CHAPTER-VII

DETERMINANTS OF PROFITABILITY
CHAPTER-VII
DETERMINANTS OF PROFITABILITY

7.1. INTRODUCTION

The profitability of a business firm is a function of both costs and price. A firm may incur loss either because of the costs go up, while the price remains the same or the price goes down while the costs remain the same. The second phenomenon of price decreasing does not ordinarily arise in most of the cases. In this context, this chapter is devoted to examine the causes for the low profitability of the selected cement companies in Tamil Nadu viz., India Cements Ltd (ICL) and Madras Cements Ltd (MCL) during the period 1993/94 -2007-08. The factors that influence the profitability are selected on the basis of the relevant theories as well as on the existing related literature. The determinants of profitability are analysed by using regression.

7.2 MEASUREMENT OF DETERMINANT VARIABLES

The evaluation of profitability of a firm in terms of its investments assets and in terms of capital contributed by creditors and owners is important because its survival will be threatened if it is unable to earn a satisfactory return on investment. The profitability of an investment depends generally on many factors. Since the factors which influence profitability are numerous and their measurement practices are different, it is necessary to specify variables and their measurement.
Some of the variables may be significant at one time, while others may be prominent at another time. Some variables may be taken at their absolute value, whereas others may be considered at their relative value. The use of variables in absolute term or in relative term to determine profitability depends on the objective for which it is being used.

Keeping the various measure of profitability (ROTA, ROCE and ROE), the following variables, on the ‘a-priori’ ground, have been identified as determinants of profitability in the present study. The variables chosen are costs and size of firm. The cost factors are expressed in relative value, whereas the size of firm is expressed in absolute value.

**7.2.1 SIZE OF FIRM**

The size of a firm may be measured in terms of either sales or assets or employees or net worth and so on. In this study, the size of firm is measured in terms of sales in money value.

**7.2.2 COST FACTORS**

The cost variables may be either total cost or specific costs. The specific costs used here are material cost, personnel cost, fuel cost, manufacturing cost, selling cost and depreciation cost.
*TOTAL COST (TC) RATIO:

Total cost means the total cost of production and sale of cement. The total cost variable has been expressed in relative term. It is calculated by dividing the amount of total cost by the amount of sales value which is given below.

\[
\text{TC ratio} = \frac{\text{Total Cost}}{\text{Sales}} \times 100
\]

This ratio is expressed in percentage. A low ratio is preferable so as to leave surplus for shareholders. The lower the ratio, the higher the profitability or vice versa. Hence, profitability is a decreasing function of TC ratio.

*MATERIAL COST (MC) RATIO:

This ratio is calculated by dividing the amount of material cost by the amount of sales value as given below.

\[
\text{MC ratio} = \frac{\text{Material Cost}}{\text{Sales}} \times 100
\]

It is expressed in percentage. A low ratio is preferable so as to leave sufficient margin to meet wage cost and to have enough surplus. The lower the ratio, the higher the profitability or vice versa. Hence profitability is a decreasing function of MC ratio.
*FUEL COST (FC) RATIO:

This ratio is computed by dividing fuel cost by sales as under:

\[
FC \text{ Ratio} = \frac{\text{Fuel cost}}{\text{Sales}} \times 100
\]

A low ratio is preferable so as to leave sufficient margin to meet financial charges and to provide surplus for share holders. The lower the ratio, the higher the profitability or vice versa. Hence profitability is an inverse function of FC ratio.

*MANUFACTURING COST (MFC) RATIO:

This ratio is calculated by dividing manufacturing cost by sales as:

\[
\text{MFC ratio} = \frac{\text{Manufacturing cost}}{\text{Sales}} \times 100
\]

It is expressed in percentage. A low ratio is advisable so as to leave enough margins to meet financial charges and to provide surplus. The lower the ratio is higher the profitability or vice versa. Hence, profitability is a decreasing function of MFC ratio.
* PERSONNEL COST (PC) RATIO:

This ratio is calculated by dividing personnel cost by sales as:

\[ \text{PC ratio} = \frac{\text{Personnel cost}}{\text{Sales}} \times 100 \]

It is expressed in percentage. A low ratio is advisable so as to leave sufficient margin to meet financial charges and to provide surplus. The lower the ratio, the higher the profitability or vice versa. Thus profitability is a decreasing function of PC ratio.

* SELLING COST (SC) RATIO:

This ratio is computed by dividing selling cost by sales as under:

\[ \text{SC Ratio} = \frac{\text{Selling cost}}{\text{Sales}} \times 100 \]

It is expressed in percentage. A low ratio is preferable so as to leave enough margins to meet financial charges and to provide surplus to the share holders. The lower the ratio, the higher the profitability or vice versa. Thus, profitability is a decreasing function of SC ratio.
**DEPRECIATION COST (DC) RATIO**

This ratio is calculated by dividing depreciation cost by sales as under:

\[
DC\text{ ratio} = \frac{\text{Depreciation cost}}{\text{Sales}} \times 100
\]

It is expressed in percentage. A low ratio is preferable so as to leave sufficient margin to meet financial charges and to provide surplus to the shareholders. The lower the ratio, the higher the profitability or vice versa. Thus, profitability is a decreasing function of DC ratio.

**7.3 EMPIRICAL ANALYSIS:**

As a sequel to the analysis of the trends in profitability, an attempt is made further to analyse the effects of these variables on the profitability of India Cements Ltd and Madras Cements Ltd by using regression.

**7.3.1 HYPOTHESIS:**

As stated earlier in the introduction chapter, the questions to be resolved in this chapter are:

a) How does size of firm affect profitability?

b) How do costs of production and sale affect profitability?
Corresponding to these questions the following hypotheses are formulated.

a) Profitability is an increasing function of size of firm.

b) Profitability is a decreasing function of costs of production and sale.

### 7.3.2 PROFITABILITY FUNCTION

Regarding the questions cited earlier, an attempt is made to answer by using the multiple regression technique. The function for profitability is estimated on the basis of the ordinary least squares method as under:

\[ P = F(S, C) \]

Where \( P \) = Profitability measured in terms of ROCE, ROTA and ROE.

\( S \) = Size of firm, measured in terms of sale value.

\( C \) = Cost of production and sale measured in terms of TC, MC, FC, PC, MFC, DC, SC.

Based on the above profitability function, six profitability models are developed as under:

\[ P = f(S, TC) \rightarrow \text{Model 1} \]

\[ P = f(S, MC, PC) \rightarrow \text{Model 2} \]

\[ P = f(S, MC, FC, PC) \rightarrow \text{Model 3} \]

\[ P = f(S, MC, FC, PC, MFC) \rightarrow \text{Model 4} \]

\[ P = f(S, MC, FC, PC, MFC, SC) \rightarrow \text{Model 5} \]
P = f(S, MC, FC, PC, MFC, SC, DC) → Model 6

Where P = ROE/ROCE / ROTA

S = Size of firm (sales)
TC = Total Cost
MC = Material Cost
FC = Fuel Cost
PC = Personnel Cost
MFC = Manufacturing Cost
SC = Selling Cost
DC = Depreciation Cost

7.3.3 SPECIFICATION OF VARIABLES

* Size of firm:

The coefficient of sales as a proxy for size of firm is expected to be positive. It implies that the increase in size of firm in terms of sales would tend to increase the profitability and vice versa.

* Costs of production and Sale:

The coefficients of costs, in terms of TC, MC, FC, PC, MFC, DC and SC are expected to be negative. It implies that the increase in cost would tend to decrease the profitability and vice versa.
7.4 RESULTS AND DISCUSSION

The regression results of the profitability in terms of ROCE, ROTA and ROE have been presented in an orderly manner under six profitability models.

7.4.1 PROFITABILITY MODEL 1

\[ P = a + b_1 s + b_2 TC \]  

The estimated regression results of the profitability model 1 for the selected cement companies during the period 1993/94 – 2007/08 are summarised in Table 7.1. It is evident that the estimated profitability function is found to be a good fit under all measures of profitability in ICL and MCL since the explanatory power of the equation measured by \( R^2 \) and F appear to be good. The value of \( R^2 \) varies from 0.93 to 0.76. That is, about 92 percent to 83 percent of the variations in ROCE, ROTA and ROE in the selected cement companies are explained by the variables in those equations. The regression as a whole is highly significant since the F-value is statistically significant at 1 percent level in both the companies under all measures of profitability.

It is clear from Table 7.1 that the co-efficient of size (\( b_1 \)) has unexpected negative sign in all measures of profitability in ICL and MCL. Further the negative co-efficient of this variable is found statistically significant in ICL and MCL. The sign specification of this variable is against the ‘a – priori’ expectation and it implies that the
TABLE 7.1
PROFITABILITY FUNCTION MODEL – 1
(1993 -94 to 2007- 08)

\[ P = f(S, TC) \]

<table>
<thead>
<tr>
<th>P</th>
<th>Co.</th>
<th>Co-efficient of</th>
<th>R²</th>
<th>F ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Constant</td>
<td>S</td>
<td>TC</td>
</tr>
<tr>
<td>ROE</td>
<td>ICL</td>
<td>150.601 (11.12)</td>
<td>-0.01</td>
<td>-134.78 (11.468)</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>167.00 (10.14)</td>
<td>-0.01</td>
<td>-161.93 (-9.50)*</td>
</tr>
<tr>
<td>ROCE</td>
<td>ICL</td>
<td>59.158 (5.670)</td>
<td>-5.379 (-1.975)***</td>
<td>-0.407 (-9.996)*</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>81.287 (5.966)</td>
<td>-7.246 (-2.343)**</td>
<td>-0.660 (-7.598)*</td>
</tr>
<tr>
<td>ROTA</td>
<td>ICL</td>
<td>50.441 (5.555)</td>
<td>-4.638 (-1.957)***</td>
<td>-0.344 (-9.716)*</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>69.384 (6.003)</td>
<td>-6.255 (-2.384)**</td>
<td>-0.560 (-7.600)*</td>
</tr>
</tbody>
</table>

Note: Figures in parenthesis are computed ‘t’ value.
Significant level: * 1 percent, ** 5 percent, *** 10 percent.
Source: Centre for Monitoring Indian Economy (CMIE), Mumbai, India.
increase in sales (size) results in decrease in profitability. The hypothesis that profitability is an increasing function of size has not been proved under this Model 1.

It is a theoretical expectation that cost has a definite and negative relationship with profitability. As such, the TC has a negative coefficient \((b_2)\) and it is highly significant at one percent level in all the three measures of both in ICL and MCL. It implies that the increase or decrease in total cost will significantly affect profitability of both the companies. Here, the sign specification of this variable is confirmed. It shows that there is an inverse relationship between profitability and total cost of ICL and MCL during the period of study. The hypothesis that profitability is a decreasing function of TC has been proved under this Model 1.

To conclude, the TC ratio and size of firm have been found to have significant negative impact on all measures of profitability in both the selected cement companies. It may therefore, be concluded that the TC ratio appears to be the determinant of profitability in ICL and MCL during the period of study. It strongly proves that the increase in TC decreases the profitability of these two companies under study, whereas the increase in size (sales) does not increase the profitability.
7.4.2 PROFITABILITY MODEL 2

The profitability Model 2 has been framed by using three variable viz., size (S), material cost (MC) and fuel cost (FC) as under:

\[ P = a + b_1 S + b_2 MC + b_3 FC \] Model – 2

The estimated regression results of the profitability Model – 2 for the selected cement companies during the period 1993/94 – 2007/08 are exhibited in Table 7-2.

It is clear from Table 7.2 that the overall fit of the regressions measured by R square and F appear to be good in ICL and MCL. The value of \( R^2 \) varies from 0.83 to 0.58. Thus about 83 percent to 58 percent of the variation in profitability of the selected companies is explained by the variables in that equation. The profitability Model 2 as a whole is highly significant since the F value is significant at 1 percent level in both the companies. The results in respect of the significance of the independent variables included in this equation in determining the profitability of ICL and MCL are presented as follows:

It is clear from Table 7.2 that the co-efficient of size\( (b_1) \) under all measures of profitability has the appropriate positive sign in MCL, whereas the negative sign has been occurred in ICL. However, the negative sign in ICL is statistically not significant, whereas the positive sign in MCL is statistically significant. The theoretical expectation is confirmed only in MCL and proves that if the size of
### TABLE 7.2

**PROFITABILITY FUNCTION MODEL – 2**

(1993-94 to 2007-08)

\[ P = f(S, MC, FC) \]

<table>
<thead>
<tr>
<th></th>
<th>Co.</th>
<th>Co-efficient of</th>
<th></th>
<th></th>
<th></th>
<th>R²</th>
<th>F ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Constant</td>
<td>S</td>
<td>MC</td>
<td>FC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ROE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ICL</td>
<td>117.53 (3.35)</td>
<td>0.00</td>
<td>-28.16</td>
<td>-349.32</td>
<td>0.58</td>
<td>4.993**</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>55.36 (1.68)</td>
<td>0.02</td>
<td>-400.54</td>
<td>9.76</td>
<td>0.64</td>
<td>6.37**</td>
</tr>
<tr>
<td><strong>ROCE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ICL</td>
<td>44.647 (2.864)</td>
<td>-2.143</td>
<td>0.863</td>
<td>-1.512</td>
<td>0.78</td>
<td>13.285*</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>7.637 (0.359)</td>
<td>12.763</td>
<td>-2.313</td>
<td>-0.431</td>
<td>0.82</td>
<td>16.982*</td>
</tr>
<tr>
<td><strong>ROTA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ICL</td>
<td>38.687 (2.910)</td>
<td>-1.940</td>
<td>0.671</td>
<td>-1.270</td>
<td>0.78</td>
<td>13.125*</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>9.751 (0.546)</td>
<td>10.076</td>
<td>-1.904</td>
<td>-0.440</td>
<td>0.83</td>
<td>17.449*</td>
</tr>
</tbody>
</table>

Note: Figures in parenthesis are computed ‘t’ value.
Significant level: * 1 percent, **5 percent, *** 10 percent.
Source: Centre for Monitoring Indian Economy (CMIE), Mumbai, India.
the MCL increases, the profitability also increases. Hence, the hypothesis that profitability is an increasing function of size of firm has been proved in the case of MCL under the profitability Model 2.

Table 7.2 also exhibits that the co-efficient of MC ($b_2$) in all cases of profitability in MCL is found to be of negative sign. The negative co-efficient is statistically significant at one percent level in all three measures of profitability in MCL. It confirms that the theoretical expectation is correct and proves that if the MC of the MCL increases, the profitability decreases and vice versa. But in case of ICL, the co-efficient of MC is found to be of negative sign only in the case of ROE, whereas in all other measures of profitability, the co-efficient of this variable is found to be of positive sign where the theoretical expectation has not been proved. It implies that the behaviour of ROCE and ROTA is more or less independent of material cost.

It is also clear from the Table 7.2 that the co-efficient of FC is found to be of negative sign in all three measures of the profitability of the selected cement companies. This negative co-efficient of FC in all three measures of profitability in ICL is found to be significant at one percent level. It means that it confirms the theoretical expectation and proves that if the FC increases, the profitability decreases and vice versa. But in case of MCL, the negative co-efficient of FC is not significant in all three measures of the profitability under study.

To conclude, the MC is found to be the most significant determinant of profitability in MCL, whereas the FC is an important determinant of profitability in ICL under model 2. The size of firm,
another factor, also influenced the ROE, ROCE and ROTA in MCL, while it did not influence in the case ICL. The MCL did not affect the profitability in ICL, whereas the FC did not influence profitability in MCL.

7.4.3 PROFITABILITY MODEL 3

The profitability Model 3 has been formulated by using four variables viz., size, material cost (MC), and fuel cost (FC) and personnel cost (PC) as shown below:

$$ P = a + b_1 S + b_2 MC + b_3 FC + b_4 PC - \text{Model 3} $$

The estimated regression results of the profitability Model 3 for the selected cement companies during the period 1993/94 – 2007/08 are presented in Table 7.3.

It is clear from Table 7.3 that the estimated regression function is found statistically good fit since the explanatory power of the equation measured by $R^2$ and F appears to be good. About 81 percent to 71 percent of the variation in ROE, 88 percent to 82 percent of the variations in ROCE and ROTA of the selected companies are explained by the variables in this model. The results in respect of the significance of the independent variables included in this model in determining the ROE, ROCE and ROTA in ICL and MCL are presented as follows.
### TABLE 7.3

**PROFITABILITY FUNCTION MODEL – 3**

(1993-94 to 2007-08)

\[ P = f(S, MC, FC, PC) \]

<table>
<thead>
<tr>
<th>P</th>
<th>Co.</th>
<th>Co-efficient of</th>
<th>( R^2 )</th>
<th>F ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Constant</td>
<td>S</td>
<td>MC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>ICL</td>
<td>145.12</td>
<td>-0.01</td>
<td>77.91</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.40)</td>
<td>(-1.80)</td>
<td>(0.29)</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>94.16</td>
<td>0.01</td>
<td>55.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.36)</td>
<td>(0.76)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>ROE</td>
<td>ICL</td>
<td>59.385</td>
<td>-5.978</td>
<td>1.021</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.289)</td>
<td>(-1.266)</td>
<td>(1.326)</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>26.826</td>
<td>7.327</td>
<td>-1.283</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.307)</td>
<td>(1.326)</td>
<td>(-1.912)**</td>
</tr>
<tr>
<td>ROTA</td>
<td>ICL</td>
<td>52.095</td>
<td>-5.440</td>
<td>0.816</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.383)</td>
<td>(-1.372)</td>
<td>(-1.261)</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>26.191</td>
<td>5.419</td>
<td>-1.022</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.538)</td>
<td>(1.182)</td>
<td>(-1.834)**</td>
</tr>
</tbody>
</table>

Note: Figures in parenthesis are computed 't' value.

Significant level: * 1 percent, ** 5 percent, *** 10 percent.

Source: Centre for Monitoring Indian Economy (CMIE), Mumbai, India.
It is clear from Table 7.3 that the coefficient of size (sales) has an unexpected negative sign in all three measures of profitability in ICL, whereas it has positive sign in MCL. Neither the negative coefficient nor the positive coefficient of size is statistically significant under all three measures of profitability in both firms under study. The hypothesis that profitability is an increasing function of size has not been proved under this model 3.

It is seen from the results exhibited in Table 7.3 that under the coefficient of MC is found to be of negative sign under ROCE and ROTA in MCL and positive sign under ROE and ROCE in ICL. This negative coefficient is significant at 10 percent level under ROCE and ROTA in MCL. The theoretical expectation of the MC is confirmed only under ROCE and ROTA. But at the same time, the coefficient of MC in ICL is found to be of positive sign which is not significant at all. In ICL, the theoretical expectation of MC has not been proved in all three measures of profitability. Hence, the hypothesis that profitability is a decreasing function of MC has been proved in MCL only.

As expected, the coefficient of FC is found to be of negative sign in all three measures of profitability of the two selected companies. This negative coefficient is found statistically significant at one percent level for ROE, ROCE and ROTA in ICL only, whereas in MCL it is insignificant in all three measures of profitability. It confirms the theoretical expectation and proves that if the FC increases, the profitability of ICL decreases and vice versa. But in MCL the theoretical expectation has not been proved. It can strongly
be said that the FC is found to be the most significant determinant of profitability of ICL under the Model 3.

Table 7.3 also shows that the co-efficient of personal cost (PC) is found to be negative sign in all three measures of profitability in both the companies. The negative co-efficient of PC is found significant at 5 percent level under ROCE and ROTA in MCL, whereas it is statistically insignificant in all three measures of the profitability in ICL. The theoretical expectation of this variable is proved only in MCL. It can be concluded that the PC is found to be the most significant determinant of ROE, ROCE and ROTA in MCL, whereas it influenced ROE in MCL.

To sum up, FC is significant determinant of profitability in ICL, whereas PC and MC are the significant determinants of profitability in MCL during the study period of study.

7.4.4 PROFITABILITY MODEL 4

The Profitability Model 4 has been formulated by using five variables viz., size (S), material cost (MC), fuel cost (FC), personnel cost (PC) and manufacturing (MFC) as given below:

\[
P = a + b_1 S + b_2 MC + b_3 FC + b_4 PC + b_5 MFC \Rightarrow \text{Model 4}
\]

The estimated regression results of the profitability Model 4 for the selected cement companies during the period 1993/94 – 2007-08 are shown in Table 7.4.
It is evident from the results exhibited in Table 7.4 that the estimated regression function for all three measures of profitability of selected cement companies is found to be statistically good fit since the explanatory power of the model measured by R square and F appears to be good. That is about 87 percent to 75 percent of the variation in ROE, 90 percent to 89 percent of the variation in ROCE and 90 percent of the variation in ROTA of the two selected companies are explained by the variables in this model.

From the regression results, it is understood that the coefficient of size (sales) has obtained a positive but insignificant sign under ROTA in ICL and MCL. Under ROCE, this coefficient has obtained negative but insignificant sign in MCL and insignificant positive sign in ICL. Further, this coefficient \( b_1 \) has positive sign in MCL and negative sign in ICL under ROE. It shows that a size did not affect the profitability in both firms. As expected, the coefficient of MC has significant negative sign in MCL under ROCE and ROTA measure of profitability. It implies that MC reduces profitability in MCL. On the contrary the MC did not influence the profitability in ICL. The coefficient of this variable is insignificant under ROE in MCL. In MCL, the theoretical expectation is confirmed and it is proved that if the MC of the company decreases the ROCE and ROTA increase and vice versa. In ICL, the positive coefficient of MC is found to be statistically insignificant in all three measures of profitability. It implies that the MC does not have any relationship with the profitability of ICL.
### TABLE 7.4

**PROFITABILITY FUNCTION MODEL - 4**

(1993-94 to 2007-08)

\[ P = f(S, MC, FC, PC, MFC) \]

<table>
<thead>
<tr>
<th>Co.</th>
<th>Constant</th>
<th>S</th>
<th>MC</th>
<th>FC</th>
<th>PC</th>
<th>MFC</th>
<th>R²</th>
<th>F ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>ICL</td>
<td>102.38 (2.01)</td>
<td>-0.00 (-0.18)</td>
<td>-46.21 (-0.16)</td>
<td>-175.44 (-1.10)</td>
<td>-656.74 (-2.24)**</td>
<td>0.75</td>
<td>5.26**</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>71.79 (2.73)</td>
<td>0.01 (1.48)</td>
<td>91.87 (0.59)</td>
<td>-1.18 (-0.01)</td>
<td>-1667.11 (-2.60)**</td>
<td>0.87</td>
<td>12.44*</td>
</tr>
<tr>
<td>ROCE</td>
<td>ICL</td>
<td>-1.823 (-0.067)</td>
<td>8.881 (1.319)</td>
<td>0.811 (1.322)</td>
<td>-0.972 (-3.487)*</td>
<td>-1.005 (-1.427)</td>
<td>0.90</td>
<td>15.878*</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>3.546 (0.120)</td>
<td>12.895 (-1.724)</td>
<td>-1.371 (-2.048)**</td>
<td>-0.370 (-0.831)</td>
<td>-2.724 (-1.109)</td>
<td>0.89</td>
<td>14.968*</td>
</tr>
<tr>
<td>ROTA</td>
<td>ICL</td>
<td>1.571 (0.068)</td>
<td>6.825 (1.91)</td>
<td>0.642 (1.231)</td>
<td>-0.831 (-3.430)*</td>
<td>-0.937 (-1.564)</td>
<td>0.898</td>
<td>15.764*</td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>8.243 (0.334)</td>
<td>9.712 (1.559)</td>
<td>-1.090 (-1.943)*</td>
<td>-0.383 (-1.027)</td>
<td>-2.469 (-1.200)</td>
<td>0.895</td>
<td>15.387*</td>
</tr>
</tbody>
</table>

Note: Figures in parenthesis are computed 't' value.
Significant level: * 1 percent, ** 5 percent, *** 10 percent.
Source: Centre for Monitoring Indian Economy (CMIE), Mumbai, India.
As expected, the co-efficient of FC is found to be of negative sign under all three measures of profitability in ICL and MCL. But in ICL the negative co-efficient is found significant at one percent level under ROCE and ROTA, whereas it is insignificant under ROE. The theoretical expectation is confirmed only under ROCE and ROTA. In ICL, it is proved that if fuel cost (FC) increases, the ROCE as well as ROTA decreases and vice versa. Moreover the co-efficient of FC is insignificant in all three measures of profitability in MCL. It shows FC did not influence the profitability in MCL, whereas it influences in ICL.

Table 7.4 also shows that the co-efficient of PC is statistically insignificant under ROCE and ROTA measures of profitability both in ICL and MCL. However, it is significant under ROE both in ICL and MCL. It implies that if personnel cost increases, the profitability (ROE) will decrease or vice versa.

In addition, the manufacturing cost (MFC) is found to be of positive sign in ICL under all three measures of profitability. However, it is significant under ROCE and ROTA measure of profitability in ICL. The theoretical expectation has not been proved here. It implies that if MFC increases the profitability (ROCE or ROTA) will increases. It is against the hypothesis that profitability is a decreasing function of MFC.

On the other hand, there is an unexpected positive but significant sign under ROE has been seen in MCL. It is just against
the theoretical expectation and implies that if the manufacturing cost increases the profitability will increase.

It is concluded that FC is the most important determinant of ROCE and ROTA in ICL, whereas MC is the significant determinant of ROCE and ROTA in MCL. The PC influenced the ROE measure of profitability in ICL and MCL.

### 7.4.5 PROFITABILITY MODEL 5

The Profitability Model 5 has been formulated by using six variables viz., size, (S), material cost (MC), Fuel Cost (FC), Personnal Cost (PC), Manufacturing Cost (MFC) and selling and distribution cost (SC) as given below:

\[ P = a + b, S + b_2 MC + b_3 FC + b_4 PC + b_5 MFC + b_6 SC \]

The estimated regression results of the Profitability Model 5 for the selected cement companies during the period 1993/94 – 2007/08 are presented in Table 7.5.

It is seen from the results exhibited in Table 7.5 that the estimated regression function is found statistically good fit since the explanatory power of the equation measured by \( R^2 \) and \( F \) appears good in all three measures of profitability in ICL and MCL. The value of \( R^2 \) varies from 0.90 to 0.77 in case of ROE, from 0.95 to 0.89 in case of ROCE and from 0.95 to 0.90 in case of ROTA of both the selected companies. That is, about 90 percent to 77 percent of the variations
### TABLE 7.5
PROFITABILITY FUNCTION MODEL - 5
(1993-94 to 2007-08)

<table>
<thead>
<tr>
<th>Co.</th>
<th>S</th>
<th>MC</th>
<th>FC</th>
<th>PC</th>
<th>MFC</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P</strong></td>
<td><strong>Constant</strong> 161.32 (2.00)</td>
<td>78.14 (3.08)</td>
<td>33.702 (1.406)</td>
<td>3.957 (0.115)</td>
<td>30.818 (1.465)</td>
<td>8.508 (0.296)</td>
</tr>
<tr>
<td><strong>ICL</strong></td>
<td>-0.00 (-0.43)</td>
<td>0.01 (0.82)</td>
<td>1.052 (1.032)</td>
<td>1.885 (1.822)</td>
<td>2.490 (2.160)</td>
<td>2.833 (*0.022)</td>
</tr>
<tr>
<td><strong>ROE</strong></td>
<td>-77.90 (-0.41)</td>
<td>15.24 (0.16)</td>
<td>1624.97 (2.66)</td>
<td>-71.46 (-1.40)</td>
<td>24.895 (0.95)</td>
<td>-9.45 (0.29)</td>
</tr>
<tr>
<td><strong>ROCE</strong></td>
<td>-128.83 (-2.66)</td>
<td>-1.349 (-1.40)</td>
<td>-2.490 (-2.16)</td>
<td>-1.424 (-1.40)</td>
<td>2.658 *** (-1.93)</td>
<td>-0.09 (-0.022)</td>
</tr>
<tr>
<td><strong>ROTA</strong></td>
<td>-728.86 (-2.39)</td>
<td>-1.349 (-1.40)</td>
<td>-2.490 (-2.16)</td>
<td>-1.424 (-1.40)</td>
<td>2.658 *** (-1.93)</td>
<td>-0.09 (-0.022)</td>
</tr>
</tbody>
</table>

**Note:** Figures in parenthesis are computed t-value.

**Source:** Centre for Monitoring Indian Economy (CMIE), Mumbai, India.

**Significant level:** * 1 percent, ** 5 percent, *** 10 percent.

**Source:** Centre for Monitoring Indian Economy (CMIE), Mumbai, India.
in ROE, 95 to 89 percent of the variations in ROCE and 95 to 90 percent of the variations in ROTA are explained by the variables in this model.

From the regression results presented in Table 7.5, it is evident that the co-efficient of size $b_1$ has the appropriate positive sign in all the measures of profitability of ICL and MCL. Further the positive co-efficient of this variable is statistically insignificant in all measures of profitability of both the companies. It shows that it does not confirm the theoretical expectation and disproves the hypothesis that if the size increases, the profitability will increases.

Moreover, it is clear from Table 7.5 that the co-efficient of MC is found to be of negative sign in all measures of profitability of MCL. The negative sign under ROCE in MCL is found to be statistically significant at 10 percent level. Here the theoretical expectation is confirmed. It implies that changes in MC affect the ROCE in MCL. Except this, the co-efficient of MC in all other measures of profitability in MCL is found to be insignificant. It implies that changes in MC do not affect ROE and ROTA of the company. In the case of ICL the co-efficient of MC is found to be of unexpected positive sign and also insignificant. It implies that changes in MC do not affect the profitability in ICL.

With regard to fuel cost (FC), the co-efficient of this variable is found to be of negative sign in all the three measures of profitability of both the selected companies. The negative co-efficient is significant
at 10 percent level only under ROCE in ICL since it confirms the theoretical expectation and proves that if the FC increases, the ROCE will decrease and vice versa. On the other hand, the co-efficient of FC in all three measures of profitability in MCL has been registered as insignificant. It shows that the variable FC did not have relationship with the profitability of MCL during the period of study.

It is also observed from Table 7.5 that the co-efficient of personnel cost (PC) in all the three measures of profitability of both the selected companies have the expected negative signs. Further the negative co-efficient is found statistically significant in the case of ROE, ROCE and ROTA in ICL since it confirms the theoretical expectation and proves that if the personal cost increases, the ROE, ROCE and ROTA decrease and vice verse. In contrast, the co-efficient of PC is insignificant in MCL under ROCE and ROTA measure of profitability. It implies that the variable PC is not a determinant factor of profitability in MCL with regard to ROCE and ROTA. Besides, the coefficient of PC has obtained a negative sign and also significant with ROE in MCL. It implies that if PC decreases, the ROE will increase and vice versa.

The manufacturing cost (MFC) included in this model does not have any significant relationship with the profitability of both the companies. It is observed that the MFC has an unexpected positive sign in all measures of profitability of MCL, whereas in ICL, it has expected negative sign only in the case of ROCE and ROTA. But the co-efficient of this variable in both companies are statistically insignificant with profitability.
Selling and distribution cost (SC) is also one of the most important variable included in this model. The co-efficient of SC is found to be the negative sign with all measures of the profitability in ICL and MCL. The co-efficient is found significant at 5 percent level with ROCE and ROTA measures of profitability in ICL since the theoretical expectation is confirmed and proved that if the selling cost increases, profitability decreases and vice versa. On the other hand, the co-efficient of SC is insignificant with all the measures of profitability in MCL. It implies that changes in SC do not affect the profitability of MCL.

To conclude, it is found that the PC is significant determinant of the ROE in ICL and MCL. Besides, the PC, SC and FC influenced the ROCE and ROTA the case of ICL, whereas the MC influenced the ROCE and ROTA in MCL under this model. The size did not influence the profitability both in ICL and MCL during the period of study.

7.4.6 PROFITABILITY MODEL 6

The Profitability Model 6 has been formulated by using seven variables viz., size (S), Material cost (MC), Fuel cost (FC), Personal cost (PC), Manufacturing cost (MFC), Selling and distribution cost (SC) and Depreciation cost (DC) as given below.

\[ P = a + b_1 S + b_2 MC + b_3 FC + b_4 PC + b_5 MFC + b_6 SC + b_7 DC \]

\( \rightarrow \) Model 6.
The estimated regression results of the profitability Model 6 for the selected cement companies during the period 1993/94 - 2007/08 are presented in Table 7.6.

The results of this model indicate that the estimated regression function is statistically found good fit since the model has the high explanatory power as measured by $R^2$ and F appear to be good. About 92 to 80 percent of the variation in ROE, 96 percent of variations in ROCE and 97 to 95 percent variations in ROTA are explained by the variables in those equation.

Table 7.6 shows the results of this regression model which indicates that the co-efficient of size is negative and insignificant with all three measures of profitability in MCL, whereas it is insignificant with in all three measures of profitability in ICL. It implies that the increase or decrease in size will not affect the profitability of the selected cement companies since the theoretical expectation has not been proved during the study period.

Further, Table 7.6 shows that the co-efficient of MC is found to be of negative sign with all three measures of profitability in ICL and MCL except with the ROE in MCL where the coefficient is found to be unexpected positive sign. The co-efficient of MC under ROCE and ROTA in MCL is statistically significant at 5 percent level. Here the theoretical expectation is proved. It implies that if MC increases, the ROCE as well as ROTA decreases in MCL and vice versa.
TABLE 7.6
PROFITABILITY FUNCTION MODEL – 6
(1993-94 to 2007-08)

\[ P = f(S, MC, FC, PC, MFC, SC, DC) \]

<table>
<thead>
<tr>
<th>P</th>
<th>Co.</th>
<th>Constant</th>
<th>S</th>
<th>MC</th>
<th>FC</th>
<th>PC</th>
<th>MFC</th>
<th>SC</th>
<th>DC</th>
<th>( R^2 )</th>
<th>( F ) ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>ICL</td>
<td>154.49</td>
<td>-0.01</td>
<td>-255.32</td>
<td>-71.11</td>
<td>-324.49</td>
<td>-34.86</td>
<td>-127.33</td>
<td>-501.50</td>
<td>0.80</td>
<td>4.00**</td>
</tr>
<tr>
<td></td>
<td>(1.91)</td>
<td>(-0.73)</td>
<td>(-0.78)</td>
<td>(-0.37)</td>
<td>(-0.65)</td>
<td>(-0.17)</td>
<td>(-0.46)</td>
<td>(-1.01)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>88.55</td>
<td>0.00</td>
<td>110.87</td>
<td>0.76</td>
<td>-769.68</td>
<td>70.59</td>
<td>85.34</td>
<td>-437.97</td>
<td>0.92</td>
<td>11.56*</td>
</tr>
<tr>
<td></td>
<td>(3.52)</td>
<td>(0.62)</td>
<td>(0.78)</td>
<td>(0.01)</td>
<td>(-0.91)</td>
<td>(0.89)</td>
<td>(-1.73)</td>
<td>(-1.39)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROCE</td>
<td>ICL</td>
<td>22.800</td>
<td>6.747</td>
<td>-0.152</td>
<td>-0.315</td>
<td>-0.166</td>
<td>0.369</td>
<td>0.815</td>
<td>-1.384</td>
<td>0.96</td>
<td>24.323*</td>
</tr>
<tr>
<td></td>
<td>(0.960)</td>
<td>(1.351)</td>
<td>(-0.236)</td>
<td>(-1.110)</td>
<td>(-0.170)</td>
<td>(1.154)</td>
<td>(-1.779)</td>
<td>(-1.418)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>63.318</td>
<td>-4.031</td>
<td>-1.286</td>
<td>-0.364</td>
<td>-2.866</td>
<td>-0.518</td>
<td>-0.358</td>
<td>-3.319</td>
<td>0.96</td>
<td>27.669*</td>
</tr>
<tr>
<td></td>
<td>(2.431)**</td>
<td>(-0.605)</td>
<td>(-2.967)**</td>
<td>(-1.155)</td>
<td>(-1.291)</td>
<td>(-1.130)</td>
<td>(-1.647)</td>
<td>(-3.813)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROTA</td>
<td>ICL</td>
<td>23.568</td>
<td>4.857</td>
<td>-4.920</td>
<td>-0.301</td>
<td>-0.428</td>
<td>0.322</td>
<td>-0.725</td>
<td>-0.927</td>
<td>0.95</td>
<td>20.120*</td>
</tr>
<tr>
<td></td>
<td>(1.065)</td>
<td>(1.047)</td>
<td>(-0.082)</td>
<td>(-1.143)</td>
<td>(-0.471)</td>
<td>(1.083)</td>
<td>(-1.703)</td>
<td>(-1.023)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MCL</td>
<td>53.837</td>
<td>-4.343</td>
<td>-1.019</td>
<td>-0.319</td>
<td>2.181</td>
<td>-0.457</td>
<td>-0.295</td>
<td>-2.758</td>
<td>0.97</td>
<td>27.454*</td>
</tr>
<tr>
<td></td>
<td>(2.608)**</td>
<td>(-0.766)</td>
<td>(-2.762)**</td>
<td>(-1.141)</td>
<td>(-1.154)</td>
<td>(-1.170)</td>
<td>(-1.598)</td>
<td>(-3.723)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Figures in parenthesis are computed 't' value.
Significant level: * 1 percent , **5 percent ***10 percent.
Source: Centre for Monitoring Indian Economy (CMIE), Mumbai, India.
study. On the other hand, the changes in DC never affect the profitability in ICL during the period of study.

It can be concluded that the MC and DC are the significant determinants of ROCE and ROTA in MCL. It is a surprise to note that none of the variable has influenced the profitability of ICL under this model.

7.5. SUMMARY:

It is summarised from the above analysis that the TC and size of firm have been found to have significant negative impact with all measures of profitability in both the selected cement companies according to the first model. As such, the TC ratio appears to be the determinant of profitability in ICL and MCL during the period of study. It strongly proves that the increase in TC decreases the profitability of these two companies under study, whereas the increase in size (sales) does not increase the profitability as per the first model.

It is observed from the results of the second model that the MC is found to be the most significant determinant of profitability in MCL whereas in ICL the FC is an important determinant of all three measures of profitability. However, the size in MCL is also considered as an important determinant of ROE, ROCE and ROTA under this model. Besides, the behaviour of ROE, ROCE and ROTA in ICL is more or less independent of size and MC, whereas in MCL, the behaviour of ROE, ROCE and ROTA is also independent of PC during the period of study.
According to third regression model, out of four independent variables, FC is the most determinant variable of ROE, ROCE and ROTA of ICL where as in MCL, the PC is the significant determinant of ROE, ROCE and ROTA during the study period in addition to MC.

It is found out from model 5 that FC is the most important determinant of ROCE and ROTA in ICL, whereas MC is the significant determinant of ROCE and ROTA in MCL. The PC influenced the ROE measure of profit ability in ICL and MCL.

In Model 6 the PC is found to be the significant determinant of the ROE in ICL and MCL. Besides, the PC, SC and FC influenced the ROCE and ROTA in the case of ICL, whereas MC influenced the ROCE and ROTA in MCL under this model. The size did not influence the profitability in ICL and MCL during the period of study.

It has been observed from the Model-6 that the MC and DC are the significant determinants of ROCE and ROTA in MCL. It is to note that none of the variable has influenced the profitability of ICL under this model.
CONCLUSION:

* Total cost influences the profitability under all measures (ROE, ROCE, ROTA) in both the companies.

* Material cost influences the profitability in MCL under all three measures

* Fuel cost influences the profitability in ICL.

* Personnel cost influences the profitability in MCL under all three measures whereas it influences the ROE alone in ICL.

* Depreciation cost influences the profitability in MCL (ROCE and ROTA)

* The size of firm as well as manufacturing cost did not influence the profitability in both the firms under study.