In this Chapter, the long–run impact of fiscal deficit and government expenditure on economic growth of India has been measured. The study used autoregressive distributive lag model for finding the results. The study used gross fiscal deficit, development expenditures and non-development expenditures as independent variables and economic growth as dependent variable. The chapter is divided in five sections followed by introduction. Section 2 encapsulates review of recent studies. Section 3 describes the econometric methodology used in the study. Section 4 discusses the results and findings of the study. Section 5 concludes the chapter.

3.1 INTRODUCTION

Fiscal policy plays a very important role in the development of an economy. The impact of fiscal deficit on economic growth is one of the alarming issues not only in India but also in the other emerging economies. Fiscal Deficit is the difference between government expenditures and government revenue. Sustained and relatively high economic growth is possible only within sound structure in which fiscal policy plays an important role. Implementation of sound policies is the only way to achieve economic growth. But are the fiscal deficits always pleasing? The answer has many dimensions, including whether the government borrowing is financing revenue expenditure (non-development) or development expenditure, whether the deficit is sustainable, and how it is being financed. We will focus only on the first aspect, which is the choice between development expenditure and non development expenditure. In India, average fiscal deficit in eighties was 6.56 percent of GDP, declined to 5.72 percent in next decade and further came down to
4.77 percent of GDP in 2000s. Government followed an expansionary Fiscal policy aimed at stimulating the economy immediately after the economic crisis of 2008. As a result, fiscal deficit in India increased to 6.58% in 2009. Government expenditure helps in increasing aggregate demand on the one hand and helps to reduce supply constraints on economic growth on the other, especially by better roads, improved irrigation facilities, good health services, banking, and highways etc. In developing countries continuous pressure of market borrowing arising as a result of high fiscal deficit, causes increase in the rate of interest, which in turn crowded out private investment (Rani and Kumar, 2017). In other words, high level of fiscal deficit affects economic growth and capital formation of the country, both by reducing private sector investment through an increase in interest rate and also through reduction in public sector’s own investment vacuum by increasing the share of interest payment in total government expenditure. Keynesian view argues that government spending stimulates the domestic economic activities, induces private investors, hence crowds-in private investment rather than crowds-out. This view advocates that in developing countries, economy is not working at full employment level. In such an environment, sensitivity to interest rate is low. Consequently, impact of increase in interest rate as a result of expansionary fiscal policy will be minimal and accordingly the output level of the economy would expand. Therefore, it is imperative to investigate the impact of fiscal deficit and its composition on economic growth in India as this can suggest the policy makers in formulating sound fiscal policy.

3.1.1 Theoretical Background of the Study

The government influences directly or indirectly on the production, consumption and distribution of the economy through public expenditures. Government expenditures give rise to positive externalities to economy and society (Piana, 2001). There is much cautionary talk among researchers and policy makers about the impact of fiscal deficit on selected macroeconomic variables. The first perspective states that fiscal deficit is important for economic growth. Koester and Kormendi (1989), Devarajan et al.(1996), Landau (1986), Skinner (1987), Boskin

The other perspective against above view is that government operations are inherently bureaucratic and therefore restrain growth of the economy (Amanja and Morrissey, 2005). Therefore, there is negative relationship between government expenditures and economic growth (Haq, 2003; Shabbir and Ahmed, 1994; Haque et al., 1994; Folster and Henrekson, 2001; Cebula, 1991, 1995; Ghali, 1997; Rahman, 2012). Some studies concluded that the budget deficit had no significant effect on the economic growth (Nelson and Singh, 1994; Karras, 1994; Guess and Koford, 1984). The research on the relationship between government expenditures and economic activities are very wealthy. Many researchers have investigated the effect of fiscal policy for different economics of the world (Ahmed, 1994; Khan and Iqbal, 1991; Claus et al., 2006; Burney and Yasmeen, 1989; Romer, 1989; Rezk et al., 2006; Perotti, 2005; Iqbal, 1994, 1995; Iqbal and Zahid, 1998; Sinha, 1998; Heppke-Falk et al., 2006; Kelly, 1997).

Pelagidis & Desli (2004) provided evidence pointing to a positive relationship between fiscal deficits and business profits. They further argue that fiscal deficits result in higher business profits and, therefore, economic growth. Further, Ocran (2011) analyzed the effects of fiscal policy associated with increases in government expenditures, tax revenue and budget deficit on the South African economy. The study found that tax revenues and fiscal deficit as fiscal policy tools helped in stimulating real output growth in South Africa. Akram (2015) investigated the impact of public debt on economic growth and investment for the Philippines. The study found that the domestic debt has a negative relationship with investment and positive relationship with economic growth. This study is an attempt to investigate the impact of fiscal deficit, development expenditure and non-development expenditure on economic growth in India. The combined impact of fiscal deficit, development expenditures and non-development expenditures on economic growth has not been studied in India. The objective of the present study...
therefore is to contribute to the debate by investigating the effect of fiscal policy on economic growth in India over the last three decades. Moreover, this work is different from already existing literature in India as we use autoregressive distributive lag model and vector error correction model to capture the long-run and short-run impact of above stated variables.

**Figure 3.1**

Trend and Pattern of Development and Non-Development Expenditures (as percent of GDP)

Figure 3.1 demonstrate that in 1980-81, the development expenditures as the percentage of GDP was 8.91 percent which decreased to 6.38 in 1999-00 and further reached at 8.56 percent in 2010-11. Average development expenditures to GDP ratio in 1980’s was 9.68 percent, decreased in next decades and came down to 7.79 and 6.91 percent in 1990s and 2000s respectively. On the contrary, non-development expenditures to GDP ratio was 6.59 percent in 1980-81, increased to 8.26 in 1993-94 and reached at peak of 9.57 in 2002-03. However, after economic crises, non-development expenditures to GDP ratio showed decreasing trend whereas development expenditures to GDP ratio exhibited increasing trend. However, in India, increased burden of borrowings to finance fiscal deficit jeopardise our prospect of growth and high interest burden results in cutback of development.
expenditures. An important factor that constrained the growth of development expenditures is the increasing share of non-development expenditures.

3.2 LITERATURE REVIEW

3.2.1 Fiscal Deficit, Public Expenditure and Economic Growth

Reddy (1972) analyzed a secular and time pattern of the growth of public expenditure in India. In an effort to establish a theoretical link between the growth of public expenditure and National Income of the country, Reddy has examined the applicability of Wagner’s hypothesis in India. According to Wagner’s hypothesis, as progressive nations industrialize, the share of the public sector in the national economy grows continuously. The increase in State expenditure is needed because of three main reasons namely (a) social activities of the state, (b) administrative and protective actions, and for (c) welfare functions. It was found that the study conducted by Peacock and Wiseman for Great Britain (1961) also holds fit in case of India and advocated that emphasize on the fact that public expenditure has tendency to increase overtime.

Volcker (1987) analyzed the twin deficit hypothesis and concluded that budget deficit leads to trade deficit and both hinder economic growth in long run.

Barro (1990, 1991) criticized the neoclassical crowding out hypothesis. He argued that there is no direct relationship between government consumption and private productivity. The study found that government consumption spending had a negative relationship with economic growth and gross capital formation.

Chelliah (1991) examined the primary deficit and found that the primary deficit should be reduced to 2.5 percentage of GDP in order to achieve sustained economic growth. In order to achieve this target, government must reduce revenue deficit. Further, steps must be taken to reduce the deficit on budget’s revenue account to take much of the financing of the public enterprises out of the budget, to stabilize the rate of capital formation on Government account, to raise the return on government lending and investment and to increase the income elasticity through tax reforms. The study suggested that state level reforms are as important as the reforms at the Centre. The reforms should include area of taxation with introduction of Value
Added Tax (VAT); cutting of subsidies and cutting of staff of general administration.

Rao (1992) examined the public finance condition at the state level with a view of tracing the emerging trends in the medium as well as long term. The study found that unstable fiscal position in states calls for bold and decisive policy measures which include reduction in employment, levy of appropriate user charge on services, phasing out of non merit subsidies, privatization of state electricity boards, rationalization of tax system by introduction of VAT and determination of the shares of states in aggregate Central taxes rather than percentage share of two taxes.

Fisher (1993) examined the role of macroeconomic factor in growth and it was found that there is negative relationship between economic growth and other macroeconomic variables like inflation, high fiscal deficit, and imprecise foreign exchange.

Nelson and Singh (1994) investigated the impact of fiscal deficit on economic growth by using annual data of 70 low developed countries for the time period of 1970-1989. The results of Ordinary Least-Squares method confirmed that there is no significant relationship between economic growth and budget deficit.

Ball and Mankiv (1995) examined short run and long run consequences of fiscal deficit on economic growth. The study found that productive capacity of a nation is the main determinant of economic growth. Further, the study found that fiscal deficit trim downs the capital stock and hamper the economic growth. In addition, the crowding out effect of investment has insignificant effect on capital stock in short run but if deficits persist for a decade or more, they can significantly decrease the economy’s capability to produce goods and services.

Cebula (1995) studied the impact of budget deficit on economic growth in the United States over the period 1955-1992. The study found negative relationship between budget deficit and rate of economic growth. It was also found that the real GDP growth rate is a decreasing function of federal personal and corporate income
tax rates while being an increasing function of expansionary monetary policies in the form of net open market operations.

Al-Khedar (1996) studied the impact of budget deficit on economic growth in G-7 nations for the period 1964-1993. By using VAR model, the study found that the budget deficit negatively associated with the trade balance and has a positive and significant relationship with economic growth of the nation.

Ghali (1997) studied the pattern of government spending in Saudi Arabia. By applying Vector Autoregressive (VAR) analysis, the study found no association between government spending and economic growth in Saudi Arabia’s.

Mugume and Obwona (1998) examined the relationship between fiscal deficits and other macro-level variables for Uganda in the post reform period. The study found a negative relationship between fiscal deficits and economic growth. The study also revealed that fiscal deficit is linked to inflation, exchange rate depreciation and the widening of current account deficit.

Ahmed et al. (2000) explored that tax-financed government expenditure crowds out investment in developed and developing countries. The study also found that expenditure on social security and welfare decreases investment in all developing and developed countries whereas expenditure on transport and communication encourages private investment in developing countries.

Ramji et al. (2001) observed that the total expenditure of the centre increased, but declined as a proportion of GDP in the nineties. The rising wave of expenditure could not be effectively met by the revenue receipts and capital receipts put together. It resulted in an increase in centre’s borrowing at high costs and consequent steep rise in interest payments reflected in the mounting non-plan expenditure affecting public investment and capital investment.

Osborn et al. (2003) examined the impact of government expenditure on economic growth for a panel of thirty developing nations for the period of 1970s and 1980s. The study found that government capital expenditure is positively associated with economic growth whereas current expenditure of the government is immaterial to economic growth.
Adam and Bevan (2005) examined the association between fiscal deficits and economic growth for a panel of forty five developing nations. The study found that impact of fiscal deficit on economic growth is complex in nature and basically depending on the financing mix and the outstanding debt stock of the nation. The study put forward the threshold effect at a level of the deficit around 1.5 percent of gross domestic product.

Gupta et al. (2005) examined the effects of fiscal consolidation and government expenditure composition on economic growth in thirty nine low-income nations. The study found an important positive association between fiscal adjustment and per capita economic growth. Further, the study found that capital expenditures during fiscal adjustment cause higher economic growth. The study concludes that fiscal consolidations are likely to activate higher economic growth rates.

Perotti (2005) examined the relationship between fiscal shocks and GDP in Australia, Canada, UK and Germany. Standard open economy DSGE Model was used for the time series data of different time period. The relationship between above variables was found insignificant.

Tan (2006) assessed the short run and long run association between fiscal deficit, economic growth, and inflation for Malaysia during the period between 1966 to 2003. The study found insignificant association between fiscal deficit and economic growth in both short run as well as in long run.

Huynh (2007) investigated the Vietnam economy and explored that there is a negative association between fiscal deficit and GDP growth rate for the period of 1990 to 2006.

Brender and Drazen (2008) found that high budget deficit is an indication of poor performance of the government and will give negative signals to the citizens that the administration authorities did not perform well in managing the funds of a nation. As a result, there is a chance of re-election process to restore the authorities.

Rubio et al. (2009) estimated solvency equation for EMU countries over the period of 1970 -2005. They used regression and VAR methodology. The result showed that deterministic co-integration prevailed in all the cases except Finland. The estimated regression coefficient was always positive and significantly differed
from zero. The study showed that fiscal policy plays an important role in EMU when dealing with asymmetric shocks.

Dalyop (2010) investigated the Nigerian economy and found that there is insignificant relationship between fiscal deficit and economic growth.

Keho (2010) assessed the association between budget deficit and economic growth for West African nations for the period 1980-2005. The study found that budget deficit had negative effect on economic growth.

Fatima et al. (2011) investigated the impact of fiscal deficit on economic growth of Pakistan by using time series of thirty years. The study found that fiscal deficit affects economic growth of the country very adversely.

Avila (2011) explored the association between fiscal deficit, macroeconomic uncertainty and economic growth of Argentina for the period 1915 to 2006. The study found that there is negative relationship between fiscal deficit and GDP per-capita income growth in Argentina.

Buscemi and Yallwe (2012) using Generalized Method Of Moments (GMM) technique, found that fiscal deficit results are significant and positively correlated to economic growth and saving in India, China and South Africa. The study revealed that real interest rates are negatively and significantly correlated with economic growth and saving. It was found that fiscal deficit affects the economic growth and saving through the means of financing the deficit.

Fatima et al. (2012) conducted a study in Pakistan to know consequential effects of budget deficit on economic growth. They used regression and results showed that inflation, budget deficit, real exchange rate and real interest rate has negative impact on economic growth while Gross investment has positive impact on economic growth of Pakistan.

Taylor et al. (2012) examined the relationship between the primary fiscal deficit, economic growth and debt of USA during the period 1961-2011. It was found that primary deficit had a positive effect on the economic growth of USA.

Rahman (2012) investigated the relationship between budget deficit and economic growth from Malaysia’s perspective by using quarterly data from 2000 to 2011. It was found that there is no long-run relationship between budget deficit and
economic growth of Malaysia, consistent with the Ricardian Equivalence Hypothesis (REH).

**Wadhwa (2013)** investigated the trend and pattern of expenditure in India and also analyzed its impact on fiscal deficit between 1980-81 to 2011-12. He found that increase in non-plan expenditure has been almost 65 times and plan expenditure has increased by 47 times and the total expenditure of central government increased almost by 60 times during this period. The compound annual growth rate of capital expenditure was much higher in the decade 2000-10 (8.96%) as compared to 4.42 percent in the previous decade.

**Adesuyi and Falowo (2013)** investigated the impact of fiscal deficit on macroeconomic growth in Nigeria and found that fiscal deficit has made a significant contribution to the GDP and economic growth of the country. They concluded that higher government spending does not create a hurdle in growth rather it raises private investment which in turn accelerates growth.

**Odhiambo et al. (2013)** investigated the relationship between fiscal deficits and economic growth in Kenyan economy. The study used both exploratory and causal research designs and used time series secondary data for a period of 38 years (1970-2007). Ordinary Least Squares (OLS) method was used for finding the results. The study found positive relationship between budget deficits and economic growth in Kenya.

**Bhoir and Dayre (2015)** investigated the impact of fiscal deficit on economic growth in India over the period of 1991-92 to 2013-14. The results of Johansson co-integration found that fiscal deficit and economic growth do not have long run relationship.

### 3.2.2 Fiscal Deficit, Public Debt and Economic Growth

**Diamond (1965)** first applied Overlapping Generations Model to examine the macroeconomic impact of public debt. The study noted that in a situation of long run equilibrium path, setting budget deficits, shifts taxes to future generations. Given the time path of the government expenditure, households will experience a positive net wealth effect that stimulates consumption and private savings.
Warner (1992) used Least Squares estimation to measure the impact of debt crisis effect on investment for 13 less developed nations over the period of 1982-1989. The study found that main reason behind the decline of investment in many of the deeply indebted nations are declining exports prices, sluggish growth, and high global interest rates in developed nations.

Cunningham (1993) examined the association between public debt and economic growth. Granger causality results show a unidirectional causality running from debt service to economic growth. In addition, the study found that debt burden has negative effect on gross domestic product (GDP) of a nation.

Cohen (1993) examined the relationship between external debt and economic growth for 81 developing countries. The study found that external debt can be very hazardous for economic health of a country if not managed properly.

Levy and Chowdhury (1993) investigated the impact of government debt on gross national product in Latin America, Sub-Saharan Africa, and Asia pacific countries for the period of 1970-1988. The study used simultaneous equations estimation and results showed that dependence on external debt decrease the capital formation in the country and encouraging capital flow from the country that indirectly affects the growth of the country.

Smyth and Hsing (1995) investigated the suitable debt to GDP ratio for the period of 1960-1991. The study found that GDP and its determinants have long-run relationship. The study also examined whether an appropriate debt ratio exists that will maximize economic growth. The study calculated the optimal debt ratio (DEBT/GDP), which represents the maximum real GDP growth rate (38.4 percent). The DEBT/GDP ratio corresponding to the maximum GDP growth rate is 38.4 percent.

Amoateng and Amoako-Adu (1996) investigated the long-run relationship between foreign debt servicing, exports, and GDP in 35 African economies over the period of 1971-1990. The study used Granger’s causality test and found one way causality between external debt service and economic growth.

Fosu (1996) empirically investigated long-run relationship between GDP and foreign debt in sub-Saharan African (SSA) nations for the period of 1970-1986
by using the Ordinary Least Square method. The study found that debt servicing and total outstanding debt have negative impact on economic growth.

**Ghali (1997)** explored the long-run relationship between GDP and public expenditure for the time period of 1960 to 1996 in Saudi Arabia. The study found long-run relationship between government expenditure, GDP, and private investment.

**Kelly (1997)** analyzed that public investments in infrastructure, and particularly housing expenditure, and social security programmes are positively connected to economic growth. He suggested that countries should actually increase budgetary spending on social security.

**Charan (1999)** investigated the relationship between domestic debt and economic growth for India for the period 1959-95. The study used co-integration and Granger causality tests for finding the results. The results of the study supported the Ricardian Equivalence hypothesis between domestic debt and economic growth.

**Fosu (1999)** investigated the impact of external debt on economic growth in sub-Saharan Africa for the 1980-1990 period. An augmented production function was used for finding the results. The findings showed negative association between external debt and economic growth. The study further discussed that the negative relationship between economic growth and debt might be due to a poor performer receiving large external debt.

**Kurian (1999)** examined the trends in state finances and found failure to maintain wasteful expenditure and lack of enthusiasm to raise additional resources” on the part of the states are the main problems worrying most of the state finances.

**Anwar (2002)** explored that if exports remain stagnant, then devaluation has directly increased foreign debt in rupee and results in dramatic increase in debt service burden, lower economic growth and higher poverty level. It was argued that while designing a debt reduction strategy, it is crucial to address basic reasons that caused debt build-up and subsequent adverse effects on economic growth and poverty levels.
Pattillo et al. (2002) used data for 93 developing countries and found that debt appears to have a nonlinear effect on growth. The study also pointed out that the average impact of debt is negative on per capita.

Schclarek (2004) empirically examined the association between debt and economic growth for a number of industrial and developing nations. The study found that lower external debt levels are associated with higher economic growth rates. For industrial nations, the study did not find any significant association between gross public debt and economic growth.

Osinubi et al. (2006) examined the association between budget deficits and external debt in Nigeria over the period 1970 and 2003. The results of the study confirmed the existence of negative relationship between economic growth and external debt.

Abbas and Christensen (2007) examined the impact of internal debt on economic growth for 93 developing nations for the period of 1975 to 2004. The study found that there is a significant positive relationship between internal debt and economic growth.

Kibui (2009) studied the long run association between external debt and economic growth in Kenya by using annual data. The study found negative relationship between external debt and economic growth in case of Kenya.

Adofu and Abula (2010) examined the association between internal debt and economic growth in Nigeria for the period 1986-2005. It was found that internal debt has negatively affected the growth of the Nigerian economy.

Abbas and Christensen (2010) analyzed optimal domestic debt levels in low income countries (including 40 Sub-Saharan Africa countries) and emerging markets between 1975 and 2004. The study found that reasonable levels of marketable internal debt as a percentage of GDP have significant positive effects on economic growth.

Checherita and Rother (2010) explored the impact of government debt on per capita GDP growth in 12 Euro area countries for the time series data of 40 years. The study found a non linear impact of debt on growth with a turning point. Beyond the level of 70-80 percent of GDP, Debt has negative impact on long run growth. In
addition to this, the study explored that there is no significant relationship between public debt and budget deficit and suggested that debt should be reduced to enhance economic growth of the country.

**Kumar and Soumya (2010)** analyzed the past trends and policy measures to understand the possible implications for economic recovery and long run growth in Indian context. It was found that there was a positive relationship between GDP and public debt from 1980s. However, there seems to be a marginal downturn from 2007–2008 to 2009–2010, implying rising public debt has had a negative impact in these years.

**Reinhart and Rogoff (2010)** analyzed financial and economic data for 44 countries, spanning across 200 years. Their main findings were that different debt levels have varying effects on economic growth. In particular, they found out that there is a weak relationship between debt accumulation and GDP growth for debt-to-GDP ratios below 90%.

**Panizza and Presbitero (2014)** examined the impact of government debt on economic growth in OECD countries. The study used an instrumental variable approach and found the evidence of no correlation between public debt and economic growth in OECD countries.

**Tasos (2014)** empirically find the association between government debt and economic growth of Greece. The time covered for the analysis was from 1980-2010. Phillip- Perron, Augmented Dickey Fuller and KPSS (Kwiatkowski-Phillips-Schmidt-Shin) test was used to analyze the data. Result of Granger causality test reveals that there was no causality between public debt and economic growth in Greece.

**Kaur and Kaur (2015)** analyzed the relationship between public debt and economic growth in India for the period of 1981-82 to 2012-13. Granger causality test and multiple regression is used to analyze the time series data of 32 years. The study showed the positive and significant relationship between public debt and investment. In addition, the study adds that at 5 percent level of significance, there is positive relationship between public debt and economic growth in India during the analysis period.
Rana and Wahid (2016) tested the relationship between fiscal deficit and economic growth in Bangladesh for the period of 2000-2012. The results of ordinary least squares found that the fiscal deficit has statistically significant negative impact on economic growth in Bangladesh.

Kempa and Khan (2016) examined the direction of causality between government debt and economic growth in G-7 countries for the period of 1980 to 2013. The results of Toda and Yamamoto causality test showed that unidirectional causality is running from economic growth to government debt.

Baharumshah, et al. (2017) tested the sustainability of fiscal policy between the time periods of 1980–2014 in Malaysia. The results of Markov-switching model show that public debt above a certain limit (55 percent of GDP) affects the economic growth negatively. Furthermore, unidirectional causality was found from public debt to economic growth during the study period.

3.3 DATA AND METHODOLOGY

3.3.1 Data Specifications
The data was collected from various issues of Handbook of Statistics of Indian Economy, Reserve Bank of India. In order to run the model, this study used EVIWS-9. To capture the long– run impact of fiscal deficit and government expenditures on economic growth for India, this study used autoregressive distributive lag model. We used gross fiscal deficit, development expenditures and non-development expenditures as independent variables and economic growth as dependent variable.

3.3.2 Model Specification
In this study, the general functional form of the model for estimating the impact of fiscal deficit, development expenditures and non-development expenditures on economic growth is specified as Eq. (1).

\[ Y = f(D, DXP, NDXP) \]

Eq. (1)
Where $Y$ is GDP at market price, $D$ is the gross fiscal deficit as percentage of GDP, $D_{X}\text{P}$ is development expenditure as percentage of GDP, $N_{DXP}$ is non-development expenditure as percentage of GDP.

### 3.3.3 ARDL Bounds Testing Approach to Cointegration

This study adopts the autoregressive distributed lag (ARDL) framework to determine the long run relationship between economic growth ($Y$) and fiscal deficit ($D$), development expenditures ($D_{X}\text{P}$) and non-development expenditures ($N_{DXP}$). Rahman (2012), Ali et al. (2013) and Mohammadi et al. (2008) adopted ARDL methodology to investigate the relationship between government expenditures and economic growth in case of Malaysian, Pakistan and Turkish economies, respectively. This technique was developed by Pesaran and Shin (1995, 1998), Pesaran et al. (1996), Pesaran (1997) and further extended by Pesaran et al. (2001).

Eq. (2)

$$\Delta \ln Y = \beta_0 + \sum \beta_i \Delta \ln Y_{-i} + \sum \beta_{ii} \Delta \ln D_{-ii} + \sum \beta_{i} \Delta \ln D_{X\text{P}_{-i}} + \sum \beta_{i} \Delta \ln N_{DXP_{-i}} + \beta_i \ln Y_{-i} + \beta_i \ln D_{-i} + \beta_i \ln D_{X\text{P}_{-i}} + \beta_i \ln N_{DXP_{-i}} + \mu_i$$

Where

- $\Delta$ = operator of first-difference
- $\ln$ = represents natural logarithm transformation
- $\beta_0$ = intercept
- $t$ = represents time
- $\beta_1, \beta_2, \beta_3, \beta_4$ = short run dynamic association
- $\beta_5, \beta_6, \beta_7, \beta_8$ = long run dynamic association
- $\mu$ = white noise error term

In the ARDL model, the bounds test is adopted to determine whether the cointegration exists or not.
The bounds test considered jointly significance of $F$ statistic and the $\chi^2$ statistic of Wald test. The hypothesis to examine whether there exists cointegration between them is expressed as follows (based on Eq. 2):

$$H_0 : \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$$  
(No cointegration)

$$H_1 : \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq 0$$  
(Cointegration exists)

The null hypothesis of no cointegration is tested by examining the joint significance of the $F$ statistic of $\beta_5, \beta_6, \beta_7, \beta_8$. If calculated $F$ statistic > upper critical value, then the null hypothesis of no cointegration will be rejected. Cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) tests are used for long run stability of the parameters.

### 3.3.4 Vector Error Correction Model Granger Causality

After analyzing long run association, we applied the Granger causality test to check the causality relationships between the variables with the help of vector error correction model (VECM). In case of cointegration exists among the series, the VECM can be presented as follows (Shahbaz et al. 2015; Ohlan, 2015):

$$\begin{bmatrix}
\Delta \ln Y_t \\
\Delta \ln D_{t-1}
\end{bmatrix} = \begin{bmatrix}
\alpha_1 \\
\alpha_2 \\
\alpha_3 \\
\alpha_4
\end{bmatrix} + \begin{bmatrix}
\beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} \\
\beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} \\
\beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} \\
\beta_{41} & \beta_{42} & \beta_{43} & \beta_{44}
\end{bmatrix} \times \begin{bmatrix}
\Delta \ln Y_{t-1} \\
\Delta \ln D_{t-1} \\
\Delta \ln DXP_{t-1} \\
\Delta \ln NDXP_{t-1}
\end{bmatrix} + \begin{bmatrix}
\Delta \ln Y_{t-1} \\
\Delta \ln D_{t-1} \\
\Delta \ln DXP_{t-1} \\
\Delta \ln NDXP_{t-1}
\end{bmatrix} \times \begin{bmatrix}
\Delta \ln Y_{t-1} \\
\Delta \ln D_{t-1} \\
\Delta \ln DXP_{t-1} \\
\Delta \ln NDXP_{t-1}
\end{bmatrix} + \eta_t$$

Where

- $\Delta = \text{difference operator}$
- $\gamma_j (j = 1, 2, 3, 4) = \text{adjustment coefficients}$
- $\chi^2 = \text{homoskedastic error terms}$
- $\text{ECM}_{t-1} = \text{lagged error correction term generated from long run association}$

The long run causality between the variables is found by the significance of the coefficient of the $\text{ECM}_{t-1}$ by applying $t$-test statistic. The existence of a
significant relationship in first differences of the variables gives the evidence on the
direction of short run causality.

3.4 EMPIRICAL RESULTS AND DISCUSSIONS

3.4.1 Results of Unit Root Test

Many macroeconomic time series contain unit roots dominated by stochastic
trends (Nelson and Plosser, 1982). A number of tests are available to test whether
the variable is stationary or not. Among them, Augmented Dickey Fuller Unit root
test is the most common. We used ADF unit root test and the results in Table 3.1
show that lnD is stationary at I(0) and other variables are stationary at I(1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level t-statistic (prob.)</th>
<th>First Difference t-statistic (prob.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnY</td>
<td>-0.1396(0.9364)</td>
<td>-3.4124(0.0179)*</td>
</tr>
<tr>
<td>lnD</td>
<td>-6.8183(0.0000)*</td>
<td>-3.2151(0.0000)*</td>
</tr>
<tr>
<td>lnDXP</td>
<td>-0.3844(0.9006)</td>
<td>-4.6352(0.0008)*</td>
</tr>
<tr>
<td>lnNDXP</td>
<td>-2.1538(0.2261)</td>
<td>-5.1611(0.0002)*</td>
</tr>
</tbody>
</table>

Note: * Significant at 5% level
Source: Calculated by the Authors

3.4.2 Long Run Elasticities of ARDL Model

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnD</td>
<td>0.318589</td>
<td>0.150533</td>
<td>2.116407</td>
<td>0.0444*</td>
</tr>
<tr>
<td>lnDXP</td>
<td>0.072201</td>
<td>0.032598</td>
<td>2.214915</td>
<td>0.0361*</td>
</tr>
</tbody>
</table>
The results of Bound test are reported in Table 3.3 shows that F statistics value is greater than lower and upper bound which confirms that there is long run relationship among the variables at 5 percent level of significance.

The results of long run ARDL model are presented in Table 3.2. The results indicate that 1 percent increase in fiscal deficit will stimulate the economic growth by 0.33 percent. The results are consistent with the findings of other studies (Barro, 1991; Aschauer, 1989; Easterly and Rebelo, 1993; Munnell, 1990; Easterly et al., 1992; Gramlich, 1994; Gupta et al., 2002; Turnovskiy, 2004; Kumar et al., 2016). The results support Keynesian Hypothesis in India which asserts that fiscal deficit stimulates economic growth in developing countries. Further, the results show that impact of development expenditures on economic growth is positive and significant. The coefficient of development expenditure indicates that 1 percent increase in development expenditure will stimulate the economic growth by 0.07 percent. However, the impact of non development expenditures on economic growth is positive but insignificant. This is may be due to the fact that non development expenditures are dominated by defence and interest payment expenditures. Both of these expenditures are not productive and hence, do not contribute to economic growth.

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>4.201288*</td>
</tr>
</tbody>
</table>

**Table 3.3**

**ARDL Bounds Test Value**

<table>
<thead>
<tr>
<th>Significance</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>2.79</td>
<td>3.67</td>
</tr>
</tbody>
</table>

Note: * indicate significant at 5 percent level.
Further, the model passed all the diagnostic tests. In addition, the stability of ARDL parameters is tested by applying the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests. The plots of CUSUM and CUSUMSQ are depicted in Figures 3.2 and 3.3 respectively. A hasty look at Figures 3.2 and 3.3 reveals that the plots of both tests are within critical bounds at the 5% level of significance. That is the estimated parameters are stable and consistent.

**Figure 3.2**
Plot of Cumulative Sum of Recursive Residuals

![CUSUM Plot](image1)

Source: Calculated by the Authors

**Figure 3.3**
Plot of Cumulative Sum of Squares of Recursive Residuals

![CUSUM SQ Plot](image2)

Source: Calculated by the Author’s

### 3.4.3 Short Run Causality Results

After confirming the long run relationship, the next step is to determine short run causality between the variables. Table 3.4 shows that there is unidirectional causality running from fiscal deficit and development expenditures and non development expenditure to economic growth in short run. Hence, the results
confirm that in India, increase in fiscal deficit as a result of rising government expenditures leads to stimulate economic growth in short run.

Table 3.4
Short Run Causality Results

<table>
<thead>
<tr>
<th>Direction of causality</th>
<th>Short run (Wald Test $\chi^2$ statistic)</th>
<th>Long Run</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\sum \Delta \ln Y_{t-1}$</td>
<td>$\sum \Delta \ln D_{t-1}$</td>
</tr>
<tr>
<td>$\Delta \ln Y_t$</td>
<td>......</td>
<td>4.830947</td>
</tr>
<tr>
<td></td>
<td>(0.0193)*</td>
<td>(0.04412)*</td>
</tr>
<tr>
<td>$\Delta \ln D_t$</td>
<td>3.054993</td>
<td>......</td>
</tr>
<tr>
<td></td>
<td>(0.2171)</td>
<td></td>
</tr>
<tr>
<td>$\Delta \ln DXP_t$</td>
<td>0.534599</td>
<td>0.023829</td>
</tr>
<tr>
<td></td>
<td>(0.7654)</td>
<td>(0.9882)</td>
</tr>
<tr>
<td>$\Delta \ln NDXP_t$</td>
<td>3.905998</td>
<td>2.831518</td>
</tr>
<tr>
<td></td>
<td>(0.1418)</td>
<td>(0.2427)</td>
</tr>
</tbody>
</table>

Note: * Significance at the 5% level

3.5 CONCLUSION

The issue of potential association between fiscal deficit, government expenditures and economic growth is of vital importance for policy making. However, this issue is contentious among researchers. This study is an attempt to examine the impact of fiscal deficit and government expenditures on economic growth in India for the period of 1980-2014. This study uses the ARDL method and Vector Error Correction (VEC) Granger Causality Model. ADF unit root test is used to check the integration of the variables under consideration. We found that all
variables are stationary at first difference except fiscal deficit which is stationary at level. Using ARDL econometric technique, the study found that there is a long run relationship between fiscal deficit, development expenditures and economic growth. The results indicate that 1 percent increase in fiscal deficit will raise the economic growth by 0.33 percent. The results also demonstrate that non-development expenditures do not contribute significantly to economic growth in long run. In addition, there is short run unidirectional causality running from fiscal deficit, development expenditure and non-development expenditures to economic growth. Thus, the study indicates that high level of fiscal deficit is not bad for economic growth in India. Further, the results support the Keynes view that government expenditures stimulate economic growth.