The purpose of this chapter is to study the changes in profitability in the cement industry in India. This chapter is primarily empirical in content. The theoretical framework that relates to this empirical analysis refers to the importance of profitability for capital accumulation where production is organised and investment is undertaken in order to make profits; a fall in the average rate of profit and consequently in the expected profitability of new investment is bound to discourage such investment. The focus is on whether changes in profitability in the cement industry which are important for investment decisions reflect productivity changes in the industry.

Profitability influences capital accumulation in two different ways. This is highlighted in policy debates on profitability that is linked to economic growth. One way to formalize it is to assume, along with N. Kaldor and other exponents of Cambridge growth theory, that the propensity to save out of profits is greater than the propensity to save out of wage income. Therefore, a shift in the distribution of income from wages to profits (say, via inflation) increases the propensity to save and thereby the rate of investment and growth. As against this, an alternative
explanation of this link is to assume, following Uzawa (1969), that rate of growth of output in a firm is a function of the rate of profit and the rate of interest when the firm is not constrained by labour market or by the output market. Here profitability is a determinant of the propensity to invest rather than of the propensity to save.\(^1\)

This study uses data on changes in profitability i.e. rate of return, to illuminate its importance for inducement to invest.

However, the link between profitability and inducement to invest should be interpreted cautiously. A higher profitability does not necessarily entail an expansion of investment. It depends upon the factors that constitute a particular pattern of profitability.\(^2\) In monopolistic industries the increase in profitability may constitute a higher mark-up (price above and over unit cost) that may reflect the successful exploitation of the market power which may be spoiled by an expansion. On the other hand, in a competitive industry a permanent and favorable change in cost and demand conditions tend to bring about expansion of production and, therefore, investment by firms.

In general, it is recognised that realization of higher level of profits in an expanded market does entail an expansion of investment. This may be reflected by an output expansion plan that is accompanied by a reduction of costs.
or by shifting of the demand curve of the product to indicate a higher growth of demand. These considerations are especially true in a study that takes profitability as a factor that brings about efficient application of investment.

Section 7.1 of this chapter brings out the trend in profitability to study its behaviour in cement industry; section 7.2 discusses various factors that influence the pattern of profitability; section 7.3 makes an attempt to isolate important factors that brings about the changes in profitability in the cement industry and examines whether this pattern of profitability over the period of time reflects an increase in productive efficiency.

SECTION 7.1: TREND OF PROFITABILITY

Profitability in this study refers to the rate of return on capital employed. Two concepts of this rate of return are used here. One is the average gross rate of return ($r$) and the second one is Tobin's ratio measure of profitability ($q$). The measure of each concept of profitability is outlined below.

Following the methodology outlined in chapter IV, average rate of return is

\[ r = \frac{\text{gross profit}}{\text{comprehensive concept of capital}} \]
where gross profit is equal to gross value-added \( (Y) \) minus the wage bill \( (wL) \) and comprehensive concept of capital is taken to be gross fixed capital stock \( (K) \) at current prices.\(^4\) Hence,

\[
r = \frac{Y - wL}{K}
\]

However, it should be mentioned that \( wL \) (or the wage bill) here may refer to the total wages paid to the workers, or alternatively, total emoluments paid to the total employees. This distinction between wages and emoluments has significant implications for the accumulation of capital in so far as it views the part of total emoluments which is paid to employees other than workers e.g. supervisors, setting, advertising and finance personnels, etc. as unproductive expenditure.\(^5\) In this framework expenditure on unproductive activities not only fail to contribute to the creation of new profit (or surplus value), they are also paid out of previously created surplus value. However, whether these unproductive expenditures are necessary outlays to sustain capital accumulation or they inhibit capital accumulation and growth is not tried out here. The tendency of rate of profit is studied by including this category of expenditure and also by excluding it, to see whether there is a significant divergence, or not. Accordingly,
where \( wL_1 \) refers to total wages and

\[
r_1 = \frac{(Y - wL_1)}{K}
\]

where \( wL_2 \) refers to total emoluments which includes total wages to labourers and salaries to employees other than labourers.\(^6\)

The second measure of profitability is the Tobin's 'q' measure of profitability which is defined as,

\[
q = \frac{r}{\text{real rate of interest}}
\]

Four different measures of \( q \) are given below as

\[
q_1 = \left(\frac{r_1}{i_R}\right)
\]

\[
q_2 = \left(\frac{r_2}{i_R}\right)
\]

\[
q_3 = \left(\frac{r_1}{i_w}\right)
\]

\[
q_4 = \left(\frac{r_2}{i_w}\right)
\]

where \( i_R \) is the real rate of interest which is rate of interest adjusted by GNP deflator and \( i_w \) is the own rate of interest when rate of interest is adjusted by the price of the commodity in question, i.e., cement price index.\(^7\)

The different concepts of profitability are analysed from 1973-74 to 1988-89 in what follows. Table 7.1
summarizes the data for the relevant variables on profitability.

Table 7.1 shows that there is no difference in the pattern of profitability, whether one takes $r_1$ or $r_2$ in the time period considered here. This pattern, which is also true of all the measures of profitability considered in table 7.1, is characterised by four distinct phases. First, a steady increase from 1973-74 to 1977-78, following a decrease thereafter from 1977-78 to 1981-82. Then, a sudden increase in profitability in 1982-83 to decrease in later period, the decrease being more pronounced in the last three years considered here.

The inclusion of emoluments to employees other than workers (i.e., $w_{L2} - w_{L1}$) therefore has no bearing upon the pattern of profitability; the issue whether this kind of expenditure is itself necessary for this particular pattern, is not taken up here, important though it may be. Given that the pattern of change is same for both $r_1$ and $r_2$, this study refers mainly to $r_2$ (that includes emoluments of employees other than workers) as the gross rate of return. The other measures of profitability, in line with the Tobin's 'q' measure, which is based upon $r_2$, refer to $q_2$ and $q_4$, accordingly.

In table 7.1 the pattern of $r_2$ shows a clear upward trend of around 9.68 per cent per annum (or, 300 per cent
Table 7.1
Measures of Profitability: Cement Industry
1973-74 to 1988-89

<table>
<thead>
<tr>
<th>Year</th>
<th>(r_1)</th>
<th>(r_2)</th>
<th>(q_1)</th>
<th>(q_2)</th>
<th>(q_3)</th>
<th>(q_4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-74</td>
<td>0.04</td>
<td>0.03</td>
<td>0.005</td>
<td>0.004</td>
<td>0.005</td>
<td>0.004</td>
</tr>
<tr>
<td>1974-75</td>
<td>0.05</td>
<td>0.03</td>
<td>0.006</td>
<td>0.004</td>
<td>0.007</td>
<td>0.004</td>
</tr>
<tr>
<td>1975-76</td>
<td>0.08</td>
<td>0.06</td>
<td>0.009</td>
<td>0.007</td>
<td>0.011</td>
<td>0.009</td>
</tr>
<tr>
<td>1976-77</td>
<td>0.08</td>
<td>0.07</td>
<td>0.010</td>
<td>0.009</td>
<td>0.012</td>
<td>0.011</td>
</tr>
<tr>
<td>1977-78</td>
<td>0.11</td>
<td>0.09</td>
<td>0.019</td>
<td>0.016</td>
<td>0.023</td>
<td>0.019</td>
</tr>
<tr>
<td>1978-79</td>
<td>0.09</td>
<td>0.08</td>
<td>0.013</td>
<td>0.010</td>
<td>0.017</td>
<td>0.013</td>
</tr>
<tr>
<td>1979-80</td>
<td>0.09</td>
<td>0.07</td>
<td>0.014</td>
<td>0.011</td>
<td>0.018</td>
<td>0.014</td>
</tr>
<tr>
<td>1980-81</td>
<td>0.08</td>
<td>0.06</td>
<td>0.015</td>
<td>0.011</td>
<td>0.017</td>
<td>0.013</td>
</tr>
<tr>
<td>1981-82</td>
<td>0.08</td>
<td>0.06</td>
<td>0.016</td>
<td>0.012</td>
<td>0.019</td>
<td>0.014</td>
</tr>
<tr>
<td>1982-83</td>
<td>0.23</td>
<td>0.21</td>
<td>0.042</td>
<td>0.038</td>
<td>0.065</td>
<td>0.059</td>
</tr>
<tr>
<td>1983-84</td>
<td>0.22</td>
<td>0.20</td>
<td>0.041</td>
<td>0.039</td>
<td>0.069</td>
<td>0.066</td>
</tr>
<tr>
<td>1984-85</td>
<td>0.26</td>
<td>0.24</td>
<td>0.053</td>
<td>0.049</td>
<td>0.089</td>
<td>0.081</td>
</tr>
<tr>
<td>1985-86</td>
<td>0.22</td>
<td>0.20</td>
<td>0.051</td>
<td>0.046</td>
<td>0.087</td>
<td>0.078</td>
</tr>
<tr>
<td>1986-87</td>
<td>0.15</td>
<td>0.13</td>
<td>0.035</td>
<td>0.032</td>
<td>0.054</td>
<td>0.050</td>
</tr>
<tr>
<td>1987-88</td>
<td>0.14</td>
<td>0.13</td>
<td>0.038</td>
<td>0.035</td>
<td>0.054</td>
<td>0.050</td>
</tr>
<tr>
<td>1988-89</td>
<td>0.14</td>
<td>0.12</td>
<td>0.037</td>
<td>0.031</td>
<td>0.050</td>
<td>0.042</td>
</tr>
</tbody>
</table>

Rate of growth (per cent per annum)

<table>
<thead>
<tr>
<th></th>
<th>(r)</th>
<th>(s)</th>
<th>(t)</th>
<th>(u)</th>
<th>(v)</th>
<th>(w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974-1982</td>
<td>9.05</td>
<td>9.05</td>
<td>15.65</td>
<td>14.72</td>
<td>18.16</td>
<td>16.95</td>
</tr>
<tr>
<td>1983-1989</td>
<td>-7.94</td>
<td>-8.91</td>
<td>-2.09</td>
<td>3.34</td>
<td>4.28</td>
<td>5.50</td>
</tr>
<tr>
<td>1982-1983</td>
<td>187</td>
<td>250</td>
<td>162.5</td>
<td>217</td>
<td>242</td>
<td>321</td>
</tr>
</tbody>
</table>

Notes
1. For the definition of \(r\)'s and \(q\)'s, see the text, p. profit rates are derived from data given in table 6.15 and 6.17. The data on rate of interest is obtained from Chandhok and the Policy Group (1990).
increase over the period) i.e. from 0.03 in 1973-74 to 0.12 in 1988-89. However, this pattern is marked by an abnormal increase of 250 per cent in 1982-83, i.e., 0.6 in 1981-82 to 0.21 in 1982-83 (and this is against an increase of 9.68 per cent per annum over the entire period).

Given the above pattern two distinct periods can be noticed. One is from 1973-74 to 1981-82 (an increase of 9.05 per cent per cent annum); the other is from 1982-83 to 1988-89 (a decrease of 8.91 per cent per annum). The dividing line between these two periods is the sharp and abnormal increase of 250 per cent per annum in one year in 1982-83. The decrease in the subsequent years in the latter period can therefore be interpreted as movement towards normal profitability by normal industry-specific influences (a change of around 9 per cent per annum) observed in the time period studied here.

As against this, the $q_2$ as a measure of profitability is characterized by a sharp increase in the first period, 1973-74 to 1981-82 and a relative slow decrease in the latter period (14.72 per cent increase in the period from 1973-74 to 1981-82 as against a decrease of 3.34 per cent per annum between 1982-83 and 1988-89. The overall trend shows an increase of 14.62 per cent per annum between 1973-74 and 1988-89 though marked by the same pattern of change as is characterized by $r_2$ (gross measure of profitability).
Moreover, both the series are characterised by an abnormal increase during 1981-82 to 1982-83.

In this instance, the measure of gross rate of return, as is given in $r_2$, is taken up in the study to reflect the behaviour of profitability in the industry, given that the pattern of profitability of both the measures of $r_2$ and $q_2$ are the same. The focus is on the factors that explain the trend of profitability, especially the sharp increase during the period 1982-83.

SECTION 7.2: ANALYSIS OF THE TREND OF PROFITABILITY

There are many proximate factors that may influence a particular trend in profitability. This can be seen in the following:

$$ r = \frac{R}{K} $$

Where $K$ is the measure of gross fixed capital in the cement industry and $R$ is the level of profit for the corresponding years. We can express rate of profit, $r$, as follows:

$$ r = \frac{R}{K} = \frac{R}{Y} \left( \frac{Y}{Y_A} \right) \left( \frac{Y_A}{K} \right) $$

(7.1)

where $Y$ is the real gross value added in cement industry; $Y_A$ is the capacity output in the cement industry i.e. installed capacity.

The relationship described in equation 7.1 is tautological, but beginning with Karl Marx himself in
capital, it shows the three main sources of changes in profitability that have occupied literature on economic theory highlighting the rate of profit as the main determinant of macro-economic vitality. They are,

\[ \frac{R}{Y} = \text{Profit share reflecting the strength of labour, or to wit, an indicator of class struggle in terms of a distribution of income between labour and capital} \]

\[ \frac{Y}{Y_A} = \text{Actual output to potential output or the capacity utilization ratio indicating the influence of the extent of realization of the full value of commodity produced.} \]

\[ \frac{Y_A}{K} = \text{Capacity-capital ratio indicating technology or the behaviour of the organic composition of capital.} \]

These three factors or variables form the basis of the theoretical approach, discussed extensively in broadly defined Marxist literature, to examine the tendency of the profit rate to fall - a long run tendency developed by Marx to show secular stagnation in market economy. However, equation 7.1 can be equally adapted to explain both short-run cyclical changes and long-run in the profit rate, following the approach adopted by Weisskopf (1979). In this approach, short-run changes in profitability is taken to be due to changes in relative prices, which is independent of any change in the capital-labour ratio. On the other hand, in the long-run, capital-labour ratio in an industry is changed and any attendant change in technology,
for example, a change in the output-capital ratio, is the factor that affects profitability. Both the short-run and long-run analysis of the changes in profitability is discussed below in the following.

**Short-Run Analysis of Profitability**

An examination of the pattern of profitability is tried out here in the context of a short-run analysis from 1973-74 to 1988-89, in the cement industry in India. The short-run is taken up here to link the pattern of profitability to changes in relative prices, independent of any technological change. The changes in relative prices are also maintained to be due to demand shocks that the industry has to face in the short-run context.\(^\text{10}\) Hence to examine the relationship between relative price changes in an industry and its resultant changes in profitability, the main variables in equation 7.1 are translated into a price formulation so that profitability is shown to be a function of relative prices only.\(^\text{11}\)

Furthermore, it is maintained that the variables indicating the three sources of influences on profitability in equation 7.1 are independent of each other in the short run. This means that in the short run the profit share, \(R/Y\), may change independent of any change in capacity utilisation, \(Y/Y_A\), and capacity-output to capital ratio,
$Y_A/K$. This may be due to relative price changes due to investment elsewhere in the economy, e.g., a change in the wage goods prices, which determines the wage rate in an industry, may not be offset by the final output price in the industry so that the labour cost in the industry may change; price of final output may change relative to prices of inputs. These changes in the relative prices may bring about a change in share of profit and consequently a change in the rate of profit, even when the other influences on rate of profit remain the same. Similarly, one may consider a change in capacity-output to capital ratio, $Y_A/K$, when a spurt of demand for capital goods bring about a change in the price of capital in an industry relative to the price of final product. In these instances one can analyze any one of the influences on profitability in terms of price relatives while holding the others constant.

It should be emphasized that in the long run the industry can adjust to these changes in relative prices by a corresponding change in its production process in terms of a change in its capital labour ratio.$^{12}$ For example, a change in the share of profit due to a change in relative prices can be adjusted by a substitution of labour for more capital or by replacing the earlier capacity by better capacity to bring about an increase in capacity-output to capital ratio. In these cases, in the long run, a change in share of
profit may not bring about a change in the rate of profit independent of any changes in other influences on rate of profit.

These considerations lead to the conclusion that the influences on profitability can be considered independent of one another only in the short run context. However the change in capacity utilisation is a short run concept and a change in it may also affect other influences on rate of profit. In other words, a change in the capacity utilisation should be discussed in terms of its influence on share of profit and capacity-output to capital ratio.

One can, therefore, analyze either the influence of share of profit or the influence of capacity-output to capital ratio in terms of price relatives, while holding the other influences constant. This is tried out in the following pages.

**Capacity Output to Capital Ratio**

Considering $Y_A/K$ in equation 7.1, we can define it in price relatives, by assuming the constancy of relative shares ($R/Y$) and capacity utilization index ($Y/Y_A$). Given $Y = W + R$, where $W$ stands for wage bill, or $wL$ and, we can define,

$$
(Y_A/K) = (W/K) (Y_A/Y) (Y/W)
= \left\{1/(K/W)\right\} \left\{1/(Y/Y_A)\right\} \left\{1/(W/Y)\right\}
$$
and given the constancy of \( Y/Y_A \) and \( W/Y = 1 - R/Y \), we have

\[
Y_A/K = \left\{1/ (K/W)\right\} \tag{7.2}
\]

In other words, equation (7.2) shows that there is an inverse relationship between \( K/W \) and \( Y_A/K \), at an industry level in the short run context.

Again,

\[
K/W = (K/wL) = (P_K \bar{K})/(P_O \bar{w}L) = (\bar{K}/L) \left(\frac{P_K}{P_O}\right) \left(\frac{1}{\bar{w}}\right) \tag{7.3}
\]

Where \( P_K \) is the price index of capital goods; \( \bar{K} \) is capital in constant prices; \( P_O \) is the price index of wage goods, \( \bar{w} \) is real wage rate.

Equation 7.3 shows that a change in \( K/W \) can be brought about by a change in \( \bar{K}/L \), or a change in \( P_K/P_O \), or a change in \( \bar{w} \). And in a short-run analysis, it is assumed that \( \bar{K}/L \) (an indicator of technology) and \( \bar{w} \) are constant (reflecting constancy of profit share), and \( K/W \) is influenced by only a change in the \( P_K/P_O \) which is independent of both \( \bar{K}/L \) and \( \bar{w} \).

A change in \( P_K/P_O \), due to factors originating from demand side, may bring about a change in \( K/W \) (equation 7.3) and consequently a change in \( Y_A/K \) (equation 7.2) and therefore can influence the rate of profit (equation 7.1).

Here a change in \( P_K/P_O \) is defined as the relative rise or
fall of prices of capital goods employed by cement industry vis-a-vis the prices of wage goods, consumed by the workers in this industry.

Hence $r_2$, or the rate of profit, is inversely related to the price ratio, $P_K/P_O$ in the short-run analysis. That is

$$r = f \left( \frac{P_K}{P_O} \right) ; f' < 0$$  \hspace{1cm} (7.4)

This also can be explained in a more straightforward way, as below:

$$r = \frac{R}{K} = \frac{R}{W} \cdot \frac{K}{W}$$

$$= \frac{R}{W} \left\{ \left( \frac{P_K}{K/L} \right) / \left( \frac{P_O}{L} \right) \right\}$$

$$= 1 / \left( \frac{P_K}{P_O} \right) \cdot \frac{K}{L} \cdot \frac{1}{\bar{w}} \cdot \frac{\bar{w}}{R}$$

and, in the short-run given the constancy of $w$, $\overline{K}/L$, and $\bar{w}/R$ (i.e. relative shares) we have,

$$r = f \left( \frac{P_K}{P_O} \right) ; f' < 0$$

**Profit-Share:**

A similar exercise can be carried out to express another term in equation 7.1. $R/Y$, in relation to price formulation by assuming constancy of $Y_A/K$ and $Y/Y_A$.

Here, the share of profit is discussed in terms of $R/O$, the gross profit margin, rather than in terms of $R/Y$, where $Y$ refers to value added, and $O$ refers to total output. This means that a change in the profit margin in terms of $R/O$ can be discussed in terms of the relative price changes that
i.e., assuming away any change in capacity utilization, and
\( O = O. \ P_w \) and we have

\[ R/O = x/ (1+x) = [1/\{1+(1/x)\}] \tag{7.6} \]

Again,

\[ P_w = (1+x) (w_l+a \ P_M) \]

or, \( x = \{P_w/(w_l + a \ P_M)\} - 1 \)

and given, \( w = w \ P_O \), we have

\[ x = [1/\{w_l(P_O/P_w) + a(P_M/P_w)\}] - 1 \tag{7.7} \]

Equation 7.7 shows that a change in price relatives in
favor of \( P_w \), or the product price in an industry, e.g.,
cement prices, \textit{vis-à-vis} wage good prices, \( P_O \) or input
prices, \( P_M \), increases \( 'x' \), or the profit margin per unit of
output. Thus an increase in \( P_w/P_O \) or \( P_w/P_M \) is going to
increase \( 'x' \), in the short period analysis. The increase in
\( 'x', \) or the profit margin, on the other hand, is bound to
realize a higher gross profit margin, i.e., \( R/O \) (equation
7.6) and consequently to a higher rate of profit (equation
7.1). In other words, a higher \( P_w/P_O \) and \( P_w/P_M \) would
realize a higher \( r_2 \) or profitability in cement industry in a
short period context. This can be given as

\[ r = f (P_w/P_O, P_w/P_M) \quad ; f' > 0 \tag{7.8} \]
affect R/Y. This is to highlight, that for any given output prices, technology has no role to play in the period considered here. The constancy of technology refers to the fact that both raw material requirement per unit of output, 'a' or IN/O (where IN is the total inputs employed by the industry), and the labour requirement per unit of output, 'l' or L/O, remains the same.

The industry’s price for final output, $P_w$, without considering indirect taxes, can be defined by two elements, costs (wage cost + input cost) per unit of output and profit margin, and can be represented as

$$P_w = (w_1 + aP_M) + x (w_1 + aP_M)$$

$$= (1+x) (w_1 + aP_M) \tag{7.5}$$

where, $w$ refers to the wage rate and $w_1$ is the wage cost per unit of output; $P_M$ is the price of total inputs and $(aP_M)$ is the per unit total input cost; $x$ is the profit mark-up over prime cost; $x(w_1 + aP_M)$ is the profit per unit of output.

We can moreover define gross margin on output, i.e., gross profit margin, as

$$R/O = \frac{\bar{O} x (w_1 +a P_M)}{\bar{O}(1+x) (w_1+a P_M)}$$

where $\bar{O}$ refers to total output at constant prices, or the total volume of output produced and sold by the industry,
The term $Y/Y_A$ in equation 7.1 indicating capacity utilization is itself a short run phenomenon, and is independent of technological change. It may be due to the short term adjustments to production environment, e.g. sudden disruptions in materials supply, foreign exchange shortages, etc. or due to the fact that sales are limited to domestic market vis-à-vis any advantages of scale economies. It is however, very difficult to separate capacity utilization that is entirely due to demand constraints, which is what is required in the examination of pattern of profitability, and its relationship with demand-shocks.

Secondly, capacity utilization can hardly be considered independent of the other two variables, or sources of influences, in equation 7.1, namely, $R/O(R/Y)$ and $Y_A/K$ or in their price equivalents. This is because in the short period context, capacity utilization is positively related to the profit margin per unit of output ($x$). This is more so when prime costs (labour cost plus raw material costs) moves counter cyclical, i.e., increase in costs happens precisely when demand or capacity utilization is falling, so that cost changes are not fully transmitted to price changes (cost changes are not fully compensated by price). The capacity to absorb cost changes is determined by output
effects of price changes and it is possible only when capacity utilization is rising. These observations are apt in case of Indian manufacturing. Hence, if capacity utilization is positively and strongly related to the profit margin, then it is also positively related to \( R/O \). This can also be expressed in the following manner:

Net gross margin on total output can be defined as,

\[
R_{N/O} = \left\{ \frac{x}{(1+x)} \right\} - \left( \frac{K}{O} \right) - \left( \frac{D}{O} \right)
\]

where \( R_N \) refers to net gross margin on total output, \( D \) refers to depreciation and \( K \) refers to overhead expenditure. Taking \( O = P_w \bar{O} \), we have,

\[
R_{N/O} = \left\{ \frac{x}{(1+x)} \right\} - \left( \frac{K}{P_w \bar{O}} \right) - \left( \frac{D}{P_w \bar{O}} \right)
\]

and substituting the value of \( P_w = (1+x) (w + aP_m) \), we have,

\[
R_{N/O} = \left( \bar{O} x(w + a P_m) - (D-K) \right)/\bar{O}
\]

Given that \( D \) and \( K \) are inversely related to capacity utilization, any decrease in capacity utilization would entail a decrease in \( R_{N/O} \), and hence profitability.

A Sum-up

The different price ratios representing sources of influence in profitability is taken together below in the following. Given that \( Y/Y_A \) cannot be considered
independently of R/O or Y_A/K especially in their price equivalents, rate of profit in its price formulation may be expressed, following equations 7.4 and 7.8, as

\[ r = \left\{ \frac{1}{(P_K/P_O)} \right\} (P_W/P_O) (P_W/P_M) \]

However, \( P_K/P_O \) can be expressed as

\[ P_K/P_O = (P_K/P_W) (P_W/P_O) \]

Hence, we have

\[ r = \left( \frac{P_W}{P_K} \right) \left( \frac{P_W}{P_M} \right), \quad f > 0 \quad (7.9) \]

**Long-Run Analysis of Profitability**

In the long-run, technological change which accompanies changes in capital-labour ratio in the industry is maintained to be the main factor which is responsible for changes in profitability. Technological progress, it is maintained, is responsible for changes in profitability in two ways. First, technological progress can be discussed in terms of an increase in labour productivity, which is responsible for increase in profitability, provided wages do not increase more than proportionately.\(^{16}\) Second, technological change is responsible for an increase in profitability which it leads to an increase in capital productivity. As innovations take place, real output rises faster than labour and capital inputs, and give in that
price level move in line with cost changes and wage rate move in line with changes in labour productivity, rise in capital-productivity flows directly to increasing profits.\textsuperscript{17}

In terms of equation 7.1 discussed earlier in this chapter, long-run increases in profitability can, therefore, be discussed either in terms of increase in the output-capital ratio or an increase in $R/Y$ which reflects the fact that labour productivity increases more than proportionate to the increase in wages.

**SECTION 7.3 : PROFILE OF IMPORTANT DATA AND EMPIRICAL ANALYSIS**

The profile of relevant variables that influence the pattern of profitability both in the long-run and short-run context is given in table 7.2 and table 7.3. Table 7.2 gives the data series for the three variables that constitute the main sources of changes in profitability in equation 7.1. Table 7.3 profiles in different price relatives that have a bearing upon profitability in a short period context. The index of prices of variables are constructed in a manner such that they do not reflect any technological change that is taking place in the industry. For example, the index of prices of intermediate inputs/total inputs (comprising mainly materials as well as fuel inputs) is a combination of different price indices that reflect the different items
### Table 7.2

Factors Influencing Profitability: Cement Industry  
(1973-74 to 1988-89)

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-74</td>
<td>0.48</td>
<td>0.10</td>
<td>0.70</td>
<td>0.15</td>
<td>74</td>
<td>0.06</td>
<td>0.08</td>
<td>0.06</td>
<td>0.8</td>
</tr>
<tr>
<td>1974-75</td>
<td>0.49</td>
<td>0.11</td>
<td>0.69</td>
<td>0.15</td>
<td>74</td>
<td>0.07</td>
<td>0.10</td>
<td>0.05</td>
<td>0.7</td>
</tr>
<tr>
<td>1975-76</td>
<td>0.59</td>
<td>0.14</td>
<td>0.74</td>
<td>0.18</td>
<td>82</td>
<td>0.10</td>
<td>0.13</td>
<td>0.07</td>
<td>0.9</td>
</tr>
<tr>
<td>1976-77</td>
<td>0.62</td>
<td>0.14</td>
<td>0.76</td>
<td>0.18</td>
<td>88</td>
<td>0.11</td>
<td>0.13</td>
<td>0.07</td>
<td>0.8</td>
</tr>
<tr>
<td>1977-78</td>
<td>0.73</td>
<td>0.19</td>
<td>0.83</td>
<td>0.26</td>
<td>88</td>
<td>0.14</td>
<td>0.16</td>
<td>0.09</td>
<td>1.0</td>
</tr>
<tr>
<td>1978-79</td>
<td>0.63</td>
<td>0.15</td>
<td>0.76</td>
<td>0.19</td>
<td>86</td>
<td>0.12</td>
<td>0.14</td>
<td>0.07</td>
<td>0.9</td>
</tr>
<tr>
<td>1979-80</td>
<td>0.59</td>
<td>0.14</td>
<td>0.74</td>
<td>0.18</td>
<td>86</td>
<td>0.12</td>
<td>0.17</td>
<td>0.07</td>
<td>0.9</td>
</tr>
<tr>
<td>1980-81</td>
<td>0.56</td>
<td>0.12</td>
<td>0.72</td>
<td>0.16</td>
<td>73</td>
<td>0.11</td>
<td>0.17</td>
<td>0.06</td>
<td>0.9</td>
</tr>
<tr>
<td>1981-82</td>
<td>0.55</td>
<td>0.12</td>
<td>0.72</td>
<td>0.15</td>
<td>67</td>
<td>0.11</td>
<td>0.16</td>
<td>0.06</td>
<td>0.8</td>
</tr>
<tr>
<td>1982-83</td>
<td>0.78</td>
<td>0.26</td>
<td>0.86</td>
<td>0.29</td>
<td>72</td>
<td>0.27</td>
<td>0.39</td>
<td>0.11</td>
<td>1.6</td>
</tr>
<tr>
<td>1983-84</td>
<td>0.78</td>
<td>0.26</td>
<td>0.87</td>
<td>0.29</td>
<td>68</td>
<td>0.26</td>
<td>0.35</td>
<td>0.11</td>
<td>1.4</td>
</tr>
<tr>
<td>1984-85</td>
<td>0.8</td>
<td>0.26</td>
<td>0.87</td>
<td>0.29</td>
<td>73</td>
<td>0.30</td>
<td>0.42</td>
<td>0.12</td>
<td>1.6</td>
</tr>
<tr>
<td>1985-86</td>
<td>0.8</td>
<td>0.25</td>
<td>0.88</td>
<td>0.28</td>
<td>72</td>
<td>0.25</td>
<td>0.33</td>
<td>0.11</td>
<td>1.4</td>
</tr>
<tr>
<td>1986-87</td>
<td>0.75</td>
<td>0.20</td>
<td>0.85</td>
<td>0.23</td>
<td>75</td>
<td>0.17</td>
<td>0.26</td>
<td>0.09</td>
<td>1.3</td>
</tr>
<tr>
<td>1987-88</td>
<td>0.76</td>
<td>0.22</td>
<td>0.86</td>
<td>0.24</td>
<td>67</td>
<td>0.17</td>
<td>0.24</td>
<td>0.09</td>
<td>1.3</td>
</tr>
<tr>
<td>1988-89</td>
<td>0.77</td>
<td>0.20</td>
<td>0.87</td>
<td>0.22</td>
<td>69</td>
<td>0.16</td>
<td>0.23</td>
<td>0.09</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Notes:

1. Series 1 = \( \bar{Y} = \frac{Y - WL_2}{Y} \);  2 = \( \bar{Y} = \frac{Y - WL_2}{O} \);  3 = \( \bar{Y} = \frac{Y - WL_1}{Y} \)  
   \( 4 = \bar{Y} = \frac{Y - WL_1}{O} \);  5 = \( U_c \);  6 = \( \frac{Y}{K} \);  7 = \( \frac{YA}{K} \);  8 = \( \frac{Y}{K} \)  
   \( 9 = \frac{YA}{K} \)

   Where \( \bar{Y}(Y) \) refers to value added at current prices (constant prices); \( O \) (\( O \)) refers to output at current (constant prices); \( YA \) refers to capacity output i.e., \( 1/U_c \), where \( U_c \) is the industry capacity utilization index; \( WL_1 \) = wage bill for workers; \( WL_2 \) = wage bill for total employees.

2. Value added and output data are from Table 6.13; capacity utilisation is derived from data from table 5.1; wage bill (emoluments) data from table 6.7 and 6.8.
Table 7.3

Price Ratio Indices Indicating Pattern of Profitability
(Cement Industry 1973-74 to 1988-89)

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-74</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100</td>
</tr>
<tr>
<td>1974-75</td>
<td>120.3</td>
<td>103.6</td>
<td>103.2</td>
<td>86.0</td>
<td>105.0</td>
<td>180</td>
</tr>
<tr>
<td>1975-76</td>
<td>123.6</td>
<td>120.9</td>
<td>114.4</td>
<td>97.9</td>
<td>102.0</td>
<td>131</td>
</tr>
<tr>
<td>1976-77</td>
<td>100.6</td>
<td>128.0</td>
<td>114.4</td>
<td>127.2</td>
<td>96.0</td>
<td>137</td>
</tr>
<tr>
<td>1977-78</td>
<td>117.0</td>
<td>121.1</td>
<td>110.0</td>
<td>103.6</td>
<td>95.0</td>
<td>131</td>
</tr>
<tr>
<td>1978-79</td>
<td>119.1</td>
<td>131.8</td>
<td>112.5</td>
<td>110.7</td>
<td>96.0</td>
<td>133</td>
</tr>
<tr>
<td>1979-80</td>
<td>138.1</td>
<td>141.5</td>
<td>105.1</td>
<td>102.5</td>
<td>91.0</td>
<td>122</td>
</tr>
<tr>
<td>1980-81</td>
<td>146.4</td>
<td>129.0</td>
<td>102.8</td>
<td>88.1</td>
<td>80.0</td>
<td>131</td>
</tr>
<tr>
<td>1981-82</td>
<td>118.5</td>
<td>132.8</td>
<td>107.6</td>
<td>112.1</td>
<td>76.0</td>
<td>152</td>
</tr>
<tr>
<td>1982-83</td>
<td>151.4</td>
<td>166.5</td>
<td>130.0</td>
<td>110.0</td>
<td>90.0</td>
<td>187</td>
</tr>
<tr>
<td>1983-84</td>
<td>135.7</td>
<td>171.2</td>
<td>132.2</td>
<td>126.2</td>
<td>92.0</td>
<td>188</td>
</tr>
<tr>
<td>1984-85</td>
<td>128.7</td>
<td>176.9</td>
<td>116.5</td>
<td>137.4</td>
<td>91.0</td>
<td>149</td>
</tr>
<tr>
<td>1985-86</td>
<td>133.4</td>
<td>176.7</td>
<td>129.3</td>
<td>132.5</td>
<td>91.0</td>
<td>183</td>
</tr>
<tr>
<td>1986-87</td>
<td>150.2</td>
<td>154.8</td>
<td>119.3</td>
<td>103.1</td>
<td>75.0</td>
<td>193</td>
</tr>
<tr>
<td>1987-88</td>
<td>130.5</td>
<td>143.9</td>
<td>113.2</td>
<td>110.3</td>
<td>72.0</td>
<td>182</td>
</tr>
<tr>
<td>1988-89</td>
<td>144.2</td>
<td>136.4</td>
<td>100.8</td>
<td>94.6</td>
<td>66.0</td>
<td>155</td>
</tr>
</tbody>
</table>

Note:  
1 = \( \frac{P_K}{P_O} \); 2 = \( \frac{P_w}{P_O} \); 3 = \( \frac{P_w}{P_M} \); 4 = \( \frac{P_w}{P_K} \); 5 = \( \frac{P_w}{P_F} \); 6 = \( \frac{P_w}{P_R} \); where \( P_K \) stand for fixed assets price index for cement industry; \( P_w \) stands for cement price index; \( P_M \) stands for input price index for cement industry; \( P_O \) stands for consumer price index for industrial labors; \( P_F \) stands for the price index for fuels; \( P_R \) stands for the price index for raw materials.

2. Refer to table 6.6 for data on \( P_K \); table 6.12 for data on \( P_M, P_F \) and \( P_R \); table 6.14 for data on \( P_W \) and table 6.15 for data on \( P_O \).
that constitute the total input; the weights that are used to combine these price indices are based upon the share of individual items in the total input in the base period, i.e., 1973-74. However, the industry over the time period has experienced technological change in terms of relative use of materials and fuels. In case there is a change in the ratio of fuels and materials (or fuel efficiency i.e. fuels in terms of a unit of material input) then an increase in prices of fuels relative to materials would be underbiased in a study that explicitly takes into account any technological change.

Table 7.2 highlights the three different sources that may influence a change in pattern of profitability. Here data series 1, 2, 3 and 4 show two different measures of profit shares and gross profit margins. Profit shares (data series 1 & 3) refer to gross profit divided by gross value-added, both at current prices while the measure of gross profit margin (data series 2 & 4) is discussed in terms of a ratio of gross profit to gross output, measured at current prices. The two different measures for each is due to two different measures of gross profit adopted; one measure deducts wages while the other deducts employee's emoluments from the gross value-added. Table 7.2 shows that all these measures of profit shares and gross profit margins registers an upward trend. The trend of these measures also closely
matches the trend of $r_2$, except in the case $Y - wL_2/Y$, the data series 3 in the table. Hence, it can be maintained that the increase in profit shares and gross profit margin, excepting the case of data series 3, can be considered to be important sources of influence for the increase in $r_2$.

Second, in the table, the capacity utilization or data series 5, in table 7.2. show a steady decrease throughout the period of study. This is just the opposite of the trend observed with respect to $r_2$. Hence it can be maintained that the trend of capacity utilization, at best has a counter-balancing effect on the rate of profit ($r_2$) in the period under study.

Third, the most important source, it seems is the change of pattern in capacity-output to capital ratio. The measure of $Y_A/K$ (data series 7) where $Y_A$ is the measure of capacity output adopted here, shows a clear upward trend in the period from 1973-74 to 1988-89 (i.e., 7.29 per cent per annum) and then a sharp increase of 144 per cent between 1981-82 and 1982-83, to decrease thereafter in the second period, from 1982-83 to 1988-89 (decrease of -8.42 per cent per annum). Similarly, the trend in $Y/K$ (data series 6) shows an increase of 6.76 per cent per annum over the time period with a sharp increase of 146 per cent from 1982-83 to 1983-84. The data also shows an increase in the in the first period and a decrease in the second period.
The above described trend in $Y_A/K$ and $Y/K$ is the same as is observed in the case of rate of profit considered here. Hence, the trend in $Y/K$ can be considered to be an important source determining the pattern of rate of profit.

In the short-period context, in which the rate of profit is also analysed, it is desirable to examine the price ratios that define these three sources independent of technological change. This is profiled in table 7.3.

Table 7.3 shows that $P_K/P_O$ ratio, or the price formulation for $Y_A/K$ in the short-run context, shows an upward trend. However, equation 7.4 shows that $P_K/P_O$ and $r_2$ has an inverse relationship and therefore, the increase in $P_K/P_O$ is not responsible for the increase in $r_2$ and may influence the rate of profit in the negative direction. At the same time, the price formulations for profit share, i.e., $P_W/P_O$, $P_W/P_M$ show an upward trend indicating the pattern of profit to be having an upward trend (equation 7.8). Individually, it can be seen that $P_W/P_O$ (price index of cement vis-a-vis price index of wage goods) has an upward trend with a sharp increase during 1982-83 i.e. from 132.8 in 1981-82 to 166.5 in 1982-83. Similarly, $P_W/P_M$ (price index of cement vis-a-vis price index for total inputs) shows an upward trend in the first period (from 1973-74 to 1981-82) to register an increase in 1982-83 and to decline.
thereafter. Though both \( P_{W/O} \) and \( P_{W/M} \) show the same pattern of change, the former is more pronounced in its increase than that of the latter. Moreover, since \( P_m \), the input price-index is a composite index of \( P_R \), the raw material price index and \( P_F \), the fuel price index\(^{18} \), one can discussed the trend of \( P_{w/M} \) in terms of the trend of \( P_{w/R} \) and \( P_{w/F} \). The data series in table 7.3 shows that while \( P_{w/F} \) has decreased over the period, \( P_{w/R} \) has increased and counter balances the effect of \( P_{w/F} \) to bring about the increase in \( P_{w/M} \). The pattern of change of \( P_{w/K} \), on the other hand, does not show any particular trend in the time period considered.

The trend of price ratios shows that \( P_{K/O} \) has a negative influence on the rate of profit, whereas the ratios \( P_{w/O}, P_{w/M} \) and essentially \( P_{w/R} \), have a positive influence on the trend of the rate of profit.

In the long-run context, data in table 7.2 shows that capital productivity, i.e., \( Y/K \) and \( Y_A/K \) at constant prices (data series 8 and 9), has increased over the time period and the trend closely matches the trend of \( r_2 \), i.e., a steady increase in the first period considered from 1973-74 to 1982-83 and a sharp increase in 1982-83 to 1983-84 to decline thereafter.

The empirical analysis to isolate the importance of the different factors both in the long-run and in the short-run
context is tried out in the following pages.

**Empirical Analysis**

In the empirical analysis the main emphasis is to see whether an increase in profitability reflects returns from technological progress, in the cement industry in India. The profile of data shows an increase in capital productivity but this indicator of technological progress should be interpreted cautiously. The measure of capital productivity is discussed in terms of a gross value-added at constant prices, say $Y_1$, which is obtained by deflating the nominal gross value-added by the cement price index. However, in literature it is mentioned that when cement price index changes differently from cost changes in terms of input price index, $P_W/P_M$, $Y_1$ is over-estimated and contains return to market-power.\(^{19}\)

Return to market-power is given by an increase in gross-profit-margin which is due to differential increases in output prices and input prices.\(^{20}\) The data in table 7.3 shows that there is an increase in $P_W/P_M$, which is the price formulation for the gross profit margin. In this case, the increase in capital productivity, as shown in table 7.2, may not entirely reflect returns from technological progress but may contain returns to market-power.
Similarly, it can be maintained that partly increases in profit share and gross profit margin may reflect that labour productivity has increased more than proportionate to the increase in wages and prices have increased more than proportionate to cost changes brought about by technological progress, respectively. However, the discussion on labour productivity on the basis of \( Y_1 \), is not tried out here, as \( Y_1 \) is taken to contain return to market-power when there is an increase in \( \frac{P_w}{P_m} \). The measure of productivity which is independent of any return to market-power is discussed in detail in the following chapter. In the following pages, the importance of price ratios in relation to profitability in the short-run context is tried out below.

The analysis to isolate the important price ratios that explain the change in profitability is tried out here. These price ratios show the main sources of change in profitability which are either a change in capacity-output to capital (employed) ratio or the profit share, in a short-period context.

The effects on profitability are studied by an OLS regression method. Profitability (e.g., taken to be the gross measure or \( r_2 \)) is regressed on the different price ratios; the relationship between price ratios and profitability is as discussed in equation 7.4, 7.8 and 7.9. The results are presented in table 7.4(a). In the regression
Table 7.4 (a)

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>PK/Po</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>(2.109)</td>
</tr>
<tr>
<td>PW/PM</td>
<td>0.004**</td>
</tr>
<tr>
<td></td>
<td>(2.767)</td>
</tr>
<tr>
<td>PW/PR</td>
<td>0.001**</td>
</tr>
<tr>
<td></td>
<td>(2.904)</td>
</tr>
<tr>
<td>PW/PF</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(.681)</td>
</tr>
<tr>
<td>PW/PO</td>
<td>0.002*</td>
</tr>
<tr>
<td></td>
<td>(4.680)</td>
</tr>
</tbody>
</table>

R²: .24 .67 .72 .85 .86
R2: .18 .61 .65 .83 .82
S.E.: .055 .038 .036 .024 .025
F: 4.44 13.08 10.46 39.72 24.97
D.W.: .783 1.800 2.49 2.036 2.017

Note:

1. Each regression equation results show the relationship of the dependent variable with the explanatory variable(s). Figures without parentheses are estimated coefficients corresponding to the explanatory variable(s), those without are estimated t-statistics.

* - significant at 1% level of significance
** - significant at 5% level of significance

2. For the definitions of variables and the relevant data series, refer to table 7.3
equations the influence of each independent variable is judged by its 't' statistic.

Table 7.4(a) shows that the most important effect is reflected by the change in cement prices (PW) in relation to consumer price index (PO), and also, to a lesser extent, to the prices of inputs, PM) [especially, to the price of materials (PR)]. However, the sign of the coefficient of PK/PO is positive though the analysis in the earlier pages points to a negative relationship between PK/PO and profitability (refer to page 213 of this chapter). It can therefore, be maintained that the ratio PK/PO has the effect of reducing profitability. However, this analysis of table 7.4(a) does not include an important variable, that is time, to reduce any specification bias that may result if one takes different ratios individually without taking into account other variables that affect profitability. This is tried out in table 7.4(b).

Table 7.4(b) shows that there is no change in the overall picture, even if time is taken up as an additional variable to explain profitability; here the coefficient of PK/PO have a negative sign (the coefficient is insignificant), and the influences of other significant variables, as shown in table 7.4(a) are not undermined in the results given in table 7.4(b).
Table 7.4 (b)

Regression Estimates: Profitability in Cement Industry
(1973-74 to 1988-89)

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Regressions</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>PK/Po</td>
<td>-0.0002</td>
<td>0.002</td>
<td>(-.322)</td>
</tr>
<tr>
<td>PW/PM</td>
<td>0.0009</td>
<td>(0.003^{**})</td>
<td>0.001</td>
</tr>
<tr>
<td>PW/PO</td>
<td>0.002*</td>
<td>0.002**</td>
<td>0.002**</td>
</tr>
<tr>
<td>Time</td>
<td>0.008</td>
<td>0.005**</td>
<td>0.0007</td>
</tr>
</tbody>
</table>

| \(R^2\)               | .86         | .36 | .78 | .85 |
| \(R^2\)               | .82         | .26 | .72 | .81 |
| S.E.                  | .025        | .051 | .031 | .026 |
| F                     | 24.69       | 3.51 | 13.50 | 20.93 |
| D.W.                  | 2.144       | .904 | 2.63 | 2.1865 |

Notes: same as in table 7.4 (a).
SECTION 7.4 NATURE OF FINDINGS

It is seen that the rate of profit has increased in the time period considered in this study (table 7.1), though the pattern of change points to the fact that there is a sharp break in the rate of change in 1982-83 which is highly significant. This is because this period also marks the partial liberalisation of the pricing policy with respect to cement industry and the consequent flow of investment into this industry which was accompanied by structural changes in the industry.

In the short-period context, the importance of changes in relative prices highlights only the influence of profit share in terms of changes in $\frac{P_W}{P_O}$ and $\frac{P_W}{P_M}$ (more specifically $\frac{P_W}{P_R}$), here are found to be the main determinant of the pattern of profitability. In the literature an increase of profit-share in terms of these relative prices does point to the possibility of market power in the industry. This is in line with the finding of Pradhan (1992) that the concentration ratio which was at a high level remained almost constant from 1973-74 to 1982-83 but increased during the latter period i.e. from 1982-83 to 1988-89.

However, data analysis shows that technological progress which is independent of relative price ratios also
influences the rate of profit. This may be reflected by the fact that the trend in the capacity-output to capital ratio also shows an increase in capital productivity, independent of any change in the relative prices, and this increase in capacity-output capital ratio can be a factor that influences the pattern of profitability in the industry.

Table 7.2 shows that both \( \frac{Y}{K} \) and \( \frac{Y}{K} \) (capital productivity at current and constant prices respectively) have increased and their trend has a strong influence on the rate of profit. However, this finding should be interpreted cautiously. These measure of capital productivity is maintained to contain return to market-power and hence, may not entirely reflect technological progress. The measures of productivity growth which do not contain returns to market power is discussed in the following chapter.
NOTES:


2. For a discussion along this line, refer to, A.Kisselgoff and F. Modigliani (1966), p. 341

3. For a choice of the concept of profitability see the discussion in Chapter IV of this thesis, pp. 100-105.

4. Comprehensive concept of capital is usually taken to mean the productive capital which combines both the working capital and the gross fixed capital. This study on the other hand, excludes working capital. The underlying rational is discussed in Chapter VI, Section 6.1


6. For details see Chapter VI, Section 6.2.

7. See Chapter IV, pp. 103-105.


10. The nature of demand shocks is analysed in Chapter III, section 3.1, pp. 67-69.


12. See Chapter III, pp. 69-76.


15. R. Chatterji (1989), pp. 47-51

17. One crucial aspect of increasing returns is that specialised machinery is economical only with high levels of output and hence an increase in capita labour ratio accompanying a large volume of output also see associated with an increase in capita productivity. See N. Kaldor (1977); pp.425-426. \(^1\) see n. 41 Chapter-1.

18. See Chapter VI, section 6.3

19. Discussed in detail in chapter VIII, Section 8.3

20. See chapter VIII, Section 8.3