This Chapter examines the relationship between fiscal deficit, private capital formation and crowding out in India. This chapter is divided into eight sections followed by introduction. Section 2 explains the theoretical framework of the study. Section 3 discusses the mathematical explanation of IS-LM model and Keynesian multiplier. Section 4 discusses the trends in fiscal deficit and private capital formation in India. Section 5 encapsulates the review of recent studies. Section 6 explains the rationale of the study. Section 7 describes the model for the study. Findings and conclusions of the study are discussed in Section 8.

6.1 INTRODUCTION

The impact of fiscal deficit on private investment becomes crucial for the effectiveness of fiscal policy. Fiscal policy provides additional spending in the world of sparse spending opportunities, but it doesn’t provide a new source of finance in countries where spending is constrained by scarcity of resources. The excess of government expenditures over its revenues are financed in the debt market in competition with private investors, hence crowd out private investments (Culbertson, 1968). Since the time of Adam Smith, many economists had argued the effects of government expenditure on private investment. 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 crowd out private investment. Financing of fiscal deficit whether through taxes, issuance of debt or money printing will lower the resources available for private sector lead to decrease the private capital formation in the country. 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. In this context, there are two different views in literature known as crowding-out effect and crowding-in effect (Lekha, 2003). Further, there are mainly two variants of crowding out in an economy at theoretical level. The first type is real crowding out also termed as direct crowding out that occurs with the reduction of the physical resources available for private sector. The other perspective of crowding out known as indirect crowding out also known as financial crowding out occurs due to upward pressure on the rate of interest induced by bond financing of fiscal deficit or high government borrowings. The issue of crowding out-in has been explored in a number of studies so far. Theoretical debates and studies on this issue initiated by Adam Smith (1776), continued by Keynes (1929), Bailey (1971), Buiter (1977), Romer (1986) and Lucas (1988). Ramirez (1994), Greene and Villanueva (1990), Aschauer (1989), and Erenburg (1993) found that public investment and private investment have a complementary relationship; while Blejer and Khan (1984), Cebula (1978), Shafik (1992), Parker (1995), Ostrosky (1979), Tun Wai and Wong (1982), Sunderrajan and Takur (1980), Pradhan, et al. (1990), Krishnamurty (1985), Kulkarni and Balders (1998), and Alesenia, et al. (2002) did find evidence for crowding out between public and private investment.

Furthermore, worldwide acceptance of Keynesian IS-LM model, illustrate the effectiveness of fiscal and monetary policy and explains fluctuations in output and interest rate. Crowding out-in of private investment depends on the model’s parameters and on the slope of IS-LM curves. Shift in IS curve to right due to increase in government expenditure leads to increase the interest rate. It is also important to note that persistent fiscal deficit as a result of tax cut or increase in government expenditure, results in expansion of aggregate demand. Despite, it accelerate the private saving but it is less than the tax cut; so the desired national saving declines. As a result, real rate of interest will rise to restore equality between national saving and demand for investment. This will crowd out private investment. As the issue of crowding out is very crucial for the effectiveness of fiscal policy of the government, hence there is need to investigate the relationship between private
capital formation, fiscal deficit, money supply and real interest rate. So, in order to check the effectiveness of fiscal policy, it become essential to investigate the issue of crowing out/in in detail by incorporating IS-LM model and Keynesian investment multiplier.

6.2 THEORETICAL BACKGROUND

There are three different views regarding crowding-out/in effect of government spending. These are the Neo-classical, Keynesian and Ricardian views. 

**Neo classical view** asserts that increase in government spending crowds out private investment. This view advocates that public expenditure is less productive than private investment, hence increased output as a result government spending is less than crowding out effect of private investment on output, thus reducing GDP (Majumder, 2007). The second view, known as **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. Therefore, 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. According to fiscal multiplier, increase in government expenditure would create greater change in the output level of the economy (Sen and Kaya, 2014). Hence, public spending crowd-in private investment. Further, in ‘The General Theory of Employment, Interest and Money’, Keynes explained the working of multiplier. The concept of multiplier may be formalized as $\Delta Y = k \Delta I$ where $\Delta Y$ is the change in income and $\Delta I$ postulates change in investment expenditure by government and $k$ is the size of multiplier. The third view on crowd-out/in effects is the **Ricardian view** based on Ricardian Equivalence theorem. This view advocates that private investment and public investments behave independently, therefore neither crowd-in nor crowd-out relationship exist between the two. According to this view, economic agents anticipate the increased impact of government spending. They realized that government will finance the increased spending by the revenue generated through future taxes. Therefore, they would not change their current income and
consumption. Thus the relationship between interest rate and private investment remain unchanged.

Most studies analyzed the effect of public expenditure on private investment and output, remained focused on the developed economies and limited attempt has been made to examine the issue from perspective of the developing countries. Motley (1983) analyzed that fiscal deficit financed by borrowing from private sector leads to increase the supply of government bonds and results in rise in interest rate, which crowd out private investment. A more recent study conducted by Mahmoudzadeh et.al. (2013) used panel data of 23 developed and 15 developing countries for the period of 2000-2009. They found that fiscal deficit crowd-out private investment in developed countries but crowd-in in developing countries. Further, Furceri and Sousa (2011) by using panel data of 145 countries (developed and developing) over the period of 1960-2007 found that government expenditure creates crowd-out effect. Sen and Kaya (2014) found that government transfer spending, government current spending and government interest payment crowd-out private investment but government capital spending crowd-in private investment in Turkey. A recent study of Singh (2012) supports for the significant crowding-in effects of public capital on private capital in India.

6.2.1 IS-LM model perspective against Keynesian View

The IS-LM model, introduced by Sir John Hicks is used to explain fluctuation in output and interest rate and to examine the effectiveness of fiscal and monetary policy for economic stabilization. However, there exists slight difference related to the influence of deficit spending on the economy, between Keynesian model and IS-LM model. Keynes advocates that government spending may actually crowd-in private investment through multiplier and accelerator effect. Keynes argues that government spending on productive purposes leads to increase in the potential output. On the other hand, IS-LM model explains that increase in fiscal deficit as a result of increased government spending leads to increase the interest rate(assuming money supply remain constant), so crowd out private investment. These effects are demonstrated in Figure 6.1 and 6.2.
IS-LM model helps in explaining the crowding out-in effect of fiscal and monetary policy that can influence the level of economic activity. In Figure 6.1, it is reflected that increase in government expenditure which is autonomous, raises aggregate demand for goods and services by shifting the IS curve to right. It is worth noting that the horizontal distance between IS and IS\(^1\) is equal to Keynesian multiplier. The initial rate of interest is \(R_1\) which is the intersection of IS and LM curve. The expansionary fiscal policy of government shows that increase in government expenditure raises interest rate and national output from \(Y_1\) to \(Y_2\) (assuming LM curve remaining unchanged). But this change in national income is less than change in government expenditure (\(\Delta G \times \frac{1}{1-mpc}\) ). Thus increase in government expenditure crowd out some private investment due to increased interest rate.

**Figure 6.1**

![Figure 6.1](https://via.placeholder.com/150)

**Figure 6.2**

![Figure 6.2](https://via.placeholder.com/150)
Through making appropriate changes in monetary policy, government can influence the economic activity. In IS – LM model, when economy is in the grip of recession, government increases money supply to control the interest rate. Change in the money supply causes rightward shift in the LM curve. It will lower the interest rate from \( R_2 \) to \( R_1 \). As a result, there will be more investments at lower rate of interest. Increase in the investment will result in rise in aggregate demand. This will shift the whole aggregate demand curve (C+I+G+XM) upward and economy will move to new equilibrium point from \( Y_2 \) to \( Y_3 \). Thus IS-LM model shows that the expansion in the money supply lowers the interest rate and increase investment. Government can influence the economic activity through proper mixture of fiscal and monetary policy to cure inflation and recession. Figure 6.2 explains Keynes potential leakage that is based on business expectation in which inefficient government spending may crowd out private investment. The basic business psychology behind this is that government expenditure on non development programmes may decrease the marginal efficiency of capital. If the increase in government spending (shown by the upward shift of IS to IS\(^1\) in Figure 6.2) has an adverse effect on liquidity preference, the LM curve will shift in left (LM\(^1\)) and income increases only from \( Y_1 \) to \( Y_2 \). Thus government spending increases the interest rate and expands the national output only with a small amount.

### 6.3 MATHEMATICAL EXPLANATION OF IS-LM MODEL AND KEYNESIAN MULTIPLIER

The IS-LM model is used to illustrate the effectiveness of fiscal and monetary policy and also to explain the slope of IS (investment saving) and LM (liquidity preferences-money supply) that causes changes in output by given change in money supply and fiscal spending. Disequilibration in goods or money market (\( Y \neq D \) or \( \frac{M_D}{P_0} \neq \frac{M_d}{P_0} \)) in economy will be adjusted by changing output or changing rate of interest respectively which is presented in the subsequent equations.
\( \bar{Y} = \alpha(Y - D) \) \hspace{1cm} \text{Eq. 1}

\( \bar{r} = \beta\left(\frac{M_0}{P_0} - \frac{M_{d,0}}{P_0}\right) \) \hspace{1cm} \text{Eq. 2}

\( \alpha < 0 \) and \( \beta < 0 \)

\( \bar{Y} = \alpha(Y - A_0 - c(1-t)Y - I_r) \)

\( \bar{r} = \beta\left(\frac{M_0}{P_0} - hY - l_r\right) \)

Where \( \alpha \) and \( \beta \) show the speed of adjustment in output and rate of interest respectively. \( Y \) is the national output, \( \bar{Y} \) is the required change in output and \( \bar{r} \) is the required change in the rate of interest. \( \frac{M_0}{P_0} \) is the supply of money and \( \frac{M_{d,0}}{P_0} \) is the demand for money in the market. Whenever there is disequilibrium in goods market, output adjusts to meet the equilibrium. Goods market will be in equilibrium when demand for goods will be equal to supply of goods. Similarly, the money market will be in equilibrium when demand for money and supply of money are equal. If supply of money is greater than demand for money, bank will not pay high interest rate to the depositors; hence will reduce the rate of interest. \( I_r \) represents investment demand for money as a function of interest rate. The goods market is defined in equation 3.

\( Y = A_0 + c(1-t)Y + I_r \) \hspace{1cm} \text{Eq. 3}

Supply of money and demand for money equilibrium is shown in Eq 4, where \( h \) represents the income responsiveness of the demand for money, that is the function of \( Y \), and \( I_r \) is the speculative demand for money a function of rate of interest.

\[ \frac{M_0}{P_0} = hY + l_r \] \hspace{1cm} \text{Eq. 4}
In order to get the result of increase in government expenditure, we well differentiate both the equations IS as well as LM (assuming supply of money to be constant or no change in LM curve):

\[ IS: \Delta Y = \Delta G + c(1-t)\Delta Y + I_r\Delta r \]  \hspace{1cm} \text{Eq. 5}

\[ LM: 0 = h\Delta Y + I_r\Delta r \]  \hspace{1cm} \text{Eq. 6}

\[ \Delta r = -\frac{h\Delta Y}{I_r} \]

By substituting the value of \( \Delta r \) we will get the equation 7

\[ \Delta Y = \Delta G + c(1-t)\Delta Y + I_r\left(-\frac{h\Delta Y}{I_r}\right) \]

\[ \frac{\Delta Y}{\Delta G} = \frac{1}{(1-c(1-t) + \frac{I_r h}{I_r})} \]  \hspace{1cm} \text{Eq. 7}

Here \( \frac{\Delta Y}{\Delta G} \) is government expenditure multiplier and the value of \( \frac{I_r h}{I_r} > 0 \) because both \( I_r \) and \( l_r \) are negative (decline in private investment and reduction in demand for money in response of high interest rate). Thus increase in government expenditure increases the interest rate resulting in decrease in demand for investment and demand for speculative purposes results in crowd out private investment.

As per IS-LM model, equation 7 can be used to calculate the crowd out effect which explains that increase in government expenditure results in increase in the interest rate (money supply is constant), further increases the cost of borrowings for private sector and causes decline in the national output.

Case 1: Further, effectiveness of monetary policy can be obtained by differentiating equation 5 and equation 6 as a result of change in money supply.
\[ \Delta Y = c(1-t)\Delta Y + I_r, \Delta r \]  
------------------------ Eq. 8

\[ \frac{\Delta M}{P_0} = h\Delta Y + I_r, \Delta r \]

\[ \Delta r = \frac{\left( \frac{\Delta M}{P_0} - h\Delta Y \right)}{I_r} \]

Substituting the \( \Delta r \) in equation 8, then the required change in output is depicted in equation 9

\[ \Delta Y = c(1-t)\Delta Y + \frac{I_r}{l_r} \left( \frac{\Delta M}{P_0} - h\Delta Y \right) \]  
------------------------ Eq. 9

\[ \frac{\Delta Y}{\Delta M} = \frac{I_r}{l_r P_0} \times \frac{1}{\left[ 1 - c(1-t) + \frac{I_r h}{l_r} \right]} \]  
------------------------ Eq. 10

If \( \frac{\Delta Y}{\Delta M} > \frac{\Delta Y}{\Delta G} \) means monetary policy is more effective. We can say that impact of increase in money supply on output is multiple of \( \frac{I_r}{l_r P_0} \). This implies that if government adopts expansionary monetary policy, this will decrease the interest rate, hence crowd-in private investment. These all together increase the national output.

and if the value of \( \frac{I_r}{l_r P_0} = 1 \) then value \( \frac{\Delta Y}{\Delta G} = \frac{\Delta Y}{\Delta M} \) will be equal.

**Case 2:** Effectiveness of fiscal policy means greater change in income due to change in government expenditure. This can be illustrated with the help of IS-LM model

a) Irresponsiveness of private investment or if \( I_r \to 0 \)
As the slope of IS: \( \frac{1-c(1-t)}{I_r} \)

When private investment does not change with change in interest rate, then IS will be vertical or steeper and the value of multiplier will be given as

\[
\frac{\Delta Y}{\Delta G} = \frac{1}{1-c(1-t)}
\]

The above equation implies the effectiveness of fiscal policy as the entire bunch (\( \frac{I_r h}{I_r} = 0 \)) is zero.

b) If \( \Delta r = 0 \) (assuming that Government doesn’t change interest rate or interest rate is held constant)

In this case investment does not change because rate of interest doesn’t increase, so the value of multiplier will be

\[
\frac{\Delta Y}{\Delta G} = \frac{1}{1-c(1-t)} \text{ as } \frac{I_r h}{I_r} = 0
\]

Because \( \Delta r = -\frac{h \Delta Y}{I_r} = 0 \)

In order to restore the interest rate constant, the money market will be in equilibrium by increasing the money supply in the market (differentiating equation 4, we get the following equation

\[
\Delta M = P_0 h \Delta Y
\]

This equation gives the required change in money supply to make the interest rate constant and in this case fiscal policy will be more effective.

c) If LM is horizontal or flat

The slope of LM defines the effectiveness of fiscal policy. When LM is flat or horizontal line is known as liquidity trap meaning that \( I_r \to -\infty \) then \( \frac{-h}{I_r} = 0 \)
Slope of LM is $\frac{\Delta r}{\Delta Y} = \frac{-h}{I_r}$

Hence the value of government expenditure multiplier will be as below by making the whole bunch $\frac{I_h}{I_r} = 0$

$$\frac{\Delta Y}{\Delta G} = \frac{1}{[1-c(1-t)]}$$

Here the value of multiplier will be stronger and increase in government expenditure will have multiplier impact on output. This implies that fiscal policy will be more effective or no crowding out of private investment. But Keynes supports only effectiveness of fiscal policy whereas IS-LM model advocates effectiveness of fiscal and monetary policy.

As per IS-LM model, in order to combat with financial crowding out, proper combination of fiscal and monetary policy should be formulated. So government should control over increased interest rates by formulating effective monetary policy.

6.3.1 Financing of Fiscal Deficit: IS-LM Model Perspective

When taxes and non-tax revenue are not sufficient to meet government expenditure, then fiscal deficit of the Government, has to be financed either by borrowing from the market (bond financing) or from the Reserve Bank of India (printing of money). The fiscal deficit is financed by borrowing from the Reserve Bank which issues new money or currency against government securities, which results in expansion in money supply. The impact of three different ways of financing is explained below

6.3.1.1 Bond Financing Government Expenditure

What really happens in the case of bond financing depends to a large extent on the movement of rate of interest. If the rate of interest remains constant, then there will be expansionary income effect as people feel wealthier by having large
bonds. However, if it increases interest rate, the expansionary income effect will be countered by

a) Reducing income effect as price of government security inversely related with interest rate

b) Rise in interest rate may crowd out private investment

c) Transfer of funds from consumption to saving leads to decrease aggregate demand

The implication of bond financing is explained by IS-LM model

\[
\frac{\Delta Y}{\Delta G} = \frac{1}{[1-c(1-t) + \frac{I_h}{l_r}]}
\]

As fiscal deficit financed by bond reduces private investment and consumption, this will lower the value of multiplier. There will be crowd out private investment as the resources are channelled from banks (saving of people) to government bonds.

6.3.1.2 Tax Financing Of Government Expenditure

The impact of government financing through taxes rearrange the IS-LM equation as follows

IS: \[\Delta Y = \Delta G + c\Delta Y - c\Delta T + I_h\Delta r\] \[\quad \text{--------- Eq.14}\]

LM: \[0 = h\Delta Y + I_r\Delta r\] \[\quad \text{--------- Eq.15}\]

\[\Delta r = \frac{-h\Delta Y}{I_r}\]

Money supply assumed to be constant and further replacing the value of \(\Delta r\) in IS equation 14, the value of multiplier will be

\[
\frac{\Delta Y}{\Delta T} = \frac{1-c}{(1-c + \frac{I_h}{l_r})} \quad \text{---------Eq.16}\]
The above value of government expenditure multiplier shows that the value of tax multiplier is less than one as the denominator is addition of extra term. It will be called balanced budget multiplier if

\[ \frac{I_h}{I_r} = 0 \] and this is possible if \( I_r = 0, I_r = -\infty \)

As the taxes are involuntary transfer of resources from private investment to government and when private investor see increasing portion of their income is taken by the government, they will lose their incentive to produce more, hence crowd out private investment that become leakage to tax multiplier.

### 6.3.1.3 Monetization of Deficit

When government tax revenues are not sufficient to offset its deficit, the government may borrow from Reserve Bank of India against its own securities like treasury bills. This will lead to increase the aggregate demand of the community to a greater extent. The value of multiplier will be more in comparison of bond financing and tax financing. 

If \( \Delta G = \frac{\Delta M}{P_0} \)

Then by differentiating IS and LM equations

\[
\Delta Y = \Delta G + c(1-t)\Delta Y + I_r\Delta r
\]

\[
\frac{\Delta M}{P_0} = h\Delta Y + l_r\Delta r
\]

\[
\Delta r = (\frac{\Delta M}{P_0} - h\Delta Y)l_r
\]

By substituting the value of \( \Delta r \), the following equation is obtained:

\[
\Delta Y = \Delta G + c(1-t)\Delta Y + \frac{I_r}{l_r} (\frac{\Delta M}{P_0} - h\Delta Y)
\]

Put \( \Delta G = \frac{\Delta M}{P_0} \)

Now the value of multiplier will be as bellow
\[
\frac{\Delta Y}{\Delta G} = \left(\frac{1 + \frac{L^c}{L^r}}{1 - c(1 - r) + \frac{L^h}{L^r}}\right)
\]  

----------- Eq. 17

The value of government expenditure (equation 17) multiplier will be larger (without any assumption) than bond financing and tax financing because rise in government expenditure along with increase in money supply in the economy (pumping more money) reduce the rate of interest, induce the private investors to start new projects. This dual impact on demand can create upward pressure in prices and create inflationary pressure in the economy. The effectiveness of fiscal and monetary policy is portrayed in Figure 6.3.

**Figure 6.3**

Effectiveness of Fiscal and Monetary Policy

It is depicted in Figure 6.3 that government increases expenditure as a result of expansionary fiscal policy causing an upward shift in IS curve from IS\(^1\) to IS\(^2\).
Here, the rate of interest will not increase as government is using money financing to offset the deficit. Thus, not only IS shift but also shifting the LM curve to right. Now with increase in money supply, $LM_1$ curve shift to right to $LM_2$. So there is no crowding out as rate of interest will not increase due to increase in money supply. In addition, this will increase the overall output from $Y_1$ to $Y_3$. But total increase in output was only $Y_1$ to $Y_2$ without implementation of proper monetary policy. Generally the effectiveness of fiscal policy and monetary policy is different in different countries as every country has different economic system and different response towards business cycles.

6.4 OVERVIEW OF FISCAL DEFICIT AND PRIVATE CAPITAL FORMATION TRENDS IN INDIA

During the last six decades after independence, Indian economy had progressively accelerated the GDP growth rate from an average of 3.5 per cent (Hindu Growth Rate) per year for the period of the first three decades of planning (1950 to 1980) to 5.4 per cent during the 1980s and 5.7 per cent during the 1990s and further 7.6 per cent during the 2000s (National Accounts Statistics (2004-05 back series)). A relatively high and long-run sustainable rate of growth depends upon improvements in the supply-side of the economy. As investment is the most critical supply side factor of the economy and it is also a necessary condition to have a higher level of investment for ensuring high growth momentum in the economy. Basically, investment of the country is measured by Gross Capital Formation (GCF) that comprises of Gross Fixed Capital Formation (GFCF) and Change in Stock (CIS). Private investment is a key channel for the effectiveness of fiscal policy and improving economic growth of the economy.
The analysis of Figure 6.4 shows the movement of gross domestic private capital formation and fiscal deficit as the percentage of GDP since 1980-81 to 2012-13. It must be observed that over the period, gross domestic private capital formation showed an increasing trend whereas fiscal deficit as the percentage of GDP showed decreasing trend. The rapid increase in private sector investment in the aggregate investment is in large part a reflection of the impact of the reforms initiated in the 1990s, which reduced restrictions on private investment and created a more favourable investment environment. Higher retained profits along with availability of resources from the banking sector facilitated by the lower financing requirement of the Government and the increased access to the domestic and international capital markets led to a sharp increase in the investment rate of the private corporate sector. Gross domestic private capital formation as the percentage of GDP was 2.51 percent in 1980-81 increased to 6.62 percent in 1992-93. It reached at a higher level of 9.91 percent in 1995-96. Acceleration in private investment did suffer a hindrance since the year 2008-09 and rate of private investment has declined gradually to 9.15 of GDP in 2012-13 from the peak level of 17.30 achieved in 2007-08. On the other hand, fiscal deficit as the percentage of GDP was 5.54 percent in 1980-81 increased to 8.13 percent in 1986-87, then showed considerable decline till 1996-97 and
reached at 5.98 percent in 2001-02. After enactment of FRBM Act 2003, it showed decreasing trend till 2007-08 but after economic crises of 2008, it increased to 6.46 percent in 2009-10. It was highest in this decade.

Table 6.1
Decade Wise Analysis of Gross Domestic Private and Public Capital Formation in India

<table>
<thead>
<tr>
<th>Average of Decade</th>
<th>Gross Domestic Private Capital Formation( % of GDP)</th>
<th>Gross Domestic Public Capital Formation( % of GDP)</th>
<th>Fiscal Deficit (% of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980s</td>
<td>4.3</td>
<td>11.11</td>
<td>6.55</td>
</tr>
<tr>
<td>1990s</td>
<td>7.01</td>
<td>8.77</td>
<td>5.71</td>
</tr>
<tr>
<td>2000s</td>
<td>10.14</td>
<td>7.84</td>
<td>4.76</td>
</tr>
</tbody>
</table>

Source: Handbook of Statistics of Indian Economy, RBI and Author’s calculation

The performance of the private and public sectors can be assessed by the rate of capital formation. Table 6.1 shows that there was an increase in the volume of private capital formation from 1980 to 2010. The annual average of private capital formation was 4.3 per cent of GDP during 1980s. However, it increased to 7.01 percent of GDP during post reform period i.e., 1990 to 1999, followed by 10.14 percent in next decade. In contrast, average gross domestic capital formation as the percentage of GDP continued to decline and came down to 8.77 in nineties from 11.11 in 1980s. The analysis has shown that the rate of capital formation in public sector reached at 7.84 percent in 2000s. The rate of capital formation has been increasing in the private sector after 2000 at the expense of the public sector. The Table 6.1 showed that annual average of fiscal deficit as the percentage of GDP was 6.55 percent in 1980s which came down to 5.71 percent of GDP in 1990s. It reached at 4.76 percent in during the period of 2000-01 to 2009-10.
Figure 6.5
Modes of Financing Fiscal Deficit in India

Note: 1. Drawdown of cash balances represent variation in treasury bills issued net of changes in cash balances with RBI up to March 31, 1997
2. Market Borrowing include dated securities and 364-day treasury bills.
3. Other borrowings comprise small savings, state provident fund, special deposits, reserve funds, treasury bills excluding 364-day treasury bills etc.

Figure 6.5 demonstrate the financing pattern of fiscal deficit in India since 1980. In 1980-81, the share of market borrowings in total borrowing requirement was 32.28 percent, showed a declining trend till 1992-93. Then it increased to 71.78 percent in 2002-03, further increased to 102.91 in 2007-08. The dependence on market borrowing to offset fiscal deficit was approximately 90 percent in 2013-14. The dependence on other borrowing was 22.44 percent in 1980-81, increased to 63.25 in 1997-98. It reduced to 10.37 in 2006-07 and reached at 3.46 in 2009-10. The dependence on government’s own cash balance to finance its expenditure was 29.85 in 1980-81. Government used cash balances to offset its fiscal deficit only till 1997 except few years after that. It reached at 2.86 percent in 2013-14. The heavy dependence on market borrowing is reason for high interest rate that results in slow growth of manufacturing sector in India.
Table 6.2

Decade Wise Analysis of Mode of Financing Fiscal Deficit (% of Gross Fiscal Deficit) in India

<table>
<thead>
<tr>
<th>Decadal Average</th>
<th>Market Borrowings</th>
<th>Other Borrowings</th>
<th>Draw down of Cash Balances</th>
<th>External Finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980s</td>
<td>26.89</td>
<td>41.47</td>
<td>21.91</td>
<td>9.72</td>
</tr>
<tr>
<td>1990s</td>
<td>37.27</td>
<td>43.79</td>
<td>13.04</td>
<td>5.89</td>
</tr>
<tr>
<td>2000s</td>
<td>73.41</td>
<td>26.37</td>
<td>-2.5</td>
<td>2.71</td>
</tr>
<tr>
<td>2010-2015</td>
<td>93.19</td>
<td>5.49</td>
<td>-1.14</td>
<td>2.46</td>
</tr>
</tbody>
</table>

Note: Authors own calculations

Table 6.2 reveals the decadal average of mode of financing fiscal deficit in India since 1980-81. The average dependence on market borrowings reached at 93.19 (2010-2015) percent from 26.89 percent in eighties. The dependence on external borrowings decreased from 9.72 percent to 2.46 percent in last three decades.

6.5 REVIEW OF LITERATURE

Cebula (1978) investigated crowding out effect of budget deficit in US and Canada over the time period of 1949 to 1976. He used IS-LM model and found that budget deficit crowd out private investment in USA and Canada.

Blejer and Khan (1984) empirically tested the crowding out effect of budget deficit in 24 developing countries over the period of 1971-79. By using Flexible Accelerator Model, they found that change in public investment crowd out private investment.

Krishnamurty (1985) empirically tested the impact of public infrastructure investment on private investment in India over the period of 1975-90. By using Sectoral Model, the study found that infrastructure investment crowd in private investment in almost all sectors.

Pradhan et al. (1988) used Computable General Equilibrium Model to find the relationship among interest rate, modes of financing public investment, money creation, market borrowings and taxation in India over the time period of 1960-
1990. The study found that crowding out effect varies with way of financing the public investment.

Aschauer (1989) point out that higher public investment may raise the marginal productivity private capital and which results in crowd in private investment. It all depends on whether the budget deficit is incurred for recurrent or productive purposes.

Aschauer (1989a, 1989b) found that government spending may increase the marginal productivity of private capital and, thus, “crowd-in” private investment.

Basanta et al. (1990) explored the relationship between public and private investment in India. In order to know the extent of relationship between these two variables, Computable general equilibrium model was used and the empirical results showed that government investment crowd-out private investment and it depends upon the way of financing the fiscal deficit.

Sunderarajan and Takur (1990) tried to find out the link between public and private investment in India and Korea over the period of 1960-78. The study was based on neoclassical model and the results showed that crowing out effect had occurred in India whereas there has complementary relationship between public and private investment in Korea.

Greene and Villanueva (1991) used neoclassical model to find the relation between gross public capital formation and private investment. The study is based on the data over the period of 1975-1987 and covered 23 developing countries. It was found that gross public capital formation crowds in private investment.

Gupta (1992) tested the Ricardian Equivalence Hypothesis (REH) in ten Asian countries including India, Indonesia, Sri Lanka and Phillipines over the period of 1960-1985. The results showed that except India, all Asian counties have crowd-out effect. The study rejected the Ricardian Equivalence Theorem in case of for Sri Lanka, India, Indonesia, and Philippines among 10 Asian countries.

Shafik (1992) investigated the crowding in effect in Egypt over the period of 1970-1988. The study found that public investment crowd out private investment and it is the interest rate that determines the private investment.
Easterly and Rebelo (1993) investigated the impact of public investment on private sector investment in developing and developed countries during the period of 1970-1988. By using cross section analysis, it was found that public investment crowd-in private sector investment.

Ramirez (1994) investigated the impact of public investment on private investment in Mexico over the period of 1950-1990. By using Flexible Accelerator Model, it was found that public investment crowd in private investment.

Erenburg and Wphar (1995) explored the dynamic relationship between private investment and government investment spending. Granger causality test was used on the annual data of USA for the period of 1954-1989. The study found a positive relationship between government infrastructure spending and private investment.


Mohanty (1995) using Ricardian Equivalence Theorem found that government consumption and transfer payments have positive impact on private consumption while public investment and interest payments have negative impact on private consumption in India. The study used data over the period of 1960-1990.

Monadjemi (1996) empirically tested the causal relationship between fiscal policy measures and private investment in UK and USA during the period of 1960-1991 and 1963-1991 respectively. Variance decomposition derived from Error Correction Model showed that the relationship between the above two variables is insignificant in short run.

Bajo-Rubio et al. (1997) explored the causal relationship between government expenditure and private investment in 14 OECD countries. The study found that government expenditure on infrastructure creates positive and significant impact on productivity of private capital. The study further added that government’s decision to cut government expenditure in order to reduce fiscal deficit results in negative impact on growth of the country.
Sankar (1997) used accelerator model over the period of 1960-94 in India and found that infrastructure investment crowds in private investment.

Monadjemi and Huh (1998) examined the association between private investment and public spending in UK, USA, and Australia for the time period 1970-1991. The study found that there is a narrow support for “crowding out” effects of public investment on private investment.

Ahmed and Miller (1999) explored the relationship between government spending and private investment. They used Lagrange-multiplier test, Random-effect model and Ordinary Least Square (OLS) for 39 countries. These countries include both developing and developed economies. The study covered the time series data for the period of 1975-1984. The study explored that openness has a significant effect on investment in developing countries. Government expenditure on infrastructure like for transport and communication has positive and significant impact on private investment in developing economies only. Government expenditure on social security program crowd-out investment in both developed and developing countries.

Bahmani and Oskooee (1999) used quarterly data from the U.S. over 1947–1992 period and used Johnson Cointegration analysis and estimated an investment function. The results revealed that there are three cointegrating vectors among investment, income, interest rate, and the budget deficits. Further investigations showed that a cointegrating vector in which all four variables carry their expected signs support the Keynesian view that the U.S. real federal deficits crowds-in real investment in the long run.

Bahmani (1999) conducted a study in USA to know the impact of federal fiscal deficit on real investment for the time period of 1947-1992. Cointegration test was used to find out the long run relationship between these variables. The results showed that real fiscal deficit crowd-in real private investment in long run.

Cruz and Teixeira (1999) explored crowding out effect of government investment on private investment in Brazil for the period of 1947-1990. They used Cointegration test and summarized that in short run, private investment is crowded
out by public investment but the coefficients of the cointegration vector indicate that they are complementary to each other in long run.

**Fatas and Mihov (2001)** by using VAR analysis in USA over the period of 1963-2000, found that investment does not react significantly to increases in government spending. The study also found that increases in government spending are expansionary with a multiplier larger than one, i.e. output increases more than one-to-one. This increase is largely driven by increases in private consumption.

**Ho (2001)** examined the link between public and private investment in Taiwan for two different time periods i.e. 1968-1980 and 1980-1999. The study used Chow test and found that public expenditure has positive impact on private investment during the period of 1968 to 1980 while there was negative impact (crowd-out) during the period of 1980-1999.

**Laopodis (2001)** examined the dynamic association between private investment and public investment spending in emerging European economies. The study found that government expenditures have positively contributed to private sector investment.

**Mittnik and Neumann (2001)** examined the causal relationship between private investment and output in six developed countries (Canada, France, the UK, Netherlands, Japan, and Germany) for the period of 1955-94. They used vector autoregressive (VAR) model and found that there is absence of crowding out effect in the six industrial countries. In addition to this, their findings demonstrate that government investment triggered an increase in private investments in three countries out of six countries.

**Alesina et al. (2002)** explored the relationship between fiscal spending and private investment in eighteen OECD countries. The study used unit root test, VAR analysis and Tobin’s Q model to analyze the time series data over the period of 1960-1996. They found that government spending has negative effect on wage component of private investment.

**Voss (2002)** investigated crowding-out effect of government investment on private investment in Canada. The data used for the study covers quarterly data.
during 1947-1988. The study used vector autoregressive (VAR) model to analyze the data and found that public investment crowd out private investment.

**Bilgili (2003)** invested the causal relationship between government expenditure and private investment in Turkey over the period of 1988-2003. VECM (Vector Error Correction Model) and impulse response function test were used to know the relationship between these two variables. The major findings of the study are that government investment crowd-out private investment whereas there is positive relationship between current spending and private investment.

**Albatel (2004)** examined the crowd-in and crowd-out effect in Saudi Arabia during the period of 1970-2000. The data was empirically tested by using different econometric tools like cointegration, VECM, variance decomposition test and impulse response function test. The empirical findings indicate that government budget deficit has a crowding-out effect on private investment. Thus there is negative relationship between the above two variables.

**Narayan (2004)** investigated whether government investment crowds out or crowds in private investment in Fiji over the period 1950–2001. They used the Error Correction Mechanism (ECM) test and found that government and private investments are cointegrated over the period 1950–1975, but not for the period 1976–2001. They also found out that in the former period (1950-1975) government investment crowded in private investment, while in the latter period (1976-2001), the relationship between government and private investments has been statistically weak.

**Atukeren (2005)** investigated the crowding out effect of public investment on private investment in 25 developing countries for the period of 1970-2000. The results of Granger Causality and cointegration tests revealed that high government involvement in the economy results in restriction on trade and use of foreign currency. The study found that ten out of eleven countries had crowding out effects and thirteen out of fourteen countries had no crowding out.

**Kustepeli (2005)** explored relationship between crowd-in and crowd-out effect of government deficit on private investment for the two different periods i.e.

**Mountford and Uhlig (2005)** carried out a study to explore the relationship between public investment and private investments in USA over the period of 1955-2000. VAR model was used to analyze the data and the results showed that government spending crowd-out private investment in USA.

**Shi et al. (2005)** investigated the causal relationship between government expenditure and private investment in short run as well as in long run in China for the period of 1978-2002. The time series data was empirically tested by using PLS, cointegration test and short run relationship was examined by using error correction model. They found that government consumption expenditure had no effect on private investment in China. It was also found that government investment crowds in private investment entirely whether in a short time or not. It is suggested that improvement in the investment proportion is must for solving the structural problems in China.

**Quattara (2005)** studied the long term determinants of private saving in Senegal. The long run private investment equation was derived with the help of Johansen cointegration techniques. The study found a positive relationship between government investment and private investment. It was also found that capital accumulation of public sector leads to boost private sector development in Senegal.

**Wang (2005)** explored the relationship between public expenditure and private investment in Canada over the period of 1961-2000. To examine the extent of relationship between the variables, cointegration and error correction model was used. The results exhibit that there is positive relationship between expenditure on health & education and private investment. Government expenditure on infrastructure has negative relationship with private investment. Other components of government spending (debt service, social security) have negative and insignificant effect on private investment.

**Atukeren (2006)** reinvestigated crowding-in effect of public investment. It was found that productive public investment may crowd in private investments. The study brought to light that development depends upon governance related factors.
and economic environment of private business of different countries. The results of the study also showed that crowding in effects is higher in countries with more stable macroeconomic environment and availability of credit facility for business.

**Heppke-Falk et al. (2006)** empirically tested the impact of government spending on private investment in Germany for the period of 1974-2004. By using SVAR analysis, they found that there is negative relationship between public spending and private investment.

**Mitra (2006)** examined the data over the period of 1969-2005 in India by using structural VAR model in three variables i.e. public investment, private investment, and output. It was found that government investment crowd-out private investment.

**Basar and Temurlenk (2007)** investigated the causal relationship between government expenditure and private investment in Turkey. In order to know the extent of crowd in or crowd out effect, SVAR model was used and the data covered was for the period of 1980-2005. The results showed that government spending crowd-out private investment.

**Chakarborty (2007)** found out that there is no real crowding out between public and private investment in India. VAR model is used to process the data that covered the period of 1970 to 2003. He further added that public investment is complementary to private investment.

**Majumder (2007)** searched the causal relationship between government spending and private investment in Bangladesh over the period of 1976-2006. Unit root test, cointegration and VAR model was used to process the data. The study found that there is complementary relationship between public expenditure and private investment.

**Giordano et al. (2007)** investigated the effect of fiscal policy on private investment in Italy. Time series data over the period of 1982-2004 was used. VAR analysis showed positive relationship between government expenditure and private investment.

**Khan and Gill (2009)** examined the relationship between public borrowing, Gross Domestic Product (GDP), and lending in Pakistan. The data taken
for the study was for the period of 1971 to 2006. They used unit root test, cointegration and vector error correction model (VECM). The results found that crowding out hypothesis was absent in Pakistan. Public expenditure on subsidy, transfer payments and micro credit has positive and significant relationship with private investment. The study brought in to light that government expenditure towards private sector results in crowd in effect in Pakistan.

Hussain et al. (2009) investigated the relationship between government expenditure and private investment in Pakistan by using Johansen cointegration technique on annual data over the time period of 1975 to 2008. The study found that non-development expenditure causes crowding out effect on private investment while development expenditure like health, education and infrastructure cause crowd in effect on private investment.

Majumdar (2009) found that government spending crowded out private investment in case of India.

Wu and Zhang (2009) examined the link between public and private investment in China for the period of 1978-2004. The relationship was empirically tested by using cointegration and error correction model to find out long run and short run relationship between these two variables. Cointegration results showed that in long run, public investment crowd-in private investment but the coefficient of error correction model showed that in short run, private investment was crowed out.

Afonso and Aubyn (2010) empirically tested the crowd in effect in 14 European Union (EU) countries for the period of 1960-2005. VAR model was used to explore the association between public expenditure and private investment. The results showed that both public and private investment has positive impact on economic growth. Crowd in effect was found in countries like Germany, Austria, Finland, Denmark, Spain, Greece, Portugal, and Sweden. On the other hand, crowd-out effect prevailed in Ireland, Canada, Belgium, UK, and in Netherlands.

Hatano (2010) investigated the dynamic relationship between government investment and private investment in Japan. Unit root test, Cointegration test and
Granger Casualty test were used for the period of 1955-2004. It is found that there is positive relationship between government investment and private investment.

Afonso and Jalles (2011) empirically investigated the impact of public investment on private investment. Panel data analysis was used to find out extent of crowd-in and crowd-out effect of government expenditure in ninety five (95) developing and developed countries for the period of 1970-2008. The study found positive relationship among public and private investment and concluded that public investment helps in fostering private investment.

Afonso and Sousa (2011) examined the macroeconomic effects of fiscal policy in Portugal. The study used the quarterly dataset of Portugal over the period 1979:1-2007:4. It was found that government spending crowds-out private investment and have a persistent and positive effect on the price level and the average cost of financing government debt.

Akram (2011) investigated the impact of public debt on economic growth in Pakistan. In addition, relationship between public debt and government investment was also tested. Time series data over the period of 1972-2009 was analyzed using Autoregressive Distributed Lag (ARDL) Model and short run relationship was captured using error correction technique. The results indicate that there is negative and significant relationship between public external debt and per capita GDP. The findings confirm existence of “Debt Overhang Theory”. There was no evidence of crowding out in Pakistan. Investment has a positive and significant relationship with per capita GDP. There is negative relationship between domestic debt and investment. The study suggested that heavy dependence on external and domestic debt must be curtailed.

Furceri and Sousa (2011) found that government spending creates an important crowding-out effect by negatively affecting both private investment and private consumption. Their study was based on the panel data of 145 developed and developing countries over the period of 1960-2007. The study also analyzed that the effect of government spending varies among countries, but does not depend on the different phases of business cycle. The results are statistically significant and robust to several econometric techniques.
Kollamparambil and Nicolaou (2011) investigated the crowd-out effect in South Africa. They used unit root test to check the stationarity of data and vector autoregression model (VAR) analysis for the period of 1946-2005. The time under study was split in to three different periods (1946-2005, 1960-2006, and 1965-2005). The study explored that public expenditure neither crowds in nor crowds out private investment, but there was indirect effect between these two variables.

Motlaleng et al. (2011) empirically tested the impact of government expenditure on private investment in Namibia using Error Correction Model (ECM). They used quarterly data for the period of 1990-2005. The findings exhibit that increase in government expenditure crowded-in private investment in Namibia. But there was negative relationship between budget deficit and private investment.

Bello et al. (2012) used multiple regression analysis to find out dynamic relationship between government spending and gross private investment in Nigeria for the period of 1975-2009. The results indicate that an increase in government expenditure increases private investment.

Asogwa and Okeke (2013) explored the causal relationship between budget deficit and private investment in Nigeria. They used OLS and Granger causality test and found that budget deficit crowd-out private investment.

Biza et al. (2013) empirically tested the crowd-out effect in South Africa for the period of 1994:Q1 -2009:Q4. Cointegration and VAR analysis with impulse response and variance decomposition analysis was used to found the results. The major finding of the study was that budget deficit crowd-out private investment in South Africa.

Forgha and Mbella (2013) investigated the impact of public expenditure on private investment in Cameroon. Various econometric methods like unit root test and VAR analysis were used to test the data. They found that public expenditure insignificantly crowd-in private investment.

Ifeakachukwu et al. (2013) used Error Correction Model (ECM) in Nigeria for the period of 1981-2010 and found that variables of government spending had different impact on private spending. Moreover, government final consumption
expenditure had crowd-in effect on private investment. On the contrary, government capital expenditure had negative effect on private investment.

Mahmoudzadeh et al. (2013) empirically tested the crowd-in and crowd-out effect of budget deficit on private investment over the period of 2000-2009 in twenty three (23) developed and fifteen (15) developing countries. Using panel data analysis, it was found that budget deficit had crowd-out effect in developed countries whereas it had crowd in effect in developing countries.

Samaei et al. (2013) used cointegration and VECM model to find out relationship between government spending and private investment over the period of 1971-2008 in Iran. The study empirically tested these variables and found that there is negative relationship between these variables and further added that government spending crowds-out private investment.

6.6 RATIONALE OF THE STUDY

Although the issue of crowding-out/in has been studied extensively, still there is no consensus for the effects of government spending on private investment. This study is different from existing studies on crowding out in India for two reasons. The first reason is that it finds out financial as well as real crowding out and while analyzing the real crowding out, it considered impact of development and non development mix of government expenditure on private capital formation. Secondly, the study has taken care of certain methodological deficiency of existing studies on crowding out issue. Most of the studies assumed the stationarity of time series and used ordinary least square and cointegration technique to estimate the impact of government spending on private capital formation which can lead to spurious and inconsistent results. Contrary to the majority of other studies, this paper applied auto regressive distributive lag (ARDL) model to eliminate the problem of lag structure. Further, this study is unique in nature because it checked the effectiveness of fiscal and monetary policy with IS-LM equations and also emphasized on steepness and flatness of IS and LM curve.
6.7 EVOLUTION OF MODEL VARIABLES

6.7.1 Empirical Model of Financial Crowding Out

An econometric model is framed to analyze the relationship between gross domestic private capital formation, budget deficit, money supply and real interest rate. The main purpose of this study is to estimate crowd out/in effect of fiscal deficit. In order to capture the impact of fiscal deficit (FD), money supply (MS) and real interest rate (RINT) on private investment, the following function is used. Generally, gross domestic private capital formation function provided as follows:

\[
GDPCP = F (FD, RINT, MS) \quad \text{for the period 1980-81 to 2013-14}
\]

Annual data for the years 1980-81 to 2013-14 of India has been used for analysis. The data for fiscal deficit, money supply and gross domestic private capital formation have been taken from Handbook of Statistics of Indian economy of various years. The data of real interest rate have been taken from World Bank indicators. ARDL approach has been used in this study to find the long run relationship among variables. Pesaran et al., (2001) developed the Autoregressive Distributive Lag Model or ARDL bounds testing approach to find out cointegration which is better suited for small samples (Haug 2002). This approach is used to analyze the long-run relationship between all series as it can outfit for small sample size.

**Model Equations**

\[
\Delta GDPCP_t = \beta_0 + \sum_{i=1}^{k} \beta_i \Delta GDPCP_{t-i} + \sum_{i=0}^{k} \beta_{1i} \Delta FD_{t-i} + \sum_{i=0}^{k} \beta_{2i} \Delta RINT_{t-i} + \sum_{i=0}^{k} \beta_{3i} \Delta MS_{t-i} + \alpha_1 GDPCP_{t-1} + \alpha_2 FD_{t-1} + \alpha_3 RINT_{t-1} + \alpha_4 MS_{t-1} + e_t
\]

(Eq.18)
where

\[ \Delta = \text{operator of first-difference} \]

\[ \beta_0 = \text{intercept} \]

\[ t = \text{time} \]

\[ \beta_1, \beta_2, \beta_3, \beta_4 = \text{short run dynamic association} \]

\[ \alpha_1, \alpha_2, \alpha_3, \alpha_4 = \text{long run dynamic association} \]

\[ e_t = \text{white noise error term} \]

In the ARDL model, the bounds test is adopted to decide whether the cointegration exists or not. The bounds test considered jointly significance of \( F \) statistic and the \( \chi^2 \) statistic of Wald test. Here the GDPCP acts as the dependent variable and FD, RINT and MS are assumed as explanatory variables. The hypothesis to examine whether there exists cointegration between them is expressed as follows:

\[ H_0 \rightarrow \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0 \quad \text{(No cointegration)} \]

\[ H_1 \rightarrow \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq 0 \quad \text{(Cointegration exists)} \]

E Views-9 was used to process the data and the null hypothesis of no cointegration was tested by examining the joint significance of the \( F \) statistic of \( \alpha_1, \alpha_2, \alpha_3, \alpha_4 \).

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.
Further, if there exists cointegration between the variables, an error correction mechanism (ECM) can be developed as

\[
\Delta GDPCP_t = \beta_0 + \sum_{i=1}^{k} \beta_i \Delta GDPCP_{t-i} + \sum_{i=0}^{k} \beta_i \Delta FD_{t-i} + \sum_{i=0}^{k} \beta_i \Delta RINT_{t-i} + \sum_{i=0}^{k} \beta_i \Delta MS_{t-i} + \lambda ECM_{t-1} + \mu_t
\]

------------- (Eq.19)

Where

- \( ECM_{t-1} \) = error correction term
- \( \mu_t \) = error term
- \( \lambda \) = coefficient of the error correction term which shows the speed of adjustment of the variables to equilibrium in long run

**Table 6.3**

Unit Root Test (Augmented Dickey Fuller Test)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level</th>
<th>At first difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDPCP</td>
<td>0.3550</td>
<td>0.0001*</td>
</tr>
<tr>
<td>DEV</td>
<td>0.4941</td>
<td>0.0003*</td>
</tr>
<tr>
<td>NONDEV</td>
<td>0.1676</td>
<td>0.0001*</td>
</tr>
<tr>
<td>FD</td>
<td>0.1286</td>
<td>0.0000*</td>
</tr>
<tr>
<td>RINT</td>
<td>0.1046</td>
<td>0.0010*</td>
</tr>
<tr>
<td>MS</td>
<td>0.9800</td>
<td>0.0017*</td>
</tr>
</tbody>
</table>

* indicates significant at 5 percent

The results of Table 6.3 indicate that all the variables are non stationary at their levels. Augmented Dickey Fuller test is used to check the stationarity of the data. All the variables in the Table 6.3 became stationary by taking first difference.
Table 6.4
Selected Financial Crowding Out Model: ARDL (1, 3, 0, 4) for Long run Relationship

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDPCP(-1)</td>
<td>0.528374</td>
<td>0.145978</td>
<td>3.619544</td>
<td>0.0021*</td>
</tr>
<tr>
<td>FD</td>
<td>-1.195695</td>
<td>0.245403</td>
<td>-4.872369</td>
<td>0.0001*</td>
</tr>
<tr>
<td>MS</td>
<td>-0.085824</td>
<td>0.030706</td>
<td>-2.795052</td>
<td>0.0124*</td>
</tr>
<tr>
<td>RINT</td>
<td>-0.465765</td>
<td>0.133918</td>
<td>-3.477974</td>
<td>0.0029*</td>
</tr>
<tr>
<td>C</td>
<td>22.93084</td>
<td>4.841889</td>
<td>4.73593</td>
<td>0.0002*</td>
</tr>
</tbody>
</table>

* indicates significant at 5 percent

Where, R-squared=0.94494, Adjusted R-squared=0.90932, S.E. of regression=1.08176, Sum squared resid.=19.89364, F-statistic=26.52480, Prob (F-statistic) = 0.00000, Durbin-Watson stat=1.969375, S.D. dependent var =3.592305, Breusch-Godfrey Serial Correlation LM Test=0.7448, Heteroskedasticity Test (Breusch-Pagan-Godfrey)=0.974;

Table 6.5
ARDL Bound Test for Financial Crowding Out Model: ARDL (1, 3, 0, 4)

<table>
<thead>
<tr>
<th>Critical Value Bounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance</td>
</tr>
<tr>
<td>10%</td>
</tr>
<tr>
<td>5%</td>
</tr>
<tr>
<td>2.5%</td>
</tr>
<tr>
<td>1%</td>
</tr>
</tbody>
</table>
Auto regressive distributive lag model is used to examine the existence of co-integration among the variables. The result of Table 6.4 shows that the coefficient of determination of the model (Adjusted-R2) is very high (90.9%). The
R² is also very high (94.49%). This indicates that about 94.49% of the total variations in gross domestic private capital formation is explained by the fiscal deficit, real interest rate and money supply while the remaining 5.51% is explained by other variation outside the model (error term). The probability value of F-statistic (0.0000) is statistically significant at 5% level of significance showing that model is well specified and statistically significant. Furthermore, the value of Durbin Watson statistic (1.96) shows that there is absence of autocorrelation in the model.

With respect to the explanatory variables, it is found that the long run coefficients (fiscal deficit, money supply and real interest rate) are negative and statistically significant at 5% level of significance. This indicates that these variables do influence gross domestic private capital formation in long run. The negative value of coefficient of fiscal deficit indicate that soaring fiscal deficit that result in increased government borrowing leads to decrease resources available for private players, hence crowd out private investment. Further, negative coefficient of real interest rate confirms that private investment in India is interest rate sensitive. In such situation private investors want to borrow funds, but due to high interest rate cannot take loans from the market to expand their business. This results in reducing the overall output of the country.

Negative relationship between money supply and private investment capital formation indicates that investment doesn’t change with change money supply (as IS curve is relatively more steep) in India as interest rate are very high in India for private business. The annual average prime lending rates were 16.47 in eighties, 15.7 in nineties and 13.32 in last decade (Handbook of statistics of Indian Economy). Persistent high interest rates reluctant private business for starting new business or expanding the existing one. This makes IS relatively steeper and expansionary monetary policy become ineffective in such a case. Although it is illustrated above that the value of multiplier is very high in case when fiscal deficit is financed by money supply (printing money equation 17). But Table 6.2 indicates that major portion of fiscal deficit in India has been financed mainly by market borrowings and other borrowings are also the reason for ineffectiveness of monetary
policy. Therefore, the value of multiplier \( \frac{\Delta Y}{\Delta G} = \frac{1}{[1-c(1-t) + \frac{I_h}{I_r}] \cdot r} \) or impact of government expenditure on private investment becomes weaker as heavy dependence on market borrowings (bond financing) leads to rise in interest rate. This is also the reason for ineffectiveness of monetary policy (IS relatively steeper). Furthermore, this becomes true with that negative coefficient of real interest rate with private investment is also the reason for crowd-out private investment. The model also indicates that coefficient of the first lagged value of GDPCP is positive and statistically significant at 5% level of significance. This implies that the immediate past value of GDPCP influences the private investment in long run. Furthermore, it is also observed from the results of bound test that the value of F statistics is 6.46 which is higher than lower bound and upper bound at 5 percent level of significance.

Diagnostic tests were performed to check serial correlation and heteroskedasticity. Breusch-Godfrey Serial Correlation LM test was adopted to check for serial correlation while Breusch-Pagan-Godfrey for Heteroskedasticity. The results show the presence of no serial correlation and heteroskedasticity. The short run stability of the model was tested using CUSUM and CUSUM Square test. If CUSUM plot was found to be within the 5% critical bound, then the null hypothesis of the stability of the parameters cannot be rejected. The results indicate that the CUSUM and CUSUM square plot are within the 5% critical bound and therefore the parameters do not suffer from any structural instability over the time period of the study.
### Table 6.6
**Short Run Relationship of Financial Crowding Out**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-0.11358</td>
<td>0.361817</td>
<td>-0.31391</td>
<td>0.7565</td>
</tr>
<tr>
<td>D(GDPCP(-1))</td>
<td>0.324253</td>
<td>0.165808</td>
<td>1.955601</td>
<td>0.0633</td>
</tr>
<tr>
<td>D(FD)</td>
<td>-1.19084</td>
<td>0.272739</td>
<td>-4.36622</td>
<td>0.0002*</td>
</tr>
<tr>
<td>D(MS)</td>
<td>0.047746</td>
<td>0.148441</td>
<td>0.321646</td>
<td>0.7508</td>
</tr>
<tr>
<td>D(RINT)</td>
<td>-0.25882</td>
<td>0.12283</td>
<td>-2.10712</td>
<td>0.0467*</td>
</tr>
<tr>
<td>ECT(-1)</td>
<td>-0.88737</td>
<td>0.38139</td>
<td>-2.32669</td>
<td>0.0296*</td>
</tr>
</tbody>
</table>

* indicates significant at 5 percent

Where R-squared=0.565538, Adjusted R-squared=0.466797, S.E. of regression=1.442934, Sum squared resid=45.80532, F-statistic=5.727475, Prob(F-statistic)= 0.001568, Mean dependent var= 0.175778, S.D. dependent var=1.976061, Durbin-Watson stat=2.016271

Now, with the acceptance of long-run coefficients of equation, we can estimate short-run coefficients. In order to estimate short run coefficient and error correction term, there is need to develop error correction model as explained in Eq. 19. Error correction model has two parts. First, it estimate short run coefficients and second the value of ECT provides speed of adjustment whereby short-run dynamics converge to the long-run equilibrium path in model. The results are presented above in Table 6.6.

The coefficients of short run model show that fiscal deficit and real interest rate are negative and statistically significant in short run whereas coefficient of money supply is found to be insignificant. This indicates that private investment is crowded out in short run also. According to this estimation, the value of ECT is -0.88 percent which shows the speed of adjustments from short run to long run. In addition, the ECM only can explain 56 per cent of fluctuation in gross domestic private capital formation.
6.7.2 Real Crowding Out in India

**Model Specification:**

$$\text{GDPCP} = f (\text{FD, NONDEV, DEV})$$

Where GDPCP is gross domestic private capital, FD is fiscal deficit, NONDEV is non-development expenditure and DEV is development expenditure. All the variables are taken as percentage of GDP at market price. The data are taken from Handbook of Statistics of Indian Economy published by Reserve bank of India.

The study covers the period from 1980-81 to 2013-14 for India. ARDL approach has been used to find the long run relationship among variables.

**Model Equations**

$$\Delta \text{GDPCP}_t = \delta_0 + \sum_{i=1}^{k} \delta_i \Delta \text{GDPCP}_{t-i} + \sum_{i=0}^{k} \delta_i \Delta \text{FD}_{t-i} + \sum_{i=0}^{k} \delta_i \Delta \text{NONDEV}_{t-i} + \sum_{i=0}^{k} \delta_i \Delta \text{DEV}_{t-i} + \eta_1 \text{GDPCP}_{t-1} + \eta_2 \text{FD}_{t-1} + \eta_3 \text{NONDEV}_{t-1} + \eta_4 \text{DEV}_{t-1} + \epsilon_t$$

-------------- (Eq.20)

where

$\Delta$ = operator of first-difference

$\delta_0$ = intercept

$t$ = time

$\delta_1, \delta_2, \delta_3, \delta_4$ = short run dynamic association

$\eta_1, \eta_2, \eta_3, \eta_4$ = long run dynamic association

$\epsilon_t$ = white noise error term

The bounds test considered jointly significance of $F$ statistic and the $\chi^2$ statistic of Wald test. Here the GDPCP acts as the dependent variable and the fiscal deficit (FD), RINT and MS are assumed as explanatory variables. The hypothesis to examine whether there exists cointegration between them is expressed as follows:

$H_0 \rightarrow \eta_1 = \eta_2 = \eta_3 = \eta_4 = 0$  (No cointegration)

$H_1 \rightarrow \eta_1 \neq \eta_2 \neq \eta_3 \neq \eta_4 \neq 0$  (Cointegration exists)
The null hypothesis of no cointegration is tested by examining the joint significance of the $F$ statistic of $\eta_1, \eta_2, \eta_3, \eta_4$. Further, if there exists cointegration between the variables, an error correction mechanism (ECM) can be developed as

$$\Delta GDPCP_t = \delta_0 + \sum_{i=1}^{k} \delta_i \Delta GDPCP_{t-i} + \sum_{i=0}^{k} \delta_i \Delta FD_{t-i} + \sum_{i=0}^{k} \delta_i \Delta NONDEV_{t-i} + \sum_{i=0}^{k} \delta_i \Delta DEV_{t-i} + \lambda ECT_{t-1} + \mu_t$$

---------- (Eq.21)

Where

$ECT_{t-1} =$ error correction term

$\mu_t =$ error term

$\lambda =$ coefficient of the error correction term

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDPCP(-1)</td>
<td>0.70558</td>
<td>0.089912</td>
<td>7.847447</td>
<td>0.0000*</td>
</tr>
<tr>
<td>FD</td>
<td>-2.023617</td>
<td>0.307341</td>
<td>-6.584271</td>
<td>0.0000*</td>
</tr>
<tr>
<td>FD(-1)</td>
<td>0.864625</td>
<td>0.253697</td>
<td>3.408104</td>
<td>0.0025*</td>
</tr>
<tr>
<td>FD(-2)</td>
<td>-0.475322</td>
<td>0.202392</td>
<td>-2.348516</td>
<td>0.0282*</td>
</tr>
<tr>
<td>NONDEV</td>
<td>1.115959</td>
<td>0.587059</td>
<td>1.900933</td>
<td>0.0705</td>
</tr>
<tr>
<td>NONDEV(-1)</td>
<td>-2.839297</td>
<td>0.651019</td>
<td>-4.361309</td>
<td>0.0002*</td>
</tr>
<tr>
<td>NONDEV(-2)</td>
<td>2.42869</td>
<td>0.464015</td>
<td>5.234079</td>
<td>0.0000*</td>
</tr>
<tr>
<td>DEV</td>
<td>0.709097</td>
<td>0.282413</td>
<td>2.510853</td>
<td>0.0199*</td>
</tr>
<tr>
<td>C</td>
<td>0.206655</td>
<td>5.629533</td>
<td>0.036709</td>
<td>0.9710</td>
</tr>
</tbody>
</table>

* indicates significant at 5 percent

R-squared=0.94381, Adjusted R-squared= 0.92337, S.E. of regression=0.99456, Sum squared resid= 21.76136, F-statistic=46.18663, Prob(F-statistic)= 0.00000, Mean dependent var=7.69993, S.D. dependent var =3.59280, Durbin-Watson stat=2.48054, Breusch-Godfrey Serial Correlation LM Test=0.1767, Heteroskedasticity Test: Breusch-Pagan-Godfrey=0.9873
Real crowding out also known as direct crowding out occurs with the reduction of the physical resources available for private sector. As government does many development and non development expenditure, this reduces the resources available for private players, thus crowding out private investment. The results of ARDL model (Table 6.7) indicate that there is a negative relationship between gross domestic private capital formation and fiscal deficit. The results also reveal negative relationship between private investment and one year lag value of non development expenditure at five percent level of significance. Contrary to this, development expenditure found positively related with gross domestic private capital formation. This shows that government expenditure for development purposes like medical facility, education, roads, research and other basic facility crowd in private investment. On the other hand, expenditure on non development purposes like pension, subsidies, transfer payments etc crowd out private investments.

Table 6.7 shows that value of R square is 94 percent indicates that about 94.38% of the total variations in gross domestic private capital formation is explained by the fiscal deficit, development expenditure and non development expenditure, While the remaining 5.62% is explained by other variation outside the model (error term). The results of ARDL bound test confirms the long run relationship among variables as value of F statistics (4.01) is above the upper bound at 5 percent level of significance. The results also show the presence of no serial correlation and no heteroskedasticity. The long run stability of the model was tested using CUSUM and CUSUM Square test. If CUSUM plot was found to be within the 5% critical bound, then the null hypothesis of the stability of the parameters cannot be rejected. The results indicates that the CUSUM and CUSUM square plot are within the 5% critical bound and therefore the parameters do not suffer from any structural instability over the time period of the study.
Table 6.8
ARDL Bounds Test for Real Crowding Out Model (F Statistics= 4.016450)

<table>
<thead>
<tr>
<th>Significance</th>
<th>I0 Bound</th>
<th>I1 Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>2.37</td>
<td>3.2</td>
</tr>
<tr>
<td>5%</td>
<td>2.79</td>
<td>3.67</td>
</tr>
<tr>
<td>2.50%</td>
<td>3.15</td>
<td>4.08</td>
</tr>
<tr>
<td>1%</td>
<td>3.65</td>
<td>4.66</td>
</tr>
</tbody>
</table>

Figure 6.8
Long Run Stability of the Real Crowding Out Model (Cusum Test)
Figure 6.9
Long Run Stability of the Real Crowding Out Model
(Cusum Square Test)

Table 6.9
Short Run Relationship between Gross Domestic Private Capital Formation and Fiscal Deficit, Development Expenditure and Non Development Expenditure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.111647</td>
<td>0.213579</td>
<td>0.522746</td>
<td>0.60590</td>
</tr>
<tr>
<td>D(GDPCP(-1))</td>
<td>0.109204</td>
<td>0.12425</td>
<td>0.87891</td>
<td>0.38820</td>
</tr>
<tr>
<td>D(FD)</td>
<td>-1.532041</td>
<td>0.247484</td>
<td>-6.19046</td>
<td>0.00000</td>
</tr>
<tr>
<td>D(DEV)</td>
<td>0.554984</td>
<td>0.32118</td>
<td>1.727952</td>
<td>0.09680</td>
</tr>
<tr>
<td>D(NONDEV(-1))</td>
<td>-2.468956</td>
<td>0.516389</td>
<td>-4.78119</td>
<td>0.00010</td>
</tr>
<tr>
<td>ECT(-1)</td>
<td>-0.76576</td>
<td>0.290886</td>
<td>-2.63251</td>
<td>0.01460</td>
</tr>
</tbody>
</table>

* indicates significant at 5 percent

Where R-squared=0.707451, Adjusted R-squared=0.646503, S.E. of regression=1.164671, Sum squared resid=32.55499, F-statistic=11.60749, Mean dependent var=0.123475, S.D. dependent var=1.958891, Durbin-Watson stat=1.276454
The short run relationship among variables is presented in Table 6.9. The empirical results indicate that coefficient of fiscal deficit and non development expenditure is negatively related with gross domestic private capital formation in short run at 5 percent level of significance. However, development expenditure is found insignificant in short run at 5 percent level of significance. The value of error correction term is -0.76 percent which indicates the speed of adjustment. In addition, the Error correction model explains 70.74 percent fluctuations in gross domestic private capital formation.

### 6.8 FINDINGS AND CONCLUSIONS

The study used the ARDL approach along with Error Correction Model to investigate the long run and short run relationship among the variables over the period of 1980-81 to 2013-14. The results of financial crowding out indicate that fiscal deficit, money supply and real interest rate have negative and significant relationship with gross domestic private capital formation in India. The results support Neo- Classical view of crowding out which advocates that an increase in government spending crowd out private investment. This view advocates that public expenditure is less productive than private investment, hence increased output as a result government spending is less than crowding out effect of private investment on output, thus reducing GDP (Majumder, 2007). The inefficiency of public sector in India is portrayed in Table 6.1 which postulates that rate of capital formation in public sector reached at 7.84 percent in 2000s from 8.87 in 1990s. The results of financial crowding out supports various studies of Blejer and Khan (1984), Cebula (1978), Shafik (1992), Parker (1995), Ostrosky (1979), Tun Wai and Wong (1982), Sunderrajan and Takur (1980), Pradhan, et al. (1990), Krishnamurty (1985), Kulkarni and Balders (1998), and Alesenia, et al. (2002). They found that high level of fiscal deficit crowd-out private investments. Further as per IS-LM analysis, increase in government expenditure increases interest rate causing crowd out private investment. This indicates that IS curve is steep in India, so the expansionary monetary policy is less effective. Private investment in India is interest rate sensitive and there is negative relationship between private investment and interest rate.
Further, private investment also has negative relationship with money supply because increase in money supply in India increases aggregate demand in short run but causes inflation in long run. In order to control high inflation, government increases interest rate. This will reduce demand in future leads to decrease the investment of private players in long run.

In addition, major portion of fiscal deficit in India has been financed by market borrowings and other borrowings, is also the reason for ineffectiveness of monetary policy. High prime lending rates and real interest rate make the IS curve more steep in India. Thus steepness of IS curve is the reason for financial crowding out in India. Therefore, it can be concluded that Keynesian theory of increasing government expenditure for increasing investment doesn’t hold true in India. However, in short run fiscal deficit and real interest rate have negative and significant relationship with gross domestic private capital formation. The results do not find any evidence of short run relationship with money supply. Finally, error correction term (ECM) is -0.88 meaning that in every year 88 per cent of the divergence between the short-run price levels from its long-run path is eliminated.

The results of real crowding out shows the negative relationship between gross domestic capital formation and one year lagged value of non development expenditure in long run as well as in short run. Development expenditures are found positively related with private investment at five percent level of significant in long run but the coefficient of development expenditure is found insignificant in short run at 5 percent level of significance. Error correction model explains that the speed of adjustment is 76 percent. These results have important implication for the formulation of long run growth and development strategies in India. The efficient use of capital mainly for development purpose is economically important for acceleration of overall productivity.

All in all, based on these findings we can assert that Indian government should implement sound monetary and fiscal policy to create optimistic environment among private business. Therefore, it is imperative for policy makers to reduce the fiscal deficit to enhance private investment or control over high interest rate. A
major portion of government spending is used for non development expenditure like subsidies, interest payments and defence which reduces the resources available for private players. Hence crowd- out private investments. Government should focus more on core developmental schemes. Simultaneously, measures to enhance the tax and non-tax revenues should be taken to increase the effectiveness of fiscal policy (supported by equation 17). Heavy dependence on market borrowing to finance fiscal deficit is also responsible for ineffectiveness of fiscal policy (supported by equation 7). In order to reap the full benefits of government spending, government should take measures to enhance capital investments and control the growth in non-plan consumptive expenditure. In order to combat with financial crowding out, proper combination of fiscal and monetary policy should be formulated. High interest rate is one of the hurdles for private investors in India (supported by equation 7) also the reason for ineffectiveness of government spending. Hence, government should control over increased interest rates by formulating sound monetary policy (supported by equation 10).