a figure of Rs. 21874.52 crore in 2005-06.

**Correlation and Regression Results**

Correlation results (Appendix 7.28) reveals that travel payments are positively and significantly correlated with all the nine variables considered namely GNP, FER, D, WGDP\textsubscript{indx}, ER, lagged ER, lagged GNP, lagged Trav Pay and lagged WGDP\textsubscript{indx}.

The results of linear regression analysis given in Table 7.27 reveals that six variables namely GNP, FER, WGDP\textsubscript{indx}, lagged Trav Pay, lagged GNP and lagged WGDP\textsubscript{indx} turned out to be significant variables affecting the travel payments. All these variables when taken along with time, have theoretical true (positive) impact on travel payments. Variable foreign exchange reserves is significant at 0.01 level thus implying that more foreign exchange reserves shows the strong position of the economy thus increasing the capacity to make these service payments. Variable D, ER and lagged ER does not affect the travel payments significantly. Alone 91 percent of variations in private transfer receipts are explained by lagged travel payments followed by 89 percent variations by foreign exchange reserves. However, coefficient of time variable is significant for two non-significant variables i.e. dummy and exchange rate.
Step-Down Regression Results

By dropping out the least important variables, the value of adjusted $R^2$ improved till iteration 4 (Table 7.28). Thus, iteration 4 can by chosen as the best equation holding the most important variables influencing travel payments. After this iteration, there occurred a perceptible reduction in the explanatory power (adjusted $R^2$) of the regression equation. Five variables viz. lagged GNP, lagged Trav pay, lagged ER, $WGDP_{idx}$ and D turned out to be the significant ones with theoretical correct sign. Lagged GNP and lagged Trav Pay carries correct positive sign and are significant variables. This indicates that India has been seeking for more travels with the growth of income and globalization. Variable $WGDP_{idx}$ also affects the travel payments positively and significantly which suggests that growth of GDP of the world would in turn increase the payments made by our economy on travels to abroad due to boom in world market. While variable lagged ER also have a significant impact on these payments. All these variables taken together explained around 87 percent of variations in investment income receipts. However, variables FER, lagged $WGDP_{idx}$, GNP, ER affects the travel payments non-significantly thus implying that these are not the significant determinants of travel payments.

After the inclusion of time variable, the resulting equation is as follows:

$$\text{Trav Pay} = 8027.57 - 44.24t + 0.0189\text{GNP}(-1) + 0.57 \text{Trav Pay}(-1) - 271.73\text{ER}(-1) + 2080.94D - 263.36\text{WGDP}_{idx}$$

$$(0.75) \quad (-0.10) \quad (4.58)** \quad (4.15)** \quad (-2.75)** \quad (1.98)* \quad (1.32)$$

$F=277.97, R^2=0.88, \bar{R}^2=0.86$

This shows that after we include time variable in the equation, variable $WGDP_{idx}$ turned out to be non-significant variable thus suggesting that $WGDP$ does not impact the travel payments considerably (may be due to travel payments for tourism purpose not for productive purpose). While variable lagged GNP is the most significant variable, followed by lagged Travel payments and lagged ER.

2b.(ii) Transportation Payments (Trans Pay)

It has been hypothesized that

$$\text{Trans Pay} = f(\text{Imp}, \text{ER}, \text{ER}(-1), D, \text{WGDP}_{idx}, \text{WGDP}_{idx} (-1), \text{GNP}, \text{GNP}(-1), \text{Trans Pay}(-1))$$
The growth behaviour of the variables has been discussed below:

Appendix 7.29 shows that transportation payments of invisibles account have been continuously increasing since 1980-81 except few years (1983-84, 1985-87, 1990-91, 1994-95, 1999-00, 2001-02 and 2003-04) at the rate of 10.83 percent. These payments increased from Rs. 1401.67 crore in 1980-81 to Rs. 7113.28 crore in 1992-93 and then to tremendous figure of Rs. 27445.72 crore in 2005-06.

**Correlation and Regression Results**

Results of correlation matrix shows that highly significant and positive correlation has been witnessed among all the independent variables (namely imports, ER, lagged ER, D, WGDP$_{idx}$, lagged WGDP$_{idx}$, GNP, lagged GNP and Lagged Trans Pay) with the dependent variable.

The linear regression results given in Table 7.29 shows that variables namely merchandise imports, WGDP$_{idx}$, GNP, lagged GNP and lagged Trans. Pay when taken along with time variable, are significant determinants of transportation payments. All the variables have satisfied theoretical expected sign. Imports of merchandise is highly significant determinant of payments for transportation. Around 89 percent of variations in transportation payments is explained with merchandise imports during this period. However, coefficient of time variable is significant for three non-significant variables i.e. exchange rate, lagged exchange rate and dummy.

**Step Down Regression Results**

Value of F-test is significant at 0.01 level which confirms the acceptability of the model(Table 7.30). Value of adjusted $R^2$ is maximum at iteration 4 which suggest that this equation gives the best set of explanatory variables. In the first iteration, all the explanatory variables are considered, and after dropping out most non-significant variables in the subsequent iterations, the value of adjusted $R^2$ improves which suggests that dropping out of the least important variable has not only lead to slight improvement in adjusted $R^2$ but has also lead us to a relatively more parsimonious situation. Evidently, results obtained through the iteration 4 gives the best set of predictors of the model.

All the variables in this equation viz. merchandise imports, exchange rate, lagged Trans Pay, lagged ER, GNP and lagged GNP are the significant variables
affecting the transportation payments. Variable merchandise imports is highly significant determinant of transportation payments. This indicates that international payments on transportation depend on imported merchandise, dispatched from abroad. Variable lagged ER (negative) and lagged GNP (positive) also carries theoretical correct sign. This implies that depreciation in country’s currency lowers the inflow of imports which in turn lowers the transportation payments. However, variable D, lagged \( \text{WGDP}_{\text{indx}} \) and \( \text{WGDP}_{\text{indx}} \) turned out to be non-significant variables affecting the transportation payments.

After the inclusion of time variable, the resulting equation is as follows:

\[
\text{Trans Pay} = 3955.13 + 135.22t + 0.0717 \text{Imp} + 763 \text{Trans Pay}(-1) - 589.86 \text{ER}(-1) + 0.0163 \text{GNP}(-1) + 53.12 \text{ER} - 0.0256 \text{GNP}
\]

\( (1.88) \quad (0.45) \quad (6.18)** \quad (3.16)** \quad (-3.1)** \quad (2.89)** \quad (1.76) \quad (-1.45) \)

\[ F=61.52, R^2=0.86, \text{ and } R^2=0.84 \]

This equation suggests that GNP turned out to be the non-significant variable. While merchandise imports is the most significant determinant, followed by lagged transportation payments and lagged ER respectively.

2b. (iii) Determinants of Insurance Payments (Ins Pay)

It has been hypothesized that

\[ \text{Ins Pay} = f(\text{FER}, \text{GDP}_{\text{FS}}, \text{Imp}, \text{GNP}, \text{WGDP}_{\text{indx}}, \text{ER}, D, \text{Ins Pay}(-1), \text{ER}(-1), \text{WGDP}_{\text{indx}}(-1), \text{GNP}(-1)) \]

The growth behaviour of the variables has been discussed below:

Appendix 7.31 shows that insurance payments have been continuously increasing since 1980-81 except few years (i.e. 1985-86, 1987-89, 1995-96, 1998-99 and 2003-04). Insurance payments which were Rs.134.24 crore in 1980-81, fluctuated and increased to Rs. 731.66 crore in 1994-95 and then further rising to Rs.3690.1 crore in 2005-06.

**Correlation and Regression Results**

Correlation matrix results depicts that highly significant and positive correlation has been witnessed among all the variables considered (FER, merchandise imp, GNP, \( \text{WGDP}_{\text{indx}} \), ER, D, lagged Ins Pay, lagged ER, lagged \( \text{WGDP}_{\text{indx}} \) and lagged GNP) and the dependent variable. However, non-significant and negative
correlation has been witnessed with India’s GDP in financial sector (GDP_{fs}). Linear regression results given in Table 7.31 shows that variables namely FER, merchandise imp, GNP, WGDP_{indx}, ER, lagged Ins Pay, lagged WGDP_{indx} and lagged GNP are significant determinants of insurance payments when taken along with time variable. All these variables have theoretical correct sign. Variable foreign exchange reserves bear positive and significant impact on insurance payments. This suggests that foreign exchange availability have been influencing choice of insurance agencies, significantly affecting international insurance payments. Alone foreign exchange reserves account for 85 percent of variations in insurance payments. Coefficient of time variable is significant for three non-significant variables i.e IGDP_{fs}, dummy and lagged exchange rate.

**Step Down Regression Results**

The model appears to be well specified (Table 7.32) with fairly high values of $R^2$ and adjusted $R^2$ and F value. As the value of adjusted $R^2$ is maximum at iteration 4 which suggests that this equation gives us the best set of explanatory variables. Six variables namely merchandise imports, GNP, lagged Ins Pay, FER, lagged WGDP_{indx} and lagged GNP have a significant and theoretical expected positive effect on insurance payments (except GNP). Variable merchandise imports positively and significantly affects the insurance payments thus implying that increase in imports will lead to more insurance payments.

After the inclusion of time variable, the resulting equation is as follows:

$$\text{Ins Pay} = -2446.51 - 71.59t + 0.00828 \text{Imp} + 0.52 \text{Ins Pay}(-1) + 0.00161 \text{FER} + 59.54 \text{WGDP}_{indx}(-1) + 0.00189 \text{GNP}(-1) - 0.00371 \text{GNP}$$

$$\begin{align*}
(\text{1.86}) & & (\text{1.41}) & & (\text{5.56})** & & (\text{2.56})** & & (\text{2.55})* & & (\text{2.41})** & & (\text{1.74}) & & (\text{1.59})
\end{align*}$$

$$F=101.99, R^2=0.87, \tilde{R}^2 = 0.866$$

The results show that now variable GNP and lagged GNP turned out to be the non-significant variables affecting insurance payments. Variable merchandise imports are the most significant variable, followed by lagged insurance payments and foreign exchange reserves respectively.

**2b. (iv) Investment Income Payments (Inv Inc Pay)**

It has been hypothesized that

$$\text{Inv Inc Pay} = f(\text{IIPI, ED, ER, FER, GNP, WGDP}_{indx}, D, \text{ER}(-1), \text{WGDP}_{indx}(-1), \text{GNP}(-1), \text{Inv Inc Pay}(-1))$$
The growth behaviour of the variables has been discussed below:

Appendix 7.33 shows that investment income payments have been rising rapidly and continuously (except 1981-82, 1993-94, 2001-02 and 2002-03). Payments rose from Rs.1843.88 crore in the beginning of eighties to nearly Rs.8709 crore in late eighties thereafter rose further exceeding Rs.18458.84 crore in 1994-95 and then to Rs. 40536.3 crore in 2005-06. Variable India’s industrial production index (IIPI indx) from 64.94 in 1980-81 to 184.74 in 1995-96 but then decreased to 143.83 in 2005-06.

**Correlation and Regression Results**

Results of correlation matrix in Appendix 7.34 shows that highly significant and positive correlation has been witnessed among all the independent variables (ED, ER and FER , GNP, WGDP indx, D, lagged ER, lagged WGDP indx, lagged GNP and lagged Inv Inc Pay) with the dependent variable except variable India’s industrial production index (IIPI).

The linear regression results given in Table 7.33 shows that six variables namely FER, GNP, WGDP indx, lagged WGDP indx, lagged GNP and lagged Inv Inc Pay are significant determinants of investment income payments when taken along with time variable. However, coefficient of time variable is significant for four non-significant variables i.e. ED, ER, dummy and lagged ER.

**Step Down Regression Results**

Value of F-test is significant at 0.01 level which confirms the acceptability of the model (Table 7.34). Value of adjusted $R^2$ is maximum at iteration 5 which suggest that this equation gives the best set of explanatory variables. Six variables namely lagged GNP, GNP, D, lagged ER, lagged WGDP indx and WGDP indx are the significant variables affecting the investment income payments. All variables have theoretical expected correct sign. However, variable lagged GNP and GNP have correct sign and is positively affecting the investment income payments. This suggest that as economy grows it avails more of the services from abroad thus increasing the payments abroad. Variable exchange rate is negatively related to payments thus implying that as the currency devalues, the payments to abroad decreases. However, variables IIPI, ED, lagged Inv Inc Pay, ER and FER turned out to be non-significant determinants of these payments.
After inclusion of time variable, the resulting equation is as follows:

\[
\text{InvIncPay} = -25341.4 - 146.32t+0.0523\text{GNP}(-1)+6233.95D+0.0310\text{GNP}(-463.24\text{ER}(-1)+1001.66\text{WGDP}\text{indx}(-1) -655.18\text{WGDP}\text{indx}(-0.157) (3.77)** (3.27)** (2.78)* (2.06)* (1.73) (0.943) (0.818)
\]

\[F=99.89, R^2=0.85, R^2=0.84\]

This shows that \(\text{WGDP}\text{indx}, \text{lagged WGDP}\text{indx}\) \(\text{and ER lagged}\) turned out to be non-significant determinants of investment income payments. Variable lagged GNP is the most significant variable, followed by dummy variable and GNP respectively.

### 2b.(v) Private Transfer Payments (PTPay)

It has been hypothesized that

\[\text{PTPay} = f(\text{PTPay}(-1), \text{WGDP}\text{indx}, \text{WGDP}\text{indx}(-1), D, \text{ER}, \text{ER}(-1), \text{GNP}, \text{GNP}(-1))\]

The growth behaviour of the variables has been discussed below:

Data given in 7.35 shows that payments on this account though rose from Rs.47.38 crore in 1980-81 to Rs.159.85 crore in 2005-06 (but decreased in 13 years since 1980-81 to 2005-06).

### Correlation and Regression Results

Correlation analysis (Appendix 7.36) shows that all the variables namely lagged PT Pay, ER, lagged ER,D, \(\text{WGDP}\text{indx}, \text{lagged WGDP}\text{indx}, \text{GNP} \) and lagged GNP are significantly and positively correlated with private transfer payments.

Linear regression results given in Table 7.35 show that out of eight variables considered, three variables namely lagged PTPay, GNP and lagged GNP significantly and positively affects the private transfer payments when taken along with time variable. One unit increase in GNP will lead to increase in private transfer payments by 0.00256 units. \(r^2 (0.73)\) was maximum in case of lagged private transfer payments. However, coefficient of time variable is significant for one non-significant variable namely dummy variable.

### Step-Down Regression Results

By dropping out the least important variables, the value of adjusted \(R^2\) improved till iteration 3. Thus, iteration 3 can by chosen as the best equation holding the most important variables influencing travel payments (Table 7.36). After this iteration, there occurred a perceptible reduction in the explanatory power \((R^2)\) of the regression equation. Three variables viz. lagged PT Pay, lagged GNP and GNP
turned out to be the significant ones. Lagged PTPay and Lagged GNP carries correct positive sign and are significant variables. This indicates that as the economy grows, grants, gifts and migrants, transfers by way of remittances for family maintenance increases to foreign countries relatives, which leads to increase in private transfer payments. However, variable GNP have a significant relationship but with theoretical wrong sign. Variables namely lagged ER, D, WGDP$_{indx}$, lagged WGDP$_{indx}$ and ER are not determining the private transfer payments significantly.

After inclusion of time variable, the resulting equation is as follows:

\[ \text{PTPay} = -480.18 - 36.27t + 0.63\text{PTPay}(-1) + 0.0067\text{GNP}(-1) - 0.0054\text{GNP}(-1) \]

\[ (1.26) (-0.55) (3.81)** (2.75)** (1.31) \]

\[ F=22.02, R^2=0.81, \bar{R}^2=0.77 \]

The results show that variable GNP comes out as non-significant variable which suggests that lagged GNP and lagged Pri Trans Pay are the significant determinants of payments on this account.

**2b.(vi) Other Invisible Payments (OtInvPay)**

It has been hypothesized that

\[ \text{Ot Inv Pay} = f(\text{Ot Inv Pay}(-1), \text{WGDP}_{indx}, \text{WGDP}_{indx}(-1), D, ER, ER(-1), GNP, GNP(-1)) \]

The growth behaviour of the variables has been discussed below:

Payments on this account have been rising rapidly(Appendix 7.37) .Other invisible payments rose from around Rs. 2819 crore in 1980-81 to nearly Rs. 5584.18 crore in 1987-88 and further above 30347.25 in 2001-02 with some fluctuations in between and finally stayed at Rs. 62308.96 crore in 2005-06.

**Correlation and Regression Results**

Correlation analysis shows that all the variables namely lagged other invisible payments, WGDP$_{indx}$, lagged WGDP$_{indx}$, D, ER, lagged ER, GNP and lagged GNP are significantly and positively correlated with other invisible payments.

Linear regression results given in Table 7.37 show that out of eight variables considered, four variables namely lagged Ot Inv Pay, WGDP$_{indx}$, GNP and lagged
GNP significantly and positively affects the other invisible payments when taken along with time variable. All these variables positively and significantly (theoretically true) affect the other invisible payments. Around 92 percent of variations in this account are explained by GNP, followed by 91 percent variations by lagged GNP. However, coefficient of time variable is significant for two variables i.e D and exchange rate.

**Step Down Regression Results**

Value of F-test is significant at 0.01 level which confirms the acceptability of the model (Table 7.38). Value of adjusted $R^2$ is maximum at iteration 2 which suggest that this equation gives the best set of explanatory variables. Variables namely lagged GNP, ER, WGDP$_{indx}$, lagged WGDP$_{indx}$, D and lagged Ot Inv Pay are the significant variables affecting the other invisible payments. All variables have theoretical expected correct sign except WGDP$_{indx}$. However, variable lagged GNP and lagged WGDP$_{indx}$ have correct sign and is positively affecting the payments which shows as the global economy grows, the payments on this account will go up. Variable ER has negative effect on payments which is theoretical true. All these variables explained 85 percent of variations in other invisible payments. Variable lagged ER and GNP turned out to be non-significant ones.

After inclusion of time variable, the resulting equation is as follows:

\[
\text{Ot Invpay} = 84041.8 + 1329.59t + 0.187\text{GNP}(-1) - 3426.22\text{ER} + 4330.19\text{WGDP}_{indx}(-1) + 17949.10\text{D} - 0.42\text{OtInvPay}(-1) - 6878.21\text{WGDP}_{indx}(1.08) \\
(0.416) \quad (6.14)\quad (3.95)\quad (2.55)\quad (1.97) \quad (1.94) \quad (1.91)
\]

F=55.18, $R^2=0.855$, $\overline{R}^2=0.838$

The results show that out of six significant variables taken in the equation, lagged inv Pay, WGDP$_{indx}$ and D comes out to be non-significant variable affecting the other invisible payments. While all the remaining variables still are important determinants of payments.

**III**

**CAPITAL ACCOUNT AND ITS DETERMINANTS**

It has been hypothesized that

\[
CAP/GDP=f(S-Igap,CAB/GDP,GGNP,GFCA,RCPI,D,WGDP_{indx},IInf,ER,ROI_{Abroad})
\]
The growth behaviour of the variables has been discussed below:

Data on capital account given in Appendix 7.39 reveals that capital account as a percent of GDP (CAP/GDP), current account balance as a percent of GDP, S-I gap and relative consumer price index (RCPI) have been continuously increasing except few years. Current account balance as percent of GDP (CAB/GDP) increased from 1.36 percent in 1980-81 to 2.07 in 1989-90 and further to 3.11 percent in 2005-06. While the deficit in saving-investment gap increased during the whole period (deficit increased from Rs. 2094 crore in 1980-81 to Rs.12279 crore in 1989-90 and then to Rs.44605 crore in 2005-06. RCPI improved from 0.76 in 1980-81 to 1.04 in 2005-06. However, interest rate prevailing abroad has been declining and it declined from 11.94 in 1980-81 to 8.14 in 1992-93 and further to 5.23 in 2005-06.

**Correlation Analysis**

Results of correlation matrix shows that capital account as a percent of GDP (CAP/GDP) is positively and significantly correlated with variables namely GGNP, RCPI, dummy, WGDP_{idx} and ER while negatively and significantly correlated with domestic inflation rate (IInf) and rate of interest abroad (ROI_{ab}). However, this variable has non-significant correlation with saving-investment gap (S-I gap), CAB/GDP and growth rate of foreign currency assets (FCA_{gr}). Regarding inter-correlation of these variables, correlation coefficient of S-I gap is significant with CAB/GDP; of GNP with RCPI, dummy, WGDP_{idx}, IInf, ER,ROI_{ab}; of RCPI with D, WGDP_{idx}, IInf, ER, ROI_{ab}; of WGP_{idx} with IInf, ER, ROI_{ab}; IInf with ER, ROI_{ab}; of ER with ROI_{ab}.

**Linear Regression Results**

Linear regression results given in Table 7.39 show that variables namely ER and ROI_{ab} are negatively and significantly affecting the capital account inflows with theoretical correct sign. This implies that if the interest rate on securities increases in foreign country, investors by following the higher returns, would make the investors to withdraw from Indian stock market to invest in U.S. market. Exchange rate alone explains 62 percent of variations in capital account inflows. However, coefficient of time variable is significant for seven non-significant variables i.e. S-I gap, GGNP, CAB/GDP, FCA_{gr}, RCPI, D and IInf.
Step Down Regression Results

Value of adjusted $R^2$ is maximum at iteration 3 which suggest that this equation gives the best set of explanatory variables (Table 7.40). Five variables namely $\text{WGDP}_{\text{indx}}$, $\text{ER}$, $\text{FCA}_{\text{gr}}$, $\text{D}$ and $\text{CAB/GDP}$ turned out to be the significant variables affecting net capital account inflows. All these variables have expected correct signs. Variable $\text{WGDP}_{\text{indx}}$ have positive and significant effect on capital accounts flows. The other variable $\text{FCA}_{\text{gr}}$ also affects the net capital inflows positively. Recent Indian experience shows that foreign currency assets are replenished by borrowings from international financial institutions and in situation of higher domestic inflation rate, which represents either higher budget deficit or increasing gap between demand and supply of goods, the government resorts to external borrowings. Variable GGNP and $\text{D}$ affects the capital account inflows positively and significantly. The hypothesis postulates that these inflows are a positive function of market size of host country which is usually measured by GGNP. While positive sign of dummy suggests that after liberalization, capital inflows into our economy rose significantly. Only variable ER is a negative function of these inflows. This suggests that as the currency of a country depreciates (or exchange rate increases), foreign investors do not invest in country’s securities and vice-versa. However, variables namely relative consumer price index (RCPI) and $\text{ROI}_{ab}$, II$_{\text{ndx}}$, CAB/GDP and S-I gap do not influence capital inflows significantly. However, the explanatory power of the equation is reasonably good.

After including the time variable, the resulting equation is as follows:

$$\begin{align*}
\text{CAP/GDP} &= 158585 - 90.78t + 1731.12\text{GGNP} + 67.86\text{FCA}_{\text{gr}} - 2327.04\text{ER} + 22388.82\text{D} + 2669.24\text{WGDP}_{\text{indx}} \\
(-1.12) &\quad (-0.013) &\quad (2.56)** &\quad (2.45)** &\quad (2.27)** &\quad (1.58)* &\quad (1.08)
\end{align*}$$

$F=20.95, R^2=0.875$, $\overline{R}^2=0.833$.

The results show that variable namely $\text{WGDP}_{\text{indx}}$ turned out to be non-significant variable thus indicating that four variables namely GGNP, $\text{FCA}_{\text{gr}}$, $\text{ER}$ and $\text{D}$ are the significant determinants of capital account.

Components of Capital Account Inflows

(i) **Foreign Direct Investment Inflows (FDI Inflows)**

It has been hypothesized that

$$\text{FDIIN} = f(\text{WGDP}_{\text{indx}}, \text{GFDRATIO}, \text{ED}, \text{II}_{\text{ndx}}, \text{FER}, \text{FDIIN}(-1), \text{II}_{\text{ndx}}, \text{ER}, \text{GDP}, \text{GGDP}, \text{Exp})$$
The growth behaviour of the variables has been discussed below:

Appendix 7.41 shows that inflows on this account increased tremendously after post-liberalization period (except 1993-94 and 1999-00). Inflows increased from Rs.376.56 crore in 1990-91 to Rs. 8695.29 crore in 1995-96 which further increased to Rs.29528.23 crore in 2005-06. However, GFD ratio showed a declining trend (GFD ratio decreased from 7.95 percent in 1990-91 to 5.77 percent in 1994-95 and then to 4.18 percent). Inflation rate in India (IInf) decreased from 9 percent in 1990-91 to 4 percent in 2005-06. FER, GDP and merchandise exp all increased at a significant rate during post-liberalization period. However, infrastructure index showed a declining phenomena as it decreased from 142.48 in 1990-91 to 91.65 in 1998-99 and then increased to 35.66 in 2005-06.

**Correlation and Linear Regression Results**

Correlation matrix shows that FDI inflows are positively and significantly correlated with seven variables viz. WGDP$_{indx}$, FER, lagged FDI, ER, India’s GDP and merchandise exp. While negative and significant correlation is witnessed between three variables viz. GFD ratio, ED and IInf. However, IIndx is least correlated variable with FDI inflows.

Linear regression results given in Table 7.41 reveal that none of these variables when taken along with trend turns out to be the significant one. However, coefficient of time variable is significant for nine variables namely GFD ratio, ED, IInf, FER, lagged FDI Inflows, IIndx, ER, GDP$_{gr}$ and exports.

**Step Down Regression Results**

Table 7.42 present the outcome of step down regression results when applied on the dataset. The model explains around 90 percent of the variations in FDI inflows. The F-statistic is significant at one percent level of significance thus indicating that the impact of independent variables is significant. Value of adjusted R$^2$ is maximum at iteration 8 which suggest that this equation gives the bets set of explanatory variables. The coefficients of Exp, ED and IIndx are statistically significant at 5 percent level. An increase in merchandise exports leads to increase in FDI inflows. This suggests that export-oriented economies can attract more FDI towards them. The negative relationship of ED with FDI inflows is also on expected
lines. As the external debt goes up, it lowers international confidence, thereby decelerating FDI significantly. Third variable i.e. IIndx does not bear expected positive sign. However, all the remaining variables seem to be irrelevant in attracting FDI inflows.

After including time variable, the resulting equation is as follows:

$$\text{FDIIN} = 42937.09 + 595.14t - 0.000534ED + 0.14Exp - 53.85I_{\text{ndx}}$$

$$F=28.94, R^2=0.91, \bar{R}^2=0.88$$

The resulting equation reveals that out of three significant variables, only two variables with expected correct signs still remained the strong determinants of FDI inflows while variable IIndx (with wrong sign) does not affect the FDI inflows significantly.

(ii) Foreign Institutional Investment Inflows (FII or Portfolio Inflows)

It has been hypothesized that

$$FIIN=f(FIIN(-1), WGD_{\text{ndx}}, ER, Inf_{\text{abroad}}, RSP, IInf_{\text{ndx}}, RSP(-1))$$

The growth behaviour of the variables has been discussed below:

Appendix 7.43 reveals that FII inflows showed immensely high increase during post-liberalization period. FII inflows increased from Rs.1166.77 crore in 1992-93 to a very high figure of 22711.89 crore in 1997-98 which further increased to 106543.1 crore in 2003-04 and then stayed at Rs.224503.7 crore in 2005-06. Inf_{abroad} has decreased significantly from 26.5 percent in 1990-91 to 5.4 percent in 1998-99 and then to 3.7 percent in 2005-06. However, returns in foreign market (RSP) showed a fluctuating trend. Returns increased from 30.47 percent in 1991-92 to 37.58 percent in 1995-96 and then declined in few years and showed a deficit of 22.1 percent in 2002-03 while reached at figure of 4.91 percent in 2005-06.

Correlation and Regression Results

Appendix 7.44 presents the outcome of correlation analysis which shows that three variables namely lagged FII inflows, WGD_{\text{ndx}} and ER are significantly and positively correlated with FII inflows. However, negative correlation is witnessed
with $\text{Inf}_{\text{abroad}}$ and $\text{IInf}$. FII inflows are least correlated with three variables namely $\text{RSP}$, $\text{IIP}_{\text{indx}}$ and lagged $\text{RSP}$.

Linear regression results given in Table 7.43 shows that lagged FII inflows, $\text{WGDP}_{\text{indx}}$ and ER are the three significant variables affecting the FII inflows in India. All the three variables are in consensus with theoretical expected signs. $\text{WGDP}_{\text{indx}}$ have expected positive sign thus suggesting that growth of the global economy also positively affects the FII inflows into the domestic economy. However, alone exchange rate explained 88 percent of variations in FII inflows in India, followed by lagged FII inflows. However, coefficient of time variable is significant for all the remaining non-significant variables namely $\text{Inf}_{\text{abroad}}$, $\text{RSP}$, $\text{IInf}$, $\text{IIP}_{\text{indx}}$ and lagged $\text{RSP}$.

**Step-Down Regression Results**

Value of adjusted $R^2$ is maximum at iteration 3 which suggest that this equation gives the best set of explanatory variables (Table 7.44). Out of all the eight variables considered, five variables (i.e.$\text{WGDP}_{\text{indx}}, \text{inf}_{\text{ab}}, \text{RSP}, \text{ER}$ and lagged portfolio inflows) tuned out to be the significant variable affecting the FII inflows. All the variables have signs to a-priori expectations. Variable inflation rate abroad (US) is significantly and positively affecting the FII inflows. This implies that when inflation in foreign country increase, purchasing power of funds invested in foreign country declines, portfolio investors would withdraw from foreign market and make investments in domestic (Indian market). However, variable exchange rate have a negative and significant effect on FII inflows. This indicates that if the exchange rate of domestic economy depreciates, it decreases the value of home currency, this discourages the foreign investors to invest in country’s securities and vice-versa. The remaining variables ie.$\text{IIP}$ index, lagged returns in foreign market and domestic inflation rate are non-significant variables.

After including the time variable, the resulting equation is as follows:

$$\text{FIIN} = -552292 + 190.64t + 2240.64\text{Inf}_{\text{abroad}} - 723.64\text{RSP} - 3271.06\text{ER} + 0.52\text{FIIN}(-1) + 6694.88\text{WGDP}_{\text{indx}}$$

(-1.88) (0.20) (3.55)** (2.81)** (2.78)** (2.07)** (1.97)**

$F= 48.73$, $R^2=0.97$, $\bar{R}^2=0.95$.  

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These results show that all the earlier variables are still the significant variables affecting FII inflows. Variable inflation rate prevailing abroad is the most significant variable, followed by RSP and ER respectively.

(iii) External Assistance Inflows (EXTASS(I))

It has been hypothesized that

\[
\text{EXTASS}(I) = f(\text{EXTASS}(I)(-1), \text{GNP}, \text{DSR}, \text{IIInf}, \text{Inf}_{\text{Abroad}})
\]

The growth behaviour of the determinants has been discussed below:

Appendix 7.45 shows that external assistance inflows decreased in almost seven years out of total 16 years. Inflows decreased from Rs. 12016.33 crore in 1990-91 to Rs.11990.41 crore in 2005-06 resulted in very low compound growth rate of 1.105 percent.

Correlation and Regression Results

Correlation matrix results in Appendix 7.46 show that no high correlation has been witnessed between this variable and any of the independent variable. Linear regression results given in Table 7.45 witnessed domestic inflation rate as significant determinant of external assistance inflows. Only 25 percent of variations in external assistance inflows are caused by this variable.

Step-Down Regression Results

However, the results of step-down regression results (Table 7.46) reveal that model is significant at 5 percent level. Only 29 percent of variations in these inflows are caused by two significant variables. Out of all the variables, two variables namely IIInf and Inf_{abroad} turn out to be the significant variables. Domestic inflation rate have expected positive effect on these inflows thus indicating that as the prices in the economy increases, it hampers the internal price stability which leads to increase in external assistance inflows. However, the other significant variables world inflation rate have negative effect on these inflows thus suggesting that if prices in the world market spiral up, it will decrease inflows in the economy so as to provide external assistance to our economies. All the remaining variables are non-significant determinants of external assistance inflows.
After including the time variable, the resulting equation is as follows:

\[
\text{EXTASS}(t) = 8247.86 + 125.08t + 616.74\text{Inf} - 103.02\text{Inf}_{\text{abroad}}
\]

\[
(1.28) \quad (0.32) \quad (1.81)^* \quad (0.83)
\]

\[F=1.68, R^2=0.29, \quad R^2 = 0.12.\]

This shows that inflation rate prevailing in India is the sole determinant of external assistance inflows out of all the variables considered.

(iv) External Commercial Borrowings Inflows (ECB(I))

It has been hypothesized that

\[
\text{ECB}(I) = f(\text{ECB}(I)(-1), \text{DSR}(-1), \text{Imp}, \text{ROI})
\]

The growth behaviour of the determinants has been discussed below:

Data given in appendix 7.47 reveals that ECB(I) though increased from Rs. 15149.05 crore in 1990-91 to Rs. 17223.68 crore in 1994-95 and then increased to Rs. 47176.99 crore in 2005-06 but decreased in five years (i.e. 1991-92, 1992-93, 1997-98, 1999-00 and 2001-02). However, domestic interest rate (ROI) has decreased from 16 percent in 1990-91 to 10.25 percent in 2005-06.

Correlation and Linear Regression Results

Correlation results show that these inflows are moderately associated with three variables (lagged debt service ratio, merchandise imp and ROI). However, lagged external commercial borrowings inflows has least correlation with these inflows. Linear regression results given in Table 7.47 reveals that merchandise imports are positively related to these inflows which show that as imports of the economy increases, economy has to borrow from other economies.

Step Down Regression Results

Step down regression results given in Table 7.48 shows that the model is significant at one percent level. Only two variables out of the four variables i.e. merchandise imports and domestic interest rate are the significant determinants of ECB(I) with theoretical correct signs. If the domestic interest rate increases, more entities will be borrowed from abroad in the form of ECBs.
After including the time variable, the resulting equation is as follows:

\[
\text{ECB(I)} = 23867.14 + 0.108\text{Imp} - 479.31\text{ROI} - 1820.40t
\]

\[
\begin{array}{c}
(0.575) \\
(1.98)** \\
(-0.81) \\
(-0.42)
\end{array}
\]

\[F=3.85, R^2=0.49, \text{adj} R^2=0.363.\]

This equation reveals that now only one variable i.e. imports remained the significant determinant of these inflows thus indicating that ECB inflows are very much affected by merchandise imports of the economy.

### Components of Capital Account Outflows

(i) **Foreign Direct Investment Outflows (FDI Outflows)**

It has been hypothesized that

\[
\text{FDIOUT}=f(\text{ER, OPEN, IInf, FER, GNP, Inf}_{\text{abroad}}, \text{ED, FDIOUT}(-1))
\]

FDI outflows increased from just Rs.3.45 crore in 1990-91 to Rs. 135.67 crore in 1997-98 and then Rs. 202.89 crore in 2005-06.

### Correlation and Regression Results

Correlation matrix result shows that the FDI outflows have non-significant correlation with all the variables considered. This shows that FDI outflows does not show any correlation with these variables considered.

Linear regression results given in Table 7.49 also reveal the same pattern. All the variables namely ER, OPEN, IInf, FER, GNP, world inflation rate (Inf\text{_{abroad}},ED and lagged FDI outflows, considered are non-significant. Coefficient of trend variable is also not significant in case of any of the variable.

### Step Down Regression Results

Table 7.50 reveals that out of all the variables, three variables (OPEN, lagged FDI outflows and Inf\text{_{abroad}}) turned out to be significant variables. Value of adjusted R^2 is maximum at iteration 6 which suggest that this equation gives the best set of explanatory variables. Only variable OPEN bears expected positive sign. This indicates that as the domestic economy integrates with the global world by opening up its market, FDI outflows will also increase. However, other two significant variables
does not bear expected correct sign. Only 17 percent of variations in FDI outflows is explained by these three variables.

After including the time variable, the resulting equation is as follows:

\[
\text{FDIOUT} = -260.17 + 1.61t + 14.81\text{OPEN} + 5.62\text{Inf}_{\text{abroad}} - 0.325\text{FDIOUT}(-1)
\]

\[-1.51 \quad (0.10) \quad (2.28)\quad (1.42) \quad (1.23)\]

\[F=1.42, \, R^2=0.19, \, \bar{R}^2=0.102.\]

These results show that now only one variable i.e. openness ratio turns out to be a significant variable affecting the FDI outflows.

(ii) Foreign Institutional Investment Outflows (FIIOUT)

It has been hypothesized that

\[\text{FIIOUT} = f(\text{FIIOUT}(-1), \text{GFD}_{\text{RATIO}}, \text{RBSE}, \text{IInf}, \text{GNP}, \text{Inf}_{\text{abroad}}, \text{RBSE}(-1))\]

The growth behaviour of the variables has been discussed below:

FII outflows (Appendix 7.51) increased tremendously from Rs.9.38 crore in 1992-93 to Rs. 15306.83 in 1997-98 and then to Rs. 183776 crore in 2005-06. However, returns in domestic market which was negative in 1991-92 showed fluctuating phenomena and reached at a figure of Rs.34.91 crore in 2005-06.

**Correlation and Regression Results**

Correlation results shows that FII outflows are significantly and positively correlated with lagged FII inflows and gross national product. While moderate and negative correlation is witnessed with three variables i.e. GFD ratio, IInf and Inf_{abroad}. However, FII outflows are non-significantly correlated with returns in domestic market (RBSE). Linear regression results given in Table 7.51 also reveals that only the two highly correlated variables namely lagged FII outflows and GNP are the significant variables affecting the FII outflows at 1 percent level of significance. Alone 81 percent of variations in FII outflows are caused due to GNP.

**Step Down Regression Results**

F-statistic confirms that the model is significant at 0.01 level (Table 7.52). Value of \(R^2\) shows that around 94 percent of variations are explained by various independent variables considered. In the first iteration, all the explanatory variables are considered, and after dropping out most non-significant variables in the
subsequent iterations, the value of adjusted $R^2$ improves which suggests that dropping out of the least important variables has not only lead to slight improvement in adjusted $R^2$ but has also lead us to a relatively more parsimonious situation. Evidently, results obtained through the iteration 4 gives the best set of predictors of the model. However, variables namely lagged FII outflows, GFD ratio and lagged returns in domestic market are the three significant determinants of FII outflows. All variables have theoretical expected signs. Variable GFD ratio and RBSE$_{\text{lagged}}$ have a negative and significant effect on FII outflows. It suggests that as the level of country’s fiscal deficit goes up, it is matched by decrease in portfolio outflows as the country’s priority would be to meet its deficit rather than to make investments abroad. The negative sign of RBSE$_{\text{lagged}}$ is justified on the grounds that investors are always believed to follow higher return, hence when return in domestic market decreases, institutional investors would flow from Indian market to foreign market (US). However, all the remaining variables (i.e. domestic inflation rate, returns in domestic market, GNP and world inflation rate) are non-significant determinants of FII outflows.

After including the time variable, the resulting equation is as follows:

$$FIIOUT = 57216.75 - 1360.61t - 8460.93GFD_{\text{ratio}} - 55.63RBSE(-1) + 1.609FIIOUT(-1)$$

(2.11) (1.07) (2.18)** (2.12)** (8.5)**

$F=80.29$, $R^2=0.84$, $R^2_{\text{adj}}=0.83$

The results show that all the three variables are still the significant factors affecting the FII outflows with gross fiscal deficit ratio as the most significant variable, followed by lagged returns in domestic market.

(iii) **External Assistance Outflows** [EXTASST(O)]

$$EXTASS(O)=f(EXTASS(O)(-1), GNP, Inf_{\text{Abroad}}, DSR)$$

Outflows on this account increased from Rs. 4217.05 crore in 1990-91 to Rs. 10749.9 crore in 2000-01 and then decreased to 6347.86 crore in 2005-06.

**Correlation and Regression Results**

External assistance outflows are positively and significantly correlated to lagged outflows, GNP and debt service ratio(DSR). However, negatively and moderately correlated to $Inf_{\text{abroad}}$. 

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Linear regression results given in Table 7.53 show that these outflows are positively and significantly affected by debt service ratio. Around 53 percent of variations are caused by this variable alone. However, time variable bears significant positive sign which shows that these outflows increased at a significant rate during post-liberalization period.

**Step Down Regression Results**

The value of adjusted coefficient of determination increases till iteration 2 which suggests that this equation gives the best set of predictors of the model. F-value is significant at 0.01 level. (Table 7.54). Only one variable i.e. GNP is a significant and positive determinant of external assistance outflows. This suggests that as the economy grows, it provides more external assistance to other economies. However, only 14 percent of variations in these outflows are explained by gross national product.

After including the time variable, the resulting equation is as follows:

\[ \text{EXTASS}(O) = 33227.87 + 3992.98t + 0.0333 \text{GNP} \]

\[ (1.89) \quad (1.95)^* \quad (1.96)^* \]

F=4.00, \( R^2 = 0.38 \), \( \bar{R}^2 = 0.286 \)

This shows that GNP is the only significant determinant of external assistance outflows.

**(iv) External Commercial Borrowings Outflows (ECB(O))**

It has been hypothesized that

\[ \text{ECB}(O) = f(\text{ECB}(O)(-1), \text{Imp}, \text{FER}) \]

The growth behaviour of the variables has been discussed below:

Outflows (Appendix 7.55) on this account though increased from Rs. 7174.311 crore in 1990-91 to Rs. 13893.98 crore in 1997-98 and then rose further to Rs. 39369.24 crore in 2005-06 showing a tremendous increase during post-liberalization period but also decreased in five years out of the total 26 years.
Correlation and Linear Regression Results

This variable is strongly and significantly related to two variables namely merchandise imports and exchange rate. However, low correlation has been witnessed with lagged ECB(O).

Linear regression results given in Table 7.55 reveal that only one variable i.e. lagged ECB(O) is significantly and positively affecting the external assistance borrowing outflows. Around 75 percent of variations in ECB outflows are caused by ECB outflows in the previous period.

Step Down Regression Results

The model is significant at one percent level (Table 7.56). Around 75 percent of variations in ECBO are caused by all the three variables considered together. All the three variables namely lagged external commercial borrowings outflows, merchandise imports and exchange rate are significant determinants of ECBO. Variable merchandise imports are positively affecting to ECBO with expected wrong sign. Variable exchange rate is positively and significantly affecting ECBO with correct sign. This indicates that the expectation of depreciation in rupee could speed up repayments.

After including the time variable, the resulting equation is as follows:

\[
ECB(O)=13135.38 + 2892.49t + 0.84ECB(O)(-1) +281.45ER+0.00326Imp
\]

(0.89) (1.17) (2.67)** (2.42)** (0.069)

\[F=10.67, R^2=0.79, \bar{R}^2=0.72\]

Two variables i.e. lagged external commercial borrowings outflows and exchange rate turns out to be the significant determinants of ECB (O).

Non-Resident Deposits (NRINET)

It has been hypothesized that

\[NRINET=f(NRINET(-1), Int Diff, OP ,ER)\]

Non-Resident deposits witnessed wide fluctuations but increasing trend. Deposits increased from Rs. 5435.44 crore in 1990-91 to Rs. 13586.46 crore in 1996-97 and then decreased to Rs.9258.23 crore in 2005-06. However, deposits in this account increased at a significant rate.
**Correlation and Linear Regression Results**

This variable is significantly correlated to exchange rate only. While linear regression results reveal no linear relationship of any variable with the NRI deposits.

**Step Down Regression Results**

Table 7.58 shows that NRI deposits are significantly affected by exchange rate but with expected wrong sign. Both the remaining variables turn out to be non-significant variables. But after including the time variable in the equation, exchange rate also turned out as non-significant variable thus indicating that none of the three variables considered in the equation is significant determinant of NRI deposits.

\[
\text{NRINET} = -4845.02 - 732.97t + 490.42ER
\]

\[
(-0.566) \quad (-0.855) \quad (1.20)
\]

\[F=1.25, \quad R^2=0.162, \quad \bar{R}^2=0.033\]

Thus, on the whole, it has been revealed from the analysis that exchange rate, gross national product of the economy, WGDP index, foreign exchange reserves, lagged exchange rate and lagged GNP turned out to be the most significant variables affecting the different accounts of balance of payments. Variable dummy also turned out to be significant in fourteen accounts out of 29 accounts of balance of payments. This shows that structural changes in the economy done in 1991 significantly affect the balance of payments position of the economy. However, external factors and growth of the economy is also affecting the balance of payments position and its various accounts.