Influences on the Capital Structure of Firms: A Case Study of the Indian Cement Industry

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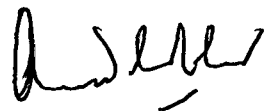Jawaharlal Nehru University
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Certificate

Certified that this dissertation entitled **Influences on the Capital Structure of Firms: A Case Study of The Indian Cement Industry** submitted by **Waknis Parag Jayant** in partial fulfilment of the degree of **Master of Philosophy** is entirely his own work and has not been considered for the award of any other degree either at this or any other university.

We recommend that this dissertation be placed before the examiners for evaluation.

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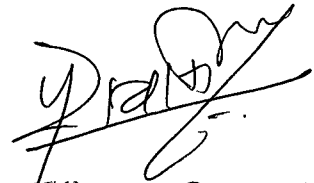
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Contents

Introduction

The significance of capital structure in general and that of an optimal capital structure in particular is far from being non-controversial, even today, in the area of financial research. Since Modigliani and Miller published their first paper establishing the irrelevance of the capital structure in 1958, a large amount of literature has surfaced both supporting and contradicting their results.

Capital Structure and Business Investment:

If only the real factors like business opportunities, capacity of the firm, etc., determined the investment at the firm level, then capital structure would be irrelevant. However, if it also depended upon the source from which the finance is available and is in use, then capital structure would become relevant and one of the determinants of the business investment. The capital structure debate has to be under stood in this perspective.

Miller (1988) has outlined the motivation behind writing the original paper on capital structure (Modigliani and Miller 1958). He writes that the basic idea behind the whole exercise was to understand what are the factors determining business investment. In the setting of perfect markets and other restrictive assumptions they argued that the capital structure is irrelevant implying that business investment does not depend upon the way it is financed. However it is important to see the role of the assumptions in getting these results. Most of the literature which tries to contradict these results have done so by challenging the

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assumptions on which they are based, thereby demonstrating the sensitivity of results to the assumptions.

These authors have argued their case for an optimal mix of debt and equity for a firm on the basis of bankruptcy costs, agency costs, etc. This basically implies that capital structure mattered and therefore would affect the level of investment a firm can under take. If we consider a group of such firms or the industrial sector as a whole then the level of investment that is under taken becomes dependent upon the way it is financed.

The whole debate on capital structure has to be understood to get to actually analyzing the behaviour of the capital structure. **Chapter One** discusses in detail the Modigliani and Miller proposition regarding capital structure and gives a general critique of their approach. It then attempts to develop the concept of an optimal capital structure and gives a brief survey of the theoretical as well as empirical literature dealing with it.

The general approach of empirical analysis has been to statistically test the determinants of the capital structure. Type of Industry has been one of such determinants tested and found significant. Another way of looking at the empirical analysis is to analyse the influence of a particular factor on the capital structure of firms. Taking this line of approach, an attempt is made to analyse the effect of the nature of industry on the behaviour of actual capital structure. The cement industry in India is taken as a case study for the purpose.

The nature of industry is nothing but the combination of the characteristics of the industry and the constraints which it imposes on the firms. **Chapter Two** gives a brief profile of cement industry to highlight its nature as defined above.

The discussion in Chapter Two forms the basis of the analysis attempted in

Chapter Three.

The last section states the conclusions based on the analysis in Chapter Three.

CHAPTER ONE

THE IRRELEVANCE OF CAPITAL STRUCTURE AND THE CONCEPT OF AN OPTIMAL CAPITAL STRUCTURE.

This chapter deals with the development of the theory of capital structure in general and the theory of an optimal capital structure in particular. The first section discusses the irrelevance proposition put forth by Modigliani and Miller. The second section gives a general critique of the above propositions. The third section develops the idea of an optimal capital structure and gives a brief review of different ideas various economists have developed over the years which now constitute a part of the standard financial theory. The fourth section deals with the various attempts made so far to test the determinants of optimal capital structure as discussed in the above literature. The last section gives a summary of the discussion and outlines the approach I take in the dissertation.

1.1 The Irrelevance Theorem by Modigliani and Miller:

Modigliani and Miller advanced the following propositions:

Proposition I: The total market value of a given firm is independent of its capital structure.

Proposition II: The cost of equity capital of a given firm is a linear increasing function of its debt-equity ratio.

Macroeconomic Intuition behind the MM Propositions:

Miller (1988) clearly states the macroeconomic intuition behind the MM propositions. He uses the concept of sectoral balance sheets to do so.

Sectoral Balance Sheets:

Business Firms

Assets	Liabilities
Productive Capital	Debts owned to Households Equity in Firms held by Households

Households

Assets	Liabilities
Debt of Firms Equity in Firms	Household Networth

Consolidating the accounts of the two sectors gives us the familiar national balance sheet.

National Balance Sheet

Assets	Liabilities
Productive Capital	Household Networth

It is evident from the above balance sheet that the debt and equity securities no longer appear in the consolidated balance sheet. The value of the business sector

to its ultimate owners in the household sector is thus seen clearly to lie in the value of the underlying capital. And similarly the debt and equity securities owned by households can be seen, not as final, but only as intermediate assets serving to partition the earnings (and their attendant risks) among the separate individual households within the sector (Miller 1988).

The value invariance proposition (proposition 1 above) is, in this sense, only the application of the above macroeconomic intuition to the microeconomics of corporate finance. However, implicit in the above concept of national balance sheet, is the presumption that *the financial markets consequently allocate income efficiently between consumption and saving and then in turn allocate savings efficiently across investment projects...The total funds furnished from saving flow to equalise risk corrected marginal returns across investment projects* (Gertler and Rose 1994)[1]. This in turn results in equalisation of risk adjusted returns of different securities at the individual level leaving an investor (group of investors) indifferent between for e.g., equity and debt.

In case of the MM propositions, the invariance is demonstrated by the assumption of perfectly competitive markets. This assumption means that markets are characterised by the absence of taxes and transaction costs and where market participants have equal information and equal opportunities. Therefore, an investor will not pay for corporate leverage if he can create the risk and return that shares in the levered corporation provide, by borrowing on personal account to buy a share in the un-levered corporation. Secondly, if firms in same risk class i.e., identical firms are valued differently in the market then the possibility of arbitrage emphasised by MM would bring about the equalisation in their value.

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[1] As quoted in Sen Kunal & Vaidya Rajendra R, (1997), "The Process of Financial Liberalisation in India", Oxford University Press, Delhi. (PP. 2-3)

This logically leads us to the conclusion that the value of the firm is independent of its capital structure. Another important implicit assumption underlying MM propositions is that the firm's sole objective in all its decisions is maximisation of firm value. To prove this, MM used the macroeconomic intuition of the national balance sheet and the assumption of perfectly competitive capital markets. However, as would be clear from the discussion that is to follow, the assumptions underlying the MM propositions are highly questionable in the real world situations.

1.2 A General Critique of the MM Propositions

The above propositions are based on the assumptions that, if the shareholders can undertake the same financial transactions as the firm, and at the same prices, then shareholders could, if they wish, completely reverse the effect of any financial policy at no cost. Nevertheless, in a real world situation, circumstances are quite contrary to the above assumption. Generally, MM propositions can fail to work in either of the following situations.

1. *Homemade Leverage:* Shareholders cannot undertake the same financial transactions as the firm, at the same prices. That is personal leverage cannot be a substitute for corporate leverage. This may be due to differences in transaction costs faced by the firm and the individual. In such a situation an investor might pay generously for the firm's capacity to borrow. Then the capital structure of the firm becomes related to the market value. Lewellen (1969) makes some important points in this regard. He says that personal leverage may not be a substitute for corporate leverage due to the following reasons:

- The individual may not in fact be able to borrow at the same rate of interest as corporations can (i.e. there might be economies of scale in borrowing).

- An individual faces unlimited liability if he fails to service the debt if he borrows on personal account. The owners of the corporation enjoy the advantage of limited liability, i.e. they are entitled to loose only the amount equal to the face value of the shares held. This might discourage the individual to borrow on personal account.

2. **Costs of Financial Distress.** Financial distress occurs when promises to creditors are broken or honoured with difficulty. Sometimes financial distress leads to bankruptcy. (Brealy & Myers 1988) Probability of bankruptcy (if costs involved in such an event are non-trivial) might restrict the use of debt in a firm's capital structure. This implies that every firm has a typical amount of debt which it can sustain. If it carries more than that then, the markets might discount (take account of) the probability of bankruptcy thereby reducing the market value of the firm. In this case the capital structure decision ceases to be independent of market value.

3 **Taxes:** The M&M proposition assumes the absence of any corporate income tax. This assumption is very crucial as it rules out preferential treatment to any instrument. If corporate tax was levied then interest on debt becomes tax deductible expense. This gives advantage to debt as an instrument from the company point of view. This implies that capital structure becomes relevant even for the investment policy of the firm. This because tax deductibility of interest expenses reduces the effective cost of capital. This guarantees a higher post tax return, ceteris paribus. Such company would obviously enjoy high market value. [2]

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[2] Of course this does not mean that a company can go on borrowing. The costs of financial distress would put the limit on the debt a firm can borrow.

4   *Full Information about Returns:* It is often the unstated assumptions rather than the stated assumptions of a model that are critical, and so it is in the case of the MM propositions (Stiglitz 1988). One such critical unstated assumption is that the market participants have full and equal information concerning the returns to the firm. Generally, in real world situations, owners / managers have greater information about the firm than the outsiders. This leads to a situation of information asymmetry. It gives rise to two problems; one the owner or the manager may wish to convince the potential creditors that the firm is worth more. Second, the managers become capable of taking actions, which affect the returns to those who provide capital. The second problem leads us to the concept of agency. Any attempt to solve the problem of information asymmetry and the agency problem (see Leland & Pyle 1977, Jensen & Meckling 1976) would make the decision of capital structure linked with the investment policy.

5   *Role of Signalling:* Signalling is an act where managers send a message to the market through some policy decisions. Borrowing can be advantageous in terms of the signalling aspects of agency problems. For example, if the managers consider the enterprise's shares to be undervalued on the stock exchange, they can provide the market with a credible signal to this effect by increasing gearing. This makes the market value of the firm linked with capital structure. This issue is later taken up in detail in the chapter.

6   *Imperfect Substitutability between internal and external finance:* The assumption of perfect markets implies that all firms have equal access to capital markets and that external funds provide a perfect substitute for internal capital. In the real world markets are seldom perfect in the sense of equal access for all firms to the capital markets and therefore the assumption

of perfect substitutability between external finance and internal finance could be violated. This is because there will be a divergence between cost of external finance and cost of internal finance on account of markets being imperfect in the real world.[3]

7 **Role of Inflation:** Most of the financial contracts are done in nominal terms. However, the rates of return are affected by the rate of inflation in the economy. Perceptions about the inflation rate would differ and therefore the interest rate charged would be subject to this influence. Because of this capacity to influence a price variable, lenders and /or borrowers violate the assumption of perfect markets. Also changing expectations of inflation may affect the relative desirability of debt and equity financing (Robichek & Myers 1965).

1.3 The Idea of an Optimal Capital Structure:

It is evident from the above criticisms that situations might arise in the real world, which would make market value linked to the financial policy of the firm. A firm would always try to balance these factors to arrive at the mix of debt and equity that it deems to be appropriate and sustainable. Such a mix will depend upon the intensity with which it faces different constraints of the imperfect markets. This mix of debt and equity, which balances these constraints can be termed as the Optimal Mix or the Optimal Capital Structure of the firm.

The optimal capital structure will have a strong contextuality, in the sense that it would vary from firm to firm. This is because the intensity with which the firm

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[3] There will be divergence in the cost of external and cost of internal finance because the external rate of interest charged to a small firm will be high relative to the opportunity cost of its internal funds. This is because the external interest rate will take into account the probability of failure of the project as well as payment to the creditors and uncertainty arising out of information asymmetry. On the other hand the internal funds, if available, can be used at managerial discretion based solely on its perception of probability of the success of the project. Hence the discount rate it will use to calculate the NPV will be lower than that used by the creditors.

faces the constraints imposed by market conditions (rather imperfections), will differ across firms (broadly in accordance with the factors like size of the firm, nature of business, financial health and performance, historical perception of management etc., which would obviously vary across firms and also by industry). These factors will affect the capacity of the firm to manipulate the market conditions to its favour. Hence, every firm will have its own OCS. [4]

More over the quantitative ambiguity[5] of many criticisms like determination of agency costs or resolving the problem of information asymmetry, make the concept of OCS empirically difficult to observe. Firms might resolve this problem by deciding a target debt ratio (by using some thumb rule) and then trying to adjust the actual capital structure to it.

Nevertheless, there are certain problems in this approach. Firstly what is the robustness of the thumb rule (if used) to decide the target ratio? Secondly, there is also a possibility that the target ratio changes over time as the firm senses the changes in the business environment and its own health.

Marsh (1982) makes this point clearly. He uses three determinants viz., company size, operating risk and asset composition to act as proxies for the true but unobservable target ratios. His empirical analysis suggests that firms behave as if they have some target ratio in their mind. Bradley et.al. (1984) define optimal leverage as setting the end period payment to the bondholders, such that the market value of the firm is maximised. If market value is linked to the capital

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[4] This does not suggest that a firm will always be at its optimal debt ratio. There will be costs of adjustment and hence there might be short run deviations from the optimal ratio. In the long run, firms might be expected to be at its optimum. This is much in the lines of the neo-classical theory of investment where a firm gradually approaches its desired capital stock (Dornbusch & Fischer 1988).

[5] They are ambiguous in the sense that they involve costs, which cannot be easily ascertained or can be done so with some assumptions or the best alternative is by using a proxy. For e.g. As Leland and Pyle (1977) suggest promoters contribution can be used as proxy to signal the quality of the project to the market. Nevertheless, how much contribution is enough to do so is something, which cannot be determined by straightforward rules.

structure then there will a certain value of the capital structure at which the market value gets maximised. Hence setting the end period payment as to maximise the value means setting the value of the capital structure such that the market value is maximised. The model which they use incorporates personal taxes on equity and on bond income, expected costs of financial distress (bankruptcy and agency costs) and positive non-debt tax shields[6].

They show that optimal financial leverage is related inversely to the expected costs of financial distress and to the (exogenously set) amount of non-debt tax shields. The simulation results demonstrate that if costs of financial distress are significant, optimal financial leverage is related inversely to the variability of firm earnings.

De Angelo & Masulis (1980) suggest that the presence of corporate tax shield substitutes[7] for debt such as accounting depreciation, depletion allowances and investment tax credits, imply a market equilibrium in which each firm has a unique interior optimum leverage decision (with or without leverage related costs). This unique interior optimum exists because there is a constant expected marginal personal tax disadvantage to debt while positive debt tax shield substitutes imply that the expected marginal corporate tax benefits decline as leverage is added to capital structure. At the unique optimum, the expected marginal personal tax benefit just equals the expected marginal personal tax disadvantage of debt. Here it is assumed that the tax code is equity biased i.e., personal tax on equity is less than that of personal tax on debt.

1.3.1 The Static Trade-off Theory of Optimal Capital Structure:

Under this theory optimal debt equity ratio is usually viewed as determined by a trade-off of the costs and benefits of borrowing, holding firm's assets and

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[6] Non debt tax shields are nothing but depreciation, tax credits etc.

[7] Tax shield is the deductibility of interest expenses for calculating the tax liability. Substitutes to this can be depreciation or tax credits etc.

investment plans constant (Myers 1984). The costs of borrowing are nothing but the present value of potential bankruptcy costs and the benefits are the present value of the tax savings from the tax deductibility of interest payments. Therefore, the trade-off theory requires an optimal trade-off between these costs and the benefits of the borrowings (Chen & Kim 1979). Optimal debt equity ratio occurs at the point where the present value of bankruptcy costs equals the present value of tax savings.

In this theory, a firm is portrayed as balancing the value of interest tax shields against various costs of bankruptcy or financial embarrassment. Furthermore as Myers (1984) rightly points out, if there were no adjustment costs, and if the static trade-off theory were correct, then each firm's observed debt value ratio should be its optimal ratio. However there must be costs and therefore lags in adjusting to the optimum.

Kim (1978) uses this trade-off theory to suggest the existence of an optimal capital structure in a perfect capital market. He shows that in a perfect capital market, where firms are subject to income taxes and costly bankruptcies, debt capacity occurs at less than one hundred percent debt financing and firms do have optimal capital structures which involve less debt financing than the their debt capacity.[8]

In a way, he suggests an interior optimum debt ratio. This is contrary to the Modigliani and Miller (1963) corrected paper. The argument they put forth was as follows. If V_U and V_L designate the value of a corporation when the amount of its debt is zero and L respectively, and 't' is the corporate tax rate, MM correction established that $V_L = V_U + tL$ Gordon (1994). This implied that the value of the corporation is an increasing function of its debt equity ratio. This in principal does not rule out a corner solution viz., having an infinite debt equity

ratio. However, results of Kim (1978) as well as De Angelo & Masulis (1980) in a way rule out this possibility of having corner solutions (that of zero debt or 100 % debt). The intuitive explanation for this phenomenon of existence of a interior optimum debt equity ratio might be as Miller (1962)[9] himself rightly states,

"The substantial costs and delays normally incurred in case of default and the fact that compensating increases in rates actually increase the probability that these costs will be incurred makes the loan contract a relatively inefficient instrument".

The static trade-off theory suggests that if there were a positive probability of bankruptcy then a firm would have an optimal debt equity ratio. However, if changes in the firm's financing policy do not affect its real investments, this increasing risk of bankruptcy will not affect the total value of the firm unless there are costs incurred in the act of bankruptcy i.e., unless it is costly to transfer assets to debt holders (Lyon 1992)[10]. Costs of transferring assets are the direct legal costs and the indirect costs of operating a firm near bankruptcy. There might be indirect costs like suppliers and customers becoming reluctant to make commitments.

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[8] Corporate debt capacity is defined as the maximum amount that a firm can borrow in a perfect capital market (Kim 1978).

[9] As quoted in Kim E.H (1978), "A Mean Variance Theory of Optimal Capital Structure", *Journal of Finance*, Vol. 33, (PP. 46)*

[10] This can be shown as follows. Let V(s) be the value of the firm for some outcome or state of nature 's'. The value of debt instruments of this firm in state s, V_d is equal to min [V(s), P] where P is the promised payment of interest and principal. The value of equity V_e, is equal to max [0, V(s) - P]. The sum of the pay offs to debt and equity in all states 's' is simply V(s). The value of the firm is independent of its decision between debt and equity claims. The firm could be entirely financed by debt or by equity and its value would be unchanged. Thus, the argument of increasing risk of bankruptcy cannot create a limit on debt finance if bankruptcy is costless.

* Miller M.H., (1962), "Credit Risk and Credit Rationing: Further Comment" Quarterly Journal of Economics. 14 August.

Insignificance of Bankruptcy Costs: One thing becomes evident from

the above discussion is that bankruptcy costs play an important role in determination of optimal capital structure. On the contrary, Haugen & Senbet (1978) suggest that bankruptcy costs are insignificant to the theory of optimal capital structure. They argue that the bankruptcy costs[11] associated with a formal reorganisation through courts must be limited to the lesser of the costs of formal bankruptcy and the transactions costs associated with an informal reorganisation of the capital structure through the capital markets (pp 387). Costs of formal bankruptcy are the costs of enforcing the legal mechanism of liquidation.

Informal reorganisation means if current earnings are insufficient to meet the promised interest payments, bankruptcy or financial crisis can be avoided by selling additional common stock and using the proceeds to repurchase the debt at fair market price. The crux of the argument is, if informal reorganisation is possible (and if the costs associated with it are lower than that of formal reorganisation) then possible costs of bankruptcy are nothing but cost of issuing new securities in such an event. The present value of these transaction costs in no case can be so significant as to offset the government subsidy (tax saving due to the deductibility of interest burden) associated with debt financing. In this sense bankruptcy, costs would be insignificant to the theory of optimal capital structure.

The important question is who will buy the shares of the corporation, which is on the verge of bankruptcy.

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[11] Bankruptcy costs can be of two types; direct and indirect. Direct costs include legal, accounting and trustee fees as well as the possible denial of income tax carryovers and carry backs. Indirect costs relate to opportunity costs resulting from disruptions in firm – supplier or firm- customer relationships that are associated with the transfer of ownership or control.

The answer lies in the process of informal reorganisation envisaged by the authors. For e.g. in such an event, the mortgage' bondholders or the subordinated bondholders might buy the stock of the firm at its reduced price (rather at a competitive price discounting the probability of bankruptcy). This would rule out the need to formally reorganise and avoid the costs associated with it.

One incentive to opt for informal reorganisation on the part of various securities holders is to avoid any external drain on the cash flow, which is inevitable in the case of formal reorganisation. The external drain on the cash flow would be the bankruptcy costs that would be incurred in case of formal reorganisation. Secondly, these costs would be in a way be shared by the stockholders with debenture holders. Therefore, they will try to avoid these costs through informal adjustment. The assumption underlying this argument is that the external drain on the cash flow in case of the formal reorganisation would be higher than the transaction costs of issuing securities, in the case of informal reorganisation.

The above analysis depends crucially on the above assumption. In reality a lot would depend upon the actual bankruptcy costs and the transaction cost to issue the shares. However the argument for debt holders themselves buying the shares would help in reducing the transaction costs. Then, in this case the bankruptcy costs would prove to be insignificant. For example., if the rehabilitation package designed by the BIFR suggests conversion of part of the loans given by the term lending institutions into equity, then the role of probability of bankruptcy to limit the borrowings at a particular level is negated. In this sense the bankruptcy costs are irrelevant to the firm.

Empirical Studies also support the insignificance hypothesis. Warner (1977) suggests that direct costs of bankruptcy are trivial. They average only to 1 % of

the market value of the firm prior to the bankruptcy. Moreover, these costs as a percent of the value seem to decrease with the size of the bankrupt firm. This means that direct costs of bankruptcy are less important for capital structure decisions of large firms than the small firms. However, there are two major problems with this study. One, it does not measure indirect cost of bankruptcy. Secondly, the study is conducted for railroad industry in the U.S.A. Hence there are problems in generalising these results.

1.3.2 Agency Costs and Optimal Capital Structure:

To conclude from the above discussion, we can say that if there is a gain from leverage because of the deductibility of interest expenses, and if the bankruptcy costs are non- trivial, then it is possible to construct a theory of optimal capital structure (Copeland and Weston 1983).

But this does not explain the fact that that many firms like those in the U.S of A had a mix of debt and equity in their capital structure even before income taxes existed. Therefore, there has to be some explanation, other than that of debt tax shields and bankruptcy costs, for the existence of an optimal capital structure. Jensen & Meckling (1976) use the concept of agency[12] costs to argue a case for the existence of optimal capital structure. They point out that when risky debt is outstanding there is an incentive to the equity holders to appropriate wealth from the bondholders by opting for riskier projects (projects even with negative net present value). This increases the default risk of the outstanding debt. Thus with the increase in the proportion of risky debt in the capital structure,

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[12] Agency costs are the sum of the monitoring expenses by the principal, the bonding expenditures by the agent and the residual loss. The term monitoring includes more than just measuring or observing the behaviour of the agent. It includes efforts on the part of the principal to control the behaviour of the agent through budget restrictions, compensation policies, operating rules etc (Jensen & Meckling 1976).

possibility of sub optimal investment increases and this results in the decline in the value of the firm. Intuitively we can also say that there will be an incentive to existing bondholders to restrict any further issues of debt to control the tendency of investing sub optimally on the part of shareholders.

On the other hand, there will be agency costs associated with external equity also. Suppose that a single individual owns a firm in the beginning. In this case, every action of such an owner-manager (O-M) would aim at maximisation of his own wealth. If he decides to sell a portion of ownership right to external shareholders,

he would no more be able to do the same. This is because he becomes a co-owner with the new shareholders. However, if the O-M could maximise his wealth at the expense of the new shareholders (in the form of increased perquisites and other benefits), then he would do so. Thus, the new shareholders will have to incur monitoring costs of some form to control this tendency of the O-M (for e.g., they can agree to appoint an independent auditor). There also might be a resistance of existing shareholders to the issue of new shares because that would mean dilution of their control over the O-M.

Given these agency costs associated with external equity as well as debt, optimal proportion of outside funds to be obtained from equity (versus debt) for a given level of internal equity is that 'E' which results in minimum total agency costs.

There are other authors who have used the concept of agency costs in differing contexts. Titman (1981)[13] suggests a different form of agency costs. He says that customers of durable goods must asses the probability of bankruptcy of the firm and weight in their decision to purchase because usually durable goods need a stream of maintenance services in future. If the firm goes bankrupt, the

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[13] As quoted in Copeland and Weston, (1983), Financial Theory and Corporate Policy, Addison & Wesley Inc. (PP. 446)

customers are deprived of these services without the hope of being compensated.

The customer is expected to assess the probability of bankruptcy by observing the proportion of debt in the capital structure. He is then expected to avoid buying goods from a firm, which is over burdened by debt. Therefore, firms producing durable goods are expected to carry less debt, ceteris paribus. Here agency cost is nothing but probability of loosing sales because of its risky capital structure. Therefore, it aims at a capital structure that minimises this probability. Agency costs in the labour contract are also important. If a firm's labour force is such that it has job specific skills (which cannot be suitable for any other job), then labourers bear a non-trivial cost if a firm goes bankrupt. Titman & Wessels (1988) call such a firm an 'unique firm' and suggest that such firms will tend to carry less debt in order to reduce the probability of bankruptcy, ceteris paribus. However, the above examples in a way deal with particular type of firms and therefore cannot be generalised into a theory of optimal capital structure. Secondly, statements like " will tend to carry less debt" do not answer important questions like how much and compared to what? On the contrary, the argument of agency costs seems to be appealing. Nevertheless, there are problems with it too. First, for an individual to become an O-M in a large corporation (and if he is to hold these rights as a part of his well diversified portfolio) has to have infinite amount of wealth (Gordon 1994). However, the concept of agency relationship might prove useful in the Indian context where many of the large corporations are predominantly family owned and managed. Secondly, the case of the modern corporation (where the investment and financing of a corporation is in the hands of management that has little or no ownership interest) is completely neglected. In short it does not deal with the central

problem of separation of ownership and control which is a characteristic feature of the firms today.

1.3.3 Role of Signalling:

If markets are not efficient i.e., they don't reflect all the information, especially that not publicly available (markets are efficient only in semi-strong sense[14]), then it is possible that mangers will choose financial policy to convey information to the market. In other words, if there exists an information asymmetry, then capital structure can also be used to fill the gap i.e., by using it as a signalling device. The first application of signalling was put forth by Ross (1977). He uses what is called as an incentive signalling approach.

The logic of the approach is as follows[15]. The managers in a healthy firm (a firm that can carry more debt (D) than what the market deems to be suitable for an unsuccessful firm [D*]), have an incentive to signal correct information to the market. A signalling equilibrium is established when, one, the signals must be unambiguous (i.e., when investors observe D>D*), the firm is always a successful firm and two, managers must have an incentive to always give the proper signal. This is guaranteed by the compensation scheme of the managers. In his single period model manager's compensation is the function of the firm's market value and a penalty in case of bankruptcy. In the end period, the value of

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[14] Market can be efficient in three ways; weak, semi - strong, strong. Weak form of efficiency is the case in which prices reflect all information contained in the record of past prices. The semi strong form of efficiency is the case in which prices reflect not only past prices but all other public information. Researchers have tried to test this by considering specific items of news like announcement of earnings and dividends, forecasts of company earnings etc. Prices were found reflecting most of this information accurately. In strong form of efficiency, prices reflect not only just public information but all the information that can be acquired by painstaking fundamental analysis of the company and the economy.

[15] The exposition of the model is done on the basis of discussion in Copeland & Weston (1983)) (op cit 450-453)

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the successful firm is always greater than the value of an unsuccessful firm. This implies that the managers in the successful firm will always have an incentive to establish a level of

debt greater than D* in order to earn maximum compensation.

This is because the market would deem its value equal to the value of the unsuccessful firm if $D<D*$. If this happens, it will reduce their compensation. On the other hand if the unsuccessful firms issues debt greater than D*, then the managers would gain in terms of value as the market will revise their value to the level of successful firm. However, as they don't have sufficient cash flows to back up the new liability, bankruptcy would become inevitable. If this happens their compensation would automatically reduce given the incentive scheme. Hence, managers in the unhealthy firm would not use debt as a signalling device, as doing so would reduce their compensation (by invoking penalty for increased probability of bankruptcy due to use of more debt and through jeopardising the status of the company as a going concern, thereby affecting the future payments.).

Given these incentives, in such a situation optimal capital structure will involve that amount of debt, which would signal the information managers want the markets to discount, correctly. The problem of whether the markets can distinguish between good and bad signals is taken care of. by the model because it makes only managers of good firms to take the action to signal information to the market.

As mentioned earlier the basis of the signalling approach is the information asymmetry arising out of the fact that managers have a better idea about future cash flow of the firm than the market. Hence signalling in a way aims to resolve the problem of information asymmetry. Leland & Pyle (1977) use this approach in their paper. It uses contribution of the owner to the project's capital

requirement to signal the quality of the project. The value of the firm increases with the percent of equity held by the owner relative to what he/she would have held in a low quality project. Then choosing an optimal capital structure would mean choosing the right amount of owners' contribution to signal the project's quality. This would help in a somewhat correct assessment by the market, of the firm's value. The main drawback with the approach is that it neglects the welfare loss arising from the fact that the owner would have to lock up more of his funds in the project than what he would have if the markets could reflect all the necessary information efficiently. Secondly, how much extra equity he has to contribute to convey the information to the market correctly is something which has to be left to the owner's discretion. Hence there is a probability that his perception about this amount may be wrong.

Warren Buffett[16] argues that a company can also signal the market by buying back the shares. The logic behind this is if the rate of return on the investment in the company is high relative to the rate of return on other investment opportunities, then its better for the company to buy back its shares. This would in turn give a positive signal to the market regarding the worth of the company.

The signalling argument seems to be quite appealing especially given its basis in inefficiency of the markets. But testing whether the prices are efficient even in the narrow sense of semi strong efficiency, is very difficult. The issue of what determines the share prices at a given point of time, is indeed far more complex that it is made to appear above.

℘ Asymmetric Information and Optimal Capital Structure:

Asymmetric information either leads to over investment or under investment. The logic behind this is as follows. In the models of asymmetric information, the firms are assumed to have better information on the distribution of returns

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[16]   ، BuffettMarry & Clark David, (199?), *Buffetology*, Rawson Associates.

from a potential project than the lenders. So in situations where lenders cannot distinguish between good and bad firms, all firms have to pay the same interest rate. This results in firms having good projects (i.e. projects with above average expected rates of return to lenders because of probabilities of their success) subsidising firms under taking worse projects. In this sense good firms pay a premium in relation to the rates they would have paid if the lenders could distinguish between firms. In such situation firms with better projects would be able to capture the benefit fully if they could undertake them with the help of internal funds. Thus asymmetric information can cause a divergence between the yield required on the project funded from internal sources and that required on a project funded externally. This implies that firms with scarce internal funds might pass many positive NPV opportunities. In this sense asymmetric information results in sub optimal investment. In a case where there is uncertain probability of success, investment with an expected return less than the economy wide opportunity cost of capital- is undertaken because the entrepreneur is not concerned with the return on the project in states of default. Had it been the case that the lenders could judge the probability of success, then such a project would have gone un-funded. Therefore in this case asymmetric information leads to over investment. In the opposite case of uncertain pay-off if successful projects might get rationed as lenders would be unable to distinguish between a better project and a worse project as for them the expected return is the same. This would result in some better projects going un-funded. This results in under investment.[17]

Stulz (1990) in his article develops his argument using the above approach from a firm's point of view. The argument is as follows: A debt issue that requires

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[17] In the first case the assumption is the probability of success differs across entrepreneurs but the project returns are identical. In the second case the assumption is the probability of success is same for all entrepreneurs but project returns vary across entrepreneurs

management to pay out funds when cash flows accrue reduces the over investment cost but exacerbate the under investment cost (It reduces the possibility of overinvestment by reducing the funds under management's control. But then this also increases the possibility of under investment). An equity issue that increases the resources under management's control reduces the under investment cost but worsens the over investment cost[18], Since debt and equity decrease one cost of managerial discretion and increase the other, there is a unique solution for the firm's capital structure, which offsets the two opposite forces. This unique solution can be called the firm's optimal capital structure. But again the problem of quantifying the amount of equity and debt necessary to make the two forces cancel each other becomes important.

1.4 Determinants of Optimal Capital Structure:

The above studies don't empirically test the determinants of the capital structure they discuss. There can be two approaches to test the determinants of the capital structure. One is to directly test the determinants statistically. The second is to look at the effect of specific determinants in detail and try to capture effect of it in terms of the performance of the company as a whole and the behaviour of capital structure in particular. Most of the empirical studies done so far fall in the first category. The following subsection gives a brief survey of these studies.

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[18] If managers have too much funds, then there is a possibility that after exhausting all positive net present value opportunities, it will invest in negative NPV projects. This is the cost of over investment. On the other hand, as managers always say that cash flow is low, its claim fails to be credible when it is actually low. So shareholders might force the managers to raise funds through debt. This might result in obligated pay off and reduce the funds available for investment. This leads to under investment cost.

Empirical Studies:

Generally the theory indicates that a firm's capital structure (also the optimal capital structure) is influenced by factors like profitability, size, industry classification, asset structure, nature of business, etc.

Generally it is postulated that higher the proportion of tangible assets in the gross assets, higher will be the firm's debt equity ratio. If tangible assets are a sizeable proportion of the gross assets then, this implies a higher capacity of the firm to raise the collateral.

Hence such companies should be found to be borrowing more. Regarding profitability theory predicts two possibilities. One, the pecking order theory states that a firm would resort to any sort of external finance only if it is facing a shortage of internal funds. If at all it decides to resort to external finance it will issue the safest security first (i.e. debt)and the risky security next (i.e. equity). Donaldson (1961) observes this behaviour among a sample of American firms. But there is no theoretical foundation for this argument per se. There have been theories put forth by Myers & Majluf (1984) and Fazzari et.al (1988) who have tried to give theoretical foundation to the argument. Irrespective of this controversy, one thing is clear that the pecking order theory predicts a negative relationship between profitability and debt equity ratio of the firm. On the other hand the trade off theory predicts a positive relationship between profitability and debt equity ratio. The reasoning is as follows. The trade off theory suggests that the choice of an optimal capital structure is done by balancing the costs and benefits of the borrowing. Technically it is that value which equates the present value of tax benefits (PVTB) with the present value of the bankruptcy costs (PVBC). If a company borrows more the PVTB increase as also the PVBC. They get equated at a higher level. A firm would be able to do so only if it has

the capacity to service additional debt. This capacity is determined by profitability of the firm. Therefore, firms with high profits would borrow more. Thus the trade off theory predicts a positive relationship between profitability and debt equity ratio, given the level of equity financing.

Size of the firm is generally expected to have a positive relationship with the debt equity ratio. The reason behind this argument is that big firms have larger capacity to borrow (because of sizeable tangible assets or higher profitability).

Ferri & Jones (1979) paper aims to investigate the relationship between a firm's financial structure and its industrial class (nature of business), size, variability of income (business risk), and operating leverage.

They found operating leverage[19], size and industry class influencing the capital structure. In particular with regard to the they found that a firm's use of debt is related to it, but the relationship does not confirm to the positive, linear scheme that has been indicated by the theory. Marsh (1982) discusses the issues involved in actually issuing equity or debt for fulfilling the requirement of external finance. Therefore, it includes market timing as an important determinant of this choice. Secondly it postulates that the choice of financing instrument will depend on the difference between its current and target ratio, where the target ratio is the function of bankruptcy risk and tax. The composition of debt will depend upon company's size, asset composition and on uncertainty about future inflation rates. The target ratios are deemed to be unobservable and therefore determinants are considered to be proxies. The empirical analysis gives results which are consistent with the notion that these target levels are themselves functions of company size, bankruptcy risk and asset composition. Bradley

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[19] Degree of Operating Leverage (DOL) is measured as the sensitivity of the Earnings before Interest and Taxes (EBIT) to the changes in quantity produced and sold (Q).

$$DOL = \frac{\Delta EBIT / EBIT}{\Delta Q / Q}$$

et.al.(1984) tests the following variables as determinants of optimal capital structure.

- Variability of firm value

- Level of non debt tax shields

- Magnitude of costs of financial distress

- Advertising and research & development expenses

They found that volatility of firm earnings is an important and inverse determinant of firm leverage. Advertising and R&D expenses are also inversely related. Non debt tax shields have positive strong relationship with the leverage. Titman & Wessels (1988) consider factors like asset structure, size, non debt tax shields, growth, industry classification, profitability, earnings volatility and uniqueness as determinants of the capital structure choice. The results suggest that uniqueness (refer to the discussion on agency costs above) is negatively related to the debt equity ratio. Short term debt ratios are shown to be negatively related to the firm size. The analysis does not support the theoretical predictions about the relationship of non debt tax shields, volatility, collateral value and future growth with the firm's capital structure. A study by Taggart (1986) of American companies suggests three possibilities:

- Reliance on debt financing increases as capital expenditures rise relative to available internal funds.

- It is limited however by investors perception of the risk of the business environment and by relative supplies of Federal government securities.

- Over the long run corporate borrowing increases as personal income tax rates rise above corporate levels.

His study is for the period 1901-2 to 1984-85. Most of these studies deal with the firms in America or U.K. The next section will deal with the studies done on Indian Corporate Sector.

Studies on the Indian Corporate Sector with respect to the Theory of Optimal Capital:

There are only couple of studies done on the Indian Corporate sector with respect to the problem of capital structure and its determinants. Singh & Hamid (1992) have done a study of 50 largest Indian corporations for the World Bank and the International finance Corporation. Their empirical analysis suggests that there is a negative relationship between after-tax retention ratio and the size of the firm. This implies that smaller firms financed their growth mainly through internal funds in comparison to the larger firms. Secondly size and long term borrowing shows a positive relationship suggesting that smaller firms rely less on the long term borrowings than the large firms. Thirdly it also shows some evidence of a negative relationship between growth of a firm and debt financing in that the slowest growing firms had the highest external financing through debt. This finding may have strong implication for the firms in the cement industry.

Kantawala (1997) covers a much wider sample of 483 firms. He uses asset structure, profitability and size as determinants of the capital structure. His empirical analysis says that except average size and operating income (one of the indicator of profitability), other factors explain the debt equity ratio satisfactorily. Asset structure shows a positive relationship with debt equity ratio suggesting that firms with considerable tangible assets would borrow more. Profitability shows a negative and significant relationship with the debt equity ratio. This contradicts the trade-off theory (higher the taxable income, higher the debt equity ratio) but supports the pecking order theory (firms borrow less if internal funds are sufficient).

1.5 Summary

Large amount of literature has surfaced since the seminal paper of Modigliani and Miller appeared. They proposed the irrelevancy of capital structure to the market value under assumptions of perfect capital markets, no taxes, and no transaction costs. Various other authors have tried to relax some of the assumptions of the MM framework and derive results in a more general setting. But the controversy still persists. The assumptions and the results that follow from the MM framework have been continuously under criticism. The tools of this criticism have been the arguments of market imperfections, consideration of bankruptcy costs, agency costs and asymmetric information and signalling. With these considerations made explicit in theorising, it has been possible to demonstrate the existence of an optimal capital structure which is linked to the market value of the firm. The strict contextuality of the term forbids any attempts to generalise the concept and the qualitative nature of the reasons forwarded for the existence of optimal capital structure, makes the concept difficult to observe in the real world situations. Considerable literature has come up to deal with the concept empirically. They have taken various variables like profitability, asset structure, size, industry classification, etc., as empirical determinants of the concept.

⚘Comment on the Approach taken in the Dissertation:

As mentioned above, testing can be done at two ways. The above survey describes studies done in the first way i.e., to test the determinants statistically. The present study tries to look at the problem from the second point of view i.e., to look at a specific determinants and analyse its effect on behaviour of capital structure. The determinant chosen for this purpose is the nature of industry. An attempt is made in this dissertation to analyse the effects of the

factors that characterise a particular type of industry on the behaviour of the capital structure of the individual firms constituting the industry.

As discussed above an optimal capital structure is contextual as well as empirically unobservable. Therefore in this study, we develop an index of optimality based on the concept of sustainability of debt to analyse the behaviour of the actual capital structure of the firms. Explanations are liked with the characteristics of the cement industry and constraints it imposes on the firms.

These characteristics and constraints might be type and nature of product, nature of technology and the usage and cost of inputs associated with the production process as a whole, degree of concentration, policy and legal framework etc. These factors might be on whom an individual firm exercises varying degree of control. Based on the intensity with which a firm faces them will ultimately decide their effect on its financial health in general and behaviour of capital structure in particular.

The next chapter will take up these issues and try to analyse them empirically on the basis of the approach discussed above.

Chapter Two

Profile of The Indian Cement Industry

This chapter gives the general profile of the Cement Industry. The first section deals with the production and consumption of cement in India. The second section deals with the policy environment in which the cement industry works. The third section deals with behaviour of the sources of financing of firms in the industry. The fourth section deals with the trends in profitability of the firms in the industry. The sections, starting with the fifth one which, deals with the regional segmentation of the market, form the background for analyzing the inter firm differences in profitability in the next chapter. The sixth section deals with the issue of concentration in the cement industry. The seventh section gives a brief idea of what is happening on the input scene. The last section discusses the possibility of developing an export market.

In making a choice of industry for this study, two criteria were applied to ensure the general applicability of the analysis attempted here. The criteria were one, technological homogeneity and two, product homogeneity. Most of the cement firms have shifted by now to the so called dry process of manufacture. So the first criterion is satisfied. There exist brands and grades in the cement so manufactured. However that does not principally alter the basic homogeneity of the product. Hence the second criterion is satisfied.

2.1 Cement- Production and Consumption:

Cement consumption depends upon two different economic agents. Resident and commercial consumption is influenced by the demand from households and small business enterprises. The second component of cement consumption comes from consumption in infrastructural project dams, bridges, ports, and roads- and in setting

up of industrial plants and utilities. The first component of this is mainly influenced by the income growth and, therefore, might exhibit a local bias as this demand will grow where actually there is an expansion in income. The second component will be mainly affected by spending on infrastructure, which has been strictly in the state domain till recently. As is evident during 1991-93, the industry experienced a recession because of poor government off take. This in a way reflects strong linkage between government consumption and demand for cement.

Table No. 2. 1

Cement Consumption and Production (million tons)

Year	Consumption	Production
1989-90	42.9	44.6
1990-91	45.8	48.9
1991-92	50.5	53.6
1992-93	50.6	54.1
1993-94	54.2	57.1
1994-95	58.3	62.4
1995-96	64.4	76.2

Source: Cement Industry in India (Statistics), Cement Manufacturers Association.

After the year 1989-90 the production figures have consistently outstripped the consumption till 1995-96. This clearly points to the excess supply situation in the market. As mentioned above this trend might be because of poor government off take in the recent years. The linkage between government spending and cement consumption becomes clear if look at the cement- GDP linkage. The contribution of the GDP growth rate to trend growth rate in cement consumption for the period 1980-81 to 1991-92 is around 63 per cent (Gokarn & Vaidya 1994). There are basically two factors responsible for this cement intensity of the GDP put forth by the authors. One is the shift in the construction activity from mud, clay and

agricultural materials to Reinforced Cement Concrete (RCC) as the economy develops. And secondly sectoral shares in the construction; share of the corporate construction would not be phenomenal because factories are mostly shell like structures with relatively few internal divisions. But the sectoral share of the public works & household construction in this cement intensity of GDP would be much larger because of relatively larger cement requirements. The spending by the Government would affect consumption of cement through reduced expenditure on public works which has suffered mainly due to the pressure on deficit spending.

2.2 Policy Environment of the Cement Industry:

The changes in the cement intensity would be more clear if we consider the policy shifts over the years. The following discussion highlights the major changes that happened in the government's policy which changed the industry from a totally controlled one to a fully decontrolled one by the beginning of the current decade.

Till 1982 the industry was fully under government control. The private enterprises were expected to work in a regime virtually every aspect of which- from project conception, location, manufacture, sale, prices & costs – were subject to the decisions and approvals of various components of the administrative machinery. The controlled price regime kept profitability under control which might have served as a disincentive for new investment.

The post 1982 scenario reflects a drastic change in structure and profitability of the industry. The dual pricing scheme and the concession to sell around 50 per cent of their output in the open market for new firms, resulted into many new firms entering into industry thereby substantially adding to the existing capacity. There was also a shift in the technology used in producing cement. The new plants mostly had adopted the modern dry process technique which was supposed to be more energy efficient. The old firms also had started modernizing their plants by then. The following table gives change over the decade in capacity by the type of technology used.

Table No.2.2

Distribution of Capacity by Process				
Installed Capacity at the Year- end				
	Tonnage ('000 te)		Proportion (per cent)	
Year	Wet *	Dry	Wet	Dry
1981-82	15 864	13 128	54.7	45.3
1990-91	15 864	43 428	26.8	73.2

* Includes 2125000 tones under the semi dry process

Source : Gokarn & Vaidya 1994

It becomes quiet clear that there has been substantial addition in the capacity as a whole and the major proportion of it comes as dry process technology. Along with the large plants there are a large number of mini cement plants in the cement industry. They are usually in the range of 100-600 tones per day kiln capacity. The logic behind setting up such plants is that it allows to tap the scattered lime stone deposits which would not be economically attractive for a large plant. Under the three tier pricing policy they were allowed many concessions like permission to sell at the price fixed for new large plants which itself was well above the price received by the old large plants. They were also allowed an excise duty rebate for five years and were exempted from distribution control. After partial decontrol they were fully exempted from the price and distribution controls. Besides these many state governments have provided incentives to mini cement plants under backward district development and other industrial promotion schemes. (Gokarn & Vaidya 1994)

In 1989 the cement industry was fully decontrolled on the price and distribution fronts. By July 1991 licensing for new cement capacity was dispensed with. After decontrol there haven't been any new entrants, till 1993-94 when companies like TISCO, DLF and groups like Sanghi (Polyester) diversified into cement.

2.3 Behaviour of Sources of Finances:

It would be interesting to look at the sources of financing of firms, in the Indian cement industry from the point of the present study. The changes in the sources of finances over the period would reflect the changes in the dependence of the industry as a whole on various sources of finance. The following table gives the sources of financing as a proportion of total capital employed. The total capital employed is defined as the total of net worth (equity + preference + reserves) and total debt (debentures + long term debt + short term debt).

Table No. 2.3

Behaviour of Various Sources of Financing:

Year	EQ/TCE	PR/TCE	RS/TCE	DB/TCE	LTD/TCE	STD/TCE
1987	0.22	0.01	0.23	0.09	0.47	0.09
1988	0.15	0.00	0.14	0.04	0.24	0.06
1989	0.26	0.00	-0.06	0.02	0.59	0.11
1990	0.24	0.00	-0.17	0.07	0.66	0.16
1991	0.32	0.00	-0.46	0.03	0.92	0.21
1992	-0.04	0.00	0.61	0.05	-0.10	0.13
1993	0.29	0.00	0.14	0.07	0.75	0.11
1994	0.24	0.00	-0.01	0.05	0.96	0.11
1995	0.25	0.00	0.17	0.06	0.51	0.11
1996	0.24	0.00	0.20	0.03	0.61	0.10
Average	**0.22**	**0.00**	**0.08**	**0.05**	**0.56**	**0.12**

Source: Calculations based on the sample of 30 firms.

TCE = Total Capital Employed

EQ = Equity

PR = Preference shares

RS = Shareholder's Reserves

DB = Debentures

LTD = Long term debt .

STD = Short term Debt

The above table is based on the calculations for the sample of thirty firms in the cement industry. It generally illustrates what could be the past trends in the various sources of financing over the period 1987-1996. The first column gives the behaviour of equity as a proportion of total capital employed. It has remained more or less in the range of 22-26 per cent over the period. Preference shares almost remain contribute nil to the total capital employed. Reserves tend to be negative in the period starting from decontrol of the industry till 1994, suggesting carry forward of substantial losses. The proportion of debentures seems to be quite low ranking almost second last in terms of contribution to the total capital employed. Long term debt forms a sizeable proportion of the total capital employed for all the years. Short term debt ranks third in terms of the contribution to the total capital employed. Most of the sources of finances seem to peak in the year 1991 except debentures. Reserves position had deteriorated to the maximum point in 1991. This might imply that the combined effect of deregulation depressing the markets, modernization and expansion schemes which most of the firms had initiated by then, and possibly the increase in the total expenses. On the one hand it squeezed profits and on the other hand it increased the need of external funds. Therefore, despite of reserves dipping to an all time low, other external sources pick up phenomenally. If we look at the average of all the years, then long term debt plays an important role in financing the working of the firms in the industry. Reserves must have plaid an important role but this is not captured in the average because of substantial negative figures in the intermediate years. But the figures for other years indicate a considerable proportion of reserves being used in the business. Equity forms more or less as a stagnant proportion of the total capital employed. The short term debt forms a reasonable proportion of the total capital employed (it cannot go up phenomenally because it is primarily used as a source of working capital finance). Therefore we can say that long term debt forms the substantial source of external finance for most of the cement companies in the industry. This is very important from the point of view of analyzing capital structure of these firms because one of the assumption used for developing an index of optimality in the next chapter, is that the firms resort to debt first whenever there is a need for external finance. Given the above discussion this

assumption seems to be in line with the actual behaviour of the sources of finances in the Indian cement industry.

2.4 Trends in Profitability:

The behaviour of reserves as seen in the above table warrants a look at the trends in profitability of the industry.

Table No. 2.4

Behaviour of Average Operating Profit Margin (OPM) and Average Net Profit (NPM) Margin:

Years	Operating Profit Margin	Net Profit Margin
1986	0.18	0.08
1987	0.17	-0.03
1988	0.13	-0.15
1989	0.11	-0.10
1990	0.13	-0.06
1991	0.20	0.01
1992	0.21	0.05
1993	0.13	0.01
1994	0.10	0.01
1995	0.19	0.11
1996	0.22	0.09

It clearly shows that after that profitability in both the terms declined following the new entry in to the industry after partial decontrol. The net profit margin shows negative sign indicating that industry incurred losses continuously for four years starting from 1987 till 1990. If these losses are carried forward, then the low figure of reserves in the year 1991 stands justified. Profitability shows an improvement in 1991 and 1992 but again falls in the subsequent years. This might explain the

increased dependence on external funds in the following years (long term debt shows increase in every alternate year whereas short term debt maintains its proportion over the years). This suggests a strong link between profitability and the behaviour of the sources of financing of firms. This will prove useful in the analysis of the capital structure of these firms in the following chapter.

2.5 Regional Segmentation of Markets:

With the exception of ACC most other companies cater to their respective regional markets. The reasons for this are quiet clear. First, the location of a cement plant has been centered around limestone deposits and availability of coal which happen to be the main inputs in the manufacture of cement. As these are geographically scattered, so are the production facilities. Secondly, cement being a bulky commodity, cost of transportation becomes very high. Hence most of the firms have been catering to the respective regional markets. The prices also therefore differ across regions depending upon whether there is a situation of excess supply or excess demand. North India seems to have a disadvantage because of the situation of excess supply for a considerable period. Whereas the southern part of the country has been characterised by significantly higher prices. This affects the profitability of firms across regions. The prices in the local market would be more widely distributed than in the regional ones. This further makes the sales realizations uneven.

2.6 Concentration in the Indian Cement Industry:

The structure of the cement industry seems to have shown fluctuating trends. The concentration in cement industry as measured by the Herfindhal index of concentration shows a declining trend from 1952-1986. (Pradhan 1992) Particularly for the period 1983-1986 it shows a stagnation at a particular value. This might imply that a part of the output is controlled by some large firms.

Gokarn and Vaidya (1994) show that the concentration in the cement industry is declining till the year 1992-93 starting from 1976-77.

Both the studies above use the four firm concentration ratio. However, in case of the Indian cement industry it would be useful to look at the concentration from the point of view of a group. The reason for this is partial decontrol of the industry in 1982 has seen entry of major industrial groups like J.K group, Birla group, etc., in the industry. The firms belonging to such groups are less likely to behave as an individual firm, but would form a strategic part of these groups. Therefore, it becomes important to see the shares of the group as a whole to get a more clearer picture of concentration in the industry.

If we look at the data compiled by the Cement Manufactures Association then the above point would become clear. The share of the five players, Birla group, ACC, J.K Cements, India Cements and L&T in 1990-91 in capacity was 50 per cent and in Total Output was 57 per cent. By 1991-92 and later new player come into this picture. These are Jaypee Rewa and Gujrat Ambuja. These firms with the above players share 63 per cent of the total capacity and 67 per cent of the total output. This evidence indeed suggests that the concentration as measured by group shares has been increasing in the Indian cement industry.

2.7 Inputs

Coal : Coal is an important input in the production of coal. It plays a dual role in the production process. First it is used as a fuel to fire the kiln. Second, the mineral content (ash) forms a constituent of clinker and thereby is instrumental in determining the quality of cement produced.

Except some small collieries in North- Eastern state of Meghalaya and some few captive mines with individual companies, coal mining is exclusively in the government domain. Coal is allocated among the users according to the policy guidelines and on the basis of coordination between the different departments of the government dealing with coal mining, the respective coal using industries & the railways.

Indian coal is very low in calorific content because of high mineral content. Moreover, the quantity gets hampered due to the poor mining practices in the various collieries. The reason for this is the incentive structure for this collieries is

biased in the favour of volume than quality. So the coal which is delivered contains rock which not only results in sub quality cement but also damages the crushing and burning machinery. Secondly the variability in the quality of coal supplied makes maintaining operating regimes at plants very difficult. (ICRA 1994) The above discussion becomes important because it is not only the direct cost of coal that is important but the indirect costs in the form of damage to the equipment or disruption of operating regimes also become important because they ultimately add to the total cost.

The companies in South which are far away from the collieries in the north and the presence of mining activity in south not being that significant, have shifted to lignite as an alternative input. There are large deposits in Tamil Nadu, Rajasthan , and Gujrat. The advantage using lignite is, that it has a higher calorific value and lower power consumption and maintenance requirements in grinding. But it also has disadvantages like high moisture content and high volatility content, which requires increased care in handling, drying, storage & transportation.

Besides there is a possibility that these deposits would be tapped for higher priority sector. Imported coal is another substitute for the domestic coal which has 60 per cent + higher calorific value. The supply generally comes from Australia, New Zealand, etc. But in this case cement plants located near the coast seem to be having a distinct advantage vis-a vis the plants located relatively in land. There is a lot of effort to tap other alternative fuel sources like petroleum coke or agricultural by-products.. Though, alternative sources of fuel might reduce costs, the improvement on this front is more of the long term possibility. Currently the industry continues to suffer from the unevenness in the quality and availability of higher calorific coal.

Transportation: The Indian Railways still bring 75 per cent of the coal and ship out 54 per cent of the finished coal on an average . There is a marginal increase in the contribution of road transport also.

The delivery schedules suffer due to poor availability of wagons. Companies have responded to this situation in a variety of ways. ACC has purchased wagons for the outward movement of cement or Gujrat Ambuja has resorted to coast route to tap the market in Mumbai. The increase in the railway freight also adds up to the

intensity of the problem. The idea of split location is also becoming a potential alternative. Clinker can be moved in open wagons unlike cement bags, which have to be moved in covered wagons. The availability of open wagons being relatively more, this becomes a more viable option. So locations can be split by setting up production facility near the market and the quarrying near the limestone deposits.

Power: The industry has been suffering from power shortages and cuts for quiet some time. There seems to be no improvement in the situation in the immediate future, given the reduction in the government expenditure on infrastructure and slow increase in the private investment in this area. Most of the companies have responded to this problem, by installing captive power plants. Some cement companies in south India have installed wind farms and supplying the power to the grid to get a compensation in the power bill.

Moreover the power problem becomes acute in some regions like Karnataka and Andhra Pradesh where there is a relative shortage of power. The power tariffs vary across states and are increasing over the years. This has reduced the diseconomies in using the captive power plants. Secondly conversion to the dry technique of manufacturing also reduces the power consumption per unit. The following table gives the production figures as produced by captive generation plants . It shows an increasing trend over the years, suggesting more and more are finding it economical to do so, given the power situation on the country.

Table No. 2.5

Year	Cement Production from Captive Power (Million Tones)	Per cent of Total Cement Production
1985-86	5.29	16.51
1986-87	5.39	15.48
1987-88	6.63	17.72
1988-89	6.3	15.09
1989-90	7.12	16.59
1990-91	7.75	16.94
1991-92	9.72	19.21
1992-93	9.17	18.08
1993-94	10.41	19.25
1994-95	12.34	21.15
1995-96	17.58	27.27

Source: Indian Cement Industry (Statistics), Cement Manufacturers Association, 1995-96.

Cost of Producing Cement: Given the above scenario on inputs it would be interesting to look at the trends in the cost of producing cement. The following table gives the cost of producing cement per bag for the period 1993-96.

Table No. 2.6

Year	Cost of Cement per bag)
1993	69
1994	76
1995	82
1996	86.5

Source: Indian Cement Industry (Statistics), Cement Manufacturers Association, 1995-96.

The figures in the above table clearly show an increasing trend. Further calculations show (not reported) that most of the cost increase comes from the increase in railway freight and cost of coal and power.

2.8 Exports:

Exports to the neighboring countries are proving to be an alternative source of market for most of the companies in the cement industry in India. Dependence on exports is mainly out of compulsion because of the slack in the domestic market. But the competitiveness of export front is mainly dependent on the cost of domestic inputs. However, devaluation of the Indian Rupee might help in enhancing the competitiveness of the exports. Large part of possibilities on this front still might have remained untapped as increase in the reliance on exports as an source of market is quiet a recent phenomenon. Development on this front would certainly help in insulating the firms from the fluctuations in the domestic market. Though, India has locational advantage in terms of South East Asia, Middle East, South Asia and East African countries lot on this also depends upon the domestic infrastructural support and as mentioned earlier very little improvement on this front is expected in near future. Given the current situation, ability to successfully tap the export market would be mainly influenced by the geographical factors like proximity to the export market and proximity to the coast.

The above discussion is aimed at giving a background to understand what exactly might be happening at the industry level. These are the characteristics, constraints and the structural factors which together constitute the nature of the industry. The next chapter attempts to analyse the effect of the nature of the industry so constituted, on the behaviour of the capital structure of the individual firms.

Chapter Three

Analysis of the Data

This chapter will present a detailed analysis of preliminary empirical results. The first section discusses the index used for comparative analysis and comments on the classification of firms made on the basis of the index. The second Section tries to analyze the performance of the firms with the help of various financial variables. It presents some arguments and propositions based on them, validity of whom is tested with the help of actual data. The third section deals with the possible causes of the inter firm differences in profitability. The fourth section tries to analyze the issue of optimization of capital structure. The last section discusses the drawbacks in the approach used for analysis.

3.1 Approach to Optimal Capital Structure:

This dissertation takes a somewhat different approach to the problem of optimal capital structure. As discussed in the previous chapter optimal capital structure is unobservable. Therefore, it attempts to develop an index for a firm's so called optimal capital structure. This index is then used to contrast the behaviour of actual debt equity ratio (ACDER). Firms are then classified according to the deviation of ACDER from the optimal debt equity ratio (OPDER). The reasons for the behaviour of firm's capital structure in a particular way are then linked with the characteristics of the industry.

The definition of OCS used for the purpose, is based on the concept of Corporate Debt Capacity . This debt capacity is to be understood from the sustainability point of view Given a certain amount of profit, how much debt can be sustained is to be ascertained. One assumption underlying this concept is that a firm always prefers to borrow in the form of debt first, whenever the need for external funds arises. This is

somewhat along lines of pecking order theory[1]. However, it also contradicts the other implication of the pecking order theory i.e., a firm will borrow less if its profits are high (suggesting higher availability of internal funds). Here **optimal capital structure (OCS)** is defined as:

OCS = SD / (SD +TE)

where   SD = Sustainable Debt

TE = Total Equity (Equity + Preference)

Sustainable Debt is nothing but ;

SD =(SIP *AD)/AIE

Where SIP = Sustainable Interest Payment

AD = Actual Debt

AIE = Actual Interest Expenses

Sustainable Interest Payment (SIP) is calculated by the following formula;

SIP (per anum per firm) = AEBIT * [1 - r +d]

Where   r = proportion to be retained

d = annual depreciation

ABEIT = Earnings before Interest & Taxes(Gross Profit)

The amount to be retained is nothing but some minimum proportion of retained profit and provision for taxes. This is done to guarantee a minimum liquidity to the firm.

The proportion to be retained is taken as a proportion of average EBIT for the Industry (sample considered for the present study). Calculation is done as stated below:

1. Average of EBIT is calculated for every year for the industry as a whole.

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[1] The pecking order theory states that a firm will choose debt first and then equity in case it resorts to external finance. But firm will do so only when it has exhausted the internal funds. So the order becomes first internal funds, second debt, and third equity. This ranking is crudely based on the degree of safety with a higher degree preferred to the less. This implies that if a firm is highly profitable then its dependence on external finance is the minimal i.e., it will not issue debt. This means higher the profit less will be the use of debt and therefore less will be the debt equity ratio.

2. These figures are further averaged out over the years 1986-1996 to get an industry average of EBIT for the whole period.

3. Similarly, averages are calculated for retained profit and annual tax provision and then taken as proportion of industry average of EBIT.(this ratio is referred to as 'r')

4. Depreciation is taken as a average over the years for each firm and then taken as proportion of Industry average of EBIT[2]

The values so obtained are used to calculate optimal debt ratio by the formulae stated above. (Reported in Appendix no 5) This section deals with firms in Cement Industry . Only those firms are considered for whom the data is either available from 1986 to 1996 or at least for five to six years.

3.1.1 Classification of Firms:

In all thirty firms are chosen for analyses, the basic criteria for choice being the data availability for the period 1986-1996. The average optimal debt ratio of each firm is taken

Table No 3.1

Type of Firm	Number of Firms
Over- geared	13
Under- geared	17
Total	30

Table based on average Actual and Optimal Debt Ratio

For Firm wise table based on the sample, see Appendix.

as a benchmark in order to classify the firms as 'over-geared' or 'under-geared'. Firms, **whose actual average debt equity ratio is less than the average optimal debt ratio,**

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[2] Depreciation is generally calculated as a percentage of the value of the concerned asset. Here the value so calculated is then taken as proportion of EBIT because ultimately the charge of depreciation goes to the Profit and Loss Account while preparing the annual balance sheet of the firm. Secondly this is not averaged out to get an industry figure because depreciation will be firm specific i.e., it will vary according to the firm's policy & age, though the maximum amount is specified by the Companies Act.

are classified as under geared. Firms, whose actual average debt equity ratio is above the optimal average debt equity ratio, are classified as over geared. The firms are analyzed on the basis of profitability and growth and the effect this has on relating the firms as over geared and under geared is analyzed. Following table gives the distribution of firms according to the classification norm stated above.

Firms for whom the difference between average actual debt equity ratio and average optimal debt equity ratio, is in decimals are considered into the under geared category. The words under geared and over geared are not used in any normative sense. They just indicate the position of their capital structure with respect to the index used for the purpose of classification.

3.2 Analyses based on Various Financial Variables:

3.2.1 Comparison on the basis of Profitability:

Profits affect the availability of internal funds. These internal funds might be used for two purposes. It can either be used to partly finance the working capital requirements or can be invested in long term projects. In either way it would reduce the dependence of such companies on borrowings. The firms classified as under geared imply that they are borrowing less than what the index based on their profitability suggests they can. From the above two statements we can logically say that firms classified as under geared would be relatively more profitable. On the other hand, firms with low profitability will be relatively more dependant on external funds for both its short term as well as long term requirement. Hence their total borrowings might go up. The firms classified as over geared imply that they are borrowing relatively on a higher scale (again in relation to the index based on their profitability). Therefore, we can say that these firms will have relatively low profits.

Based on the above arguments the following arguments can be made.

➤ *Firms classified as under geared will show a relatively high profitability*

➤ *Firms classified as over geared will show a relatively low profitability*

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The following table gives the operating profit margin and net profit margin figures as a proportion of the net sales according to the classification of firms:

Table No 3.2

Under geared	Average-OP/NS	Average-NP/NS
Associated Cement Companies Ltd	0.12	0.06
Dalmia Cement (Bharat) Ltd	0.18	0.08
Deccan Cements Ltd	0.19	0.08
Dhar Cement Ltd	0.17	0.05
Gujrat Ambuja Cements Ltd	0.29	-0.02
India cements Ltd	0.12	0.00
Kakatia Cements Ltd	0.20	0.02
Madras Cement Ltd	0.26	0.15
Mangalam Cement Ltd	0.15	0.04
Mysore Cement Ltd	0.13	0.10
NCL Industries Ltd	0.35	0.13
Rassi Cement Ltd	0.20	0.04
Shree Cement Ltd	0.33	0.15
Suvarna Cements Ltd	0.14	0.09
Narmada Cement Co Ltd	0.11	0.17
OCL India Ltd	0.17	0.11
Saurashtra Cement Ltd	0.12	0.06
Standard Deviation	0.07	0.05
Average	0.19	0.08
Over geared		
Balram Cement Ltd	0.05	-0.08
Hemadri Cements Ltd	0.21	-0.12
Modi Cement Ltd	0.12	0.00
Priyadarshini Cement Ltd	0.18	0.06
Shree Digvijay Cement Ltd	0.05	0.05
Cdoromandel Cements Ltd	0.14	-0.08
Gujrat Sidhee Cement Ltd	0.16	-0.19
Janapriya Cement Ltd	0.15	-0.05
Kalyanpur Cements Ltd	0.14	-0.22
Mahendra Cements Ltd	0.05	-0.04
Panyam Cements & Mineral Industries Ltd	0.07	-0.01
Sri Chakra Cements Ltd	0.06	0.01
Sri Vishnu Cement Ltd	0.08	-0.49
Standard Deviation	0.06	0.15
Average	0.11	-0.14

Calculations based on The Bombay Stock Exchange Official Directory

The first ratio shows consistently high values for under geared firms than over geared firms. The average operating profit margin is much higher in case of the former than the later. However, the above table gives a mixed picture because some firms in the over geared category show values comparable to that of under geared firms. The picture is quiet clear if we look at the ratio of net profit to net sales figures. They clearly show that the under geared firms have much higher net profit margins than the over geared firms which mostly have negative margins. So the propositions regarding profitability are in a way confirmed, though the discrepancy in the operating profits needs to be further probed. The issue is taken up later in this chapter.

In case of a firm which has low debt servicing capacity due to low profitability, there is a possibility that it would be denied credit on long term basis. This is because doing so would reduce the lender's exposure to the risk of default. However, it would continue to get working capital as generally banks lend on this account on the basis of the collateral present in the form of raw material. Moreover, lending on short term basis also reduces the risk exposure of the lender. If the lender feels it to be safe he can always roll over a part or all of the short term debt. Therefore, short term debt would cause the total borrowings to increase. The firms classified as over geared would show the above trends in behaviour of the various components of total debt (because of low profitability and therefore, low debt servicing capacity).

In case of firms classified as under geared, total borrowings may go up due to long term component as well as short term component. Lenders won't mind to lend to such companies as there is relatively low risk of default due to high profitability. We cannot say anything particular about the behaviour of short term debt as a proportion of total debt, a priori. This is because, if short term debt has to decrease as proportion of total debt, either the profits have to be invested mainly in working capital or long term borrowings should increase more than the short debt. If the proportion of short term debt in total debt goes down it would be a result of the above two factors combined[3].

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[3] We can get a clear picture if we prepare the statement of changes in financial position (fund flow analysis) or a sources and uses of funds statement for each company for every year. But this is beyond the scope of the present study.

Based on the above arguments and the propositions about profitability, we can propose the following about firms classified as over geared:

> **For firms classified as over geared firms, short term debt as a proportion of total debt in total debt would increase.**

The following table gives the behaviour of sources of debt financing for the different type of firms over the years. The table clearly shows that firms relying more on short term debt as a proportion of total debt, are those classified as over geared. This corroborates the proposition that firms with low profitability have to rely increasingly on the short term debt and such firms are generally those classified as over geared. Firms showing a decline in the proportion of short term debt are those classified as under geared. This as mentioned above might be a combination of high profitability and increase in debentures (which is a type of long term borrowing) as a proportion of total debt.

Table No 3.3

Behavior of Various Sources of Debt Financing											
Under Geared Firms											
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Db/TD		0.09	0.11	0.06	0.10	0.09	0.08	0.12	0.12	0.16	0.13
Lt/Td		0.71	0.60	0.71	0.73	0.74	0.78	0.76	0.70	0.68	0.69
St/Td		0.20	0.29	0.24	0.17	0.18	0.14	0.12	0.18	0.15	0.17
Over Geared Firms											
Db/Td		0.05	0	0.02	0.08	0.03	0.03	0.02	0.02	0.02	0.01
Lt/Td		0.75	0.92	0.75	0.74	0.77	0.83	0.84	0.83	0.77	0.77
St/Td		0.20	0.08	0.23	0.18	0.20	0.15	0.14	0.16	0.21	0.21

Note: Db = Debentures

Lt = Long Term Debt

St = Short Term Debt

Td = Total Debt (Db + Lt + St)

Calculations based on The Bombay Stock Exchange Official Directory.

Figure No.1 & 2 gives a clear picture of the behaviour of various sources of debt financing for the firms under both the categories. They also support the proposition.

The question regarding the borrowing patterns of the firms is how the firms with low operating profitability are able to borrow at all? One might argue that the creditor would prefer to lend to such a company if he has lent to it earlier. This is quiet intuitive because if the firm is able to improve its performance with the infusion of additional funds, then the possibility of recovering earlier loans increases. In case of cement industry this argument does not seem to be far fetched. This either can happen as a compulsion on the lending institutions or because of an informal agreement between lenders and borrowers.

Most of the firms in the over geared category have been referred to the Board of Industrial and Financial Reconstruction (BIFR). When this happens, the BIFR prepares a rehabilitation scheme under which it generally asks the promoters to bring in additional equity capital and/or direct the concerned lending institutions to lend to such firms. In such a case the lending institutions have to lend to the sick firms despite their poor financial health. An alternative scenario might also emerge, where the over geared firms are able to borrow irrespective of their financial health.

Even if a company is not referred to BIFR and still incurs losses, recovering loans through cumbersome court procedures becomes tedious and costly. In such a situation a lender would prefer to lend to that firm in hope of recovering the loans made earlier if the performance of the firm improves. This is a scenario where a tacit agreement between the lenders and borrowers to supply the required amount funds might emerge to simply avoid the inefficient and (therefore) costly legal procedures. In such a case also there is possibility that a lender would not lend on log term account but would prefer to lend on the short term account to reduce his risk exposure.

3.2.2 Growth of Firms and its relation to the Classification of the Firms:

A Comparison using Gross Fixed Assets as an Indicator of Growth:

The logic behind the relationship of Financing patterns and growth of the firms, as reflected by growth in gross fixed assets, is somewhat related to that of financing patterns and profitability. For a firm to grow its financial health should be in a better shape. For a firm which is barely able to survive, growth will be relatively low. These are the firms which have to borrow heavily to keep the affairs going. Whereas firms which are relative in good financial health would be expected to grow as they would be able to raise the required funds with relative ease. Considering the above argument and the proposition regarding profitability we can say the following:

- *Firms that show a sluggish growth over the years would invariably be those classified as over geared.*

- *Firms that show a faster growth would be those classified as under geared firms.*

Table No 3.4

Range of compounded Annual Growth Rate of Gross Fixed Assets.			
0.35-0.25	0.25-0.15	0.15-0.05	0.05-(-0.05)
Gujrat Ambuja Cements Ltd (UG)	Kakatia Cemaents Ltd (UG)	Dalmia Cement (Bharat) Ltd (UG)	Rassi Cement Ltd (UG)
Mangalam Cement Ltd (UG)	NCL Industries Ltd (UG)	Madras Cement Ltd (UG)	OCL India Ltd (UG)
India cements Ltd (UG)	Associated Cement Companies Ltd (UG)	Sri Chakra Cements Ltd(OG)	Modi Cement Ltd(OG)
Mangalam Cement Ltd (UG)	Deccan Cements Ltd (UG)	Kalyanpur Cements Ltd(OG)	Shree Digvijay Cement Ltd(OG)
Shree Cement Ltd (UG)	Dhar Cement Ltd (UG)		Cdoromandel Cements Ltd (OG)
	Mysore Cement Ltd (UG)		Gujrat Sidhee Cement Ltd(OG)
	Saurashtra Cement Ltd (UG)		Panyam Cements & Mineral Industries Ltd(OG)
	Hemadri Cements Ltd (OG)		Suvarna Cements Ltd (UG)
	Mahendra Cements Ltd(OG)		Narmada Cement Co Ltd (UG)
			Balram Cement Ltd (OG)
			Priyadarshini Cement Ltd(OG)
			Sri Vishnu Cement Ltd (OG)
			Janapriya Cement Ltd(OG)

UG - UNDER GEARED   OG - OVERGEARED

The above table clubs firms according to growth rates in a specified range. The range starts with a higher growth rate from the left corner (0.35) and gradually goes to the negative value. Most of the firms classified as under geared cluster to the left hand side of the table suggesting a relatively higher growth rate (12 out of 17 firms are in first two columns). Most of the over geared firms cluster to the right hand side of the table suggesting relatively low or negative growth rates (9 out of 13 firms are in the last column).

This corroborates the above proposition regarding growth and the classification of firms. The reason for this is quiet clear from our earlier proposition about profitability. There we demonstrated that firms with low profitability are those classified as over geared and those with high profitability are those classified as under geared. Therefore, over geared firms would be slow growers because for them the main issue is that of improving profitability unlike that of the under geared firms which, because of relatively high profitability can grow faster.

3.2.3 Comparison with Net Sales:

Net Sales figures can be used as another indicator of growth. Profitability is mainly influenced by net sales through the price that the goods sold fetch (and also the volume). A firm with sluggish growth sales can seldom be expected to grow because in that case profitability stagnates or in some cases declines, ceteris paribus. If firms with low profitability are over geared then logically firms which show sluggish growth in net sales would also be classified as over geared and vice versa. In relation to this following propositions can be tested.

- *Firms that show sluggish growth in sales are generally those classified as over geared*

- *Firms that show a faster growth are generally those classified as under geared.*

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The following table gives comparative figures of net sales and the compounded annual growth rate under the two categories.

Table No 3.5

Range of Compounded Annual Growth Rates of Net Sales				
Above 0.40	0.40-0.30	0.30-0.20	0.20-0.10	below 0.10
Suvarna Cements Ltd	*Gujrat Ambuja Cements Ltd*	*Madras Cement Ltd*	*Associated Cement Companies Ltd*	*Dalmia Cement (Bharat) Ltd*
Gujrat Sidhee Cement Ltd	*Saurashtra Cement Ltd*	*Mangalam Cement Ltd*	*Deccan Cements Ltd*	*NCL Industries Ltd*
Sri Vishnu Cement Ltd	Sri Chakra Cements Ltd	*Priyadarshini Cement Ltd*	*Dhar Cement Ltd*	*OCL India Ltd*
		Rassi Cement Ltd	*India cements Ltd*	Balram Cement Ltd
		Cdoromandel Cements Ltd	*Kakatia Cemaents Ltd*	Modi Cement Ltd
		Kalyanpur Cements Ltd	*Mysore Cement Ltd*	Shree Digvijay Cement Ltd
		Panyam Cements & Mineral Industries Ltd	*Shree Cement Ltd*	Janapriya Cement Ltd
			Narmada Cement Co Ltd	Mahendra Cements Ltd
			Hemadri Cements Ltd	

Note: Names in *italics* are of firms classified as under geared and others are of those classified as over geared.

Formula as in Table No.4

As is evident from the ranges given at the top of the table, the value of the growth rate goes on decreasing as we go from left to right. There is no clustering evident according to the classification made, suggesting that growth rate varies irrespective of the classification.

Therefore, the above data does not support the propositions about net sales.

3.3 Causes of Inter-firm differences in profitability:

From the above analysis it becomes clear that profitability and growth are the key variables in understanding the behaviour of capital structure of a firm. Profitability affects the behaviour of short term source of financing. It also influences the long term sources of finances through growth. However, the proposition tested regarding the

growth of net sales shows that it is not significant to explain the classification of the firms. This is because there is no clustering evident to suggest a higher growth rate for firms in a particular category. This is not surprising because demand for cement has a strong linkage with the GDP growth. Hence if there is a good demand on account of increase in the GDP then all firms will show good sales performance, ceteris paribus. Moreover, as was discussed in the earlier chapter, due regional segmentation of the market, sales performance would also vary accordingly However, regional variation in sales cannot be the only factor causing these inter firm differences. This is because cost would also become an important variable, considering the discussion in the previous chapter. Therefore, one has to look at the firm as well as industry specific factors which cause the profitability of some firms to suffer while other firms continue to improve their performance.

The effect of these variables as discussed in the previous chapter would vary geographically as well as across firms. This is because the production capacity is widely distributed across India and cement being a bulky commodity the markets also get geographically distributed. However the data availability is very poor. Moreover, the available data suffers in terms of coverage across time as well as in terms of the number of firms, and therefore can at best be illustrative of what might be happening at the firm level. Most of the available data pertains to the firms classified as under geared for the purpose of the present study. Hence the analysis based on it cannot be generalized for all the sample.

The following factors might be affecting the profitability of firms:

Cost of Inputs: This might be one of the important factor affecting profitability of firms and also causing inter firm differences in profitability. The general input costs are:

- Wages
- Royalty
- Central excise
- Packing
- Power

- Railway freight on coal

- Coal

- Railway freight on cement

Except royalty and packing charges every other cost shows an increasing trend throughout the period. The royalty and packing charges have been rising in the initial years but from 1992 they remain more or less constant. Wages show a sharp increase since 1989(Parthasarthy & Chakravarty 1998 pp.295 & 298). Moreover old firms face a relative higher wage bill than the new firms (Gokarn & Vaidya 1994). Input costs like railway freight and power tariffs not only are increasing they also vary from states to states. These factors are also influenced by firm specific conditions. Secondly, except western Maharashtra no other region has been able to supply uninterrupted power supply. There have been power cuts upto 60 per cent in Andhra Pradesh. So cost of production lost due to power shortage for firms situated in such states, puts a pressure on the profit margins of firms.

Fuel cost is basically the cost of coal which has been increasing over the years. Indirectly the effective cost might increase because of variations in quality of the coal so supplied or because of the disruption of timely delivery of coal due to poor availability of railway wagons.

Freight on cement would depend upon how far the manufacturing base is from the market. Traditionally the aspect of market has been neglected one and only source of raw material was deemed to be important.[4] The problem of location would be more grave for mini cement plants because the basic idea behind establishing them was to tap relatively small lime stone deposits which large firms would not do because of the uneconomic size of the deposits. If cost of fuel & power and railway freight is the major cost for all the firms then it is bound to put pressure on the profit margins. If we see the write ups which various firms give for publishing in the Bombay Stock Exchange Official

[4] Recently companies like ACC and Gujrat Ambuja have initiated the process of splitting the location of the plants with locating the manufacturing near to the market place because transporting clinker is deemed to be cheaper and safer than transporting cement.

Directory, then almost all firms and specifically firms classified as over geared mention the above two factors as affecting their profitability adversely.

The following table gives the decomposition of cost increase between 1989-90 and 1992-93 for each of the 12 individual cement companies. The firms have been arranged in ascending order with reference to increase in unit costs. Modi and Gujrat Sidhee are classified as over geared for the purpose of the present study.

Table No 3.6

Decomposition of Unit Cost and Profitability Trends for 12 Cement Companies Between 1989-90 & 1992-93								
	Increase in			Share in increase in Total Cost (per cent)				
Company	Total Cost	Net Realzn	Optg Profit	Store	Empl	R & M	Mktg	Power & Fuel	Outward Freight
Saurashtra	162	390	228	17	6	4	neg	54	-16
Rassi	235	397	162	9	4	3	-6	65	21
Guj Ambuja	238	208	-30	5	8	3	3	41	16
Chettinad	243	533	290	22	1	6	-1	37	11
Dalmia	330	511	181	16	6	11	-4	42	7
Guj Sidhee	353	473	120	25	nil	3	neg	66	18
Mysore	403	438	35	11	5	3	neg	41	20
Modi	409	295	-114	13	2	5	2	20	30
ACC	439	439	nil	2	5	10	5	24	14
Shree	445	470	25	13	5	3	2	40	24
India	451	538	87	7	3	5	17	29	40
Madras	520	614	94	9	6	1	6	32	25
Source: The Indian Cement Industry, August 1994, ICRA Investment Information Publications								

For almost all firms the majority of increase in the cost comes from fuel and power and outward freight. However, most units appear to have had some success in containing

cost rise on the internal factor front- raw material, stores, employee and marketing expenses. While these internal factors accounted for 50 per cent of the average cost of companies for all firms together, the top three companies have been able to keep the rise on these accounts to 20 per cent and lower (ICRA 1994). For Gujrat Sidhee, 60 per cent of cost rise comes from fuel and power but for Modi it is the freight which account for 30 per cent of the cost rise which is second in the industry. Even if the actual increases in the cost on account of power and fuel are not to be considered, it can be argued to be intuitively true. This is because if most of the firms have shifted to the energy efficient dry process of manufacturing, the net cost on account of fuel and power should decrease. If this is not happening then it means that the direct and the indirect costs of these inputs must have shown a substantial increase which negated the savings in the use of fuel and power arising out of shift to energy efficient dry process.

Marketing Expenditures: Cement moved from being a bulk commodity to branded one in eighties. Given the homogeneity of the product, a consumer can easily shift to a competing brand, if the required one is not available easily. A producer therefore has to incur certain expenditures, in addition to conventional advertising expediters, in order to ensure that his product is reaching the market on a regular basis and that dealers have an incentive to stock it and push it to the consumers (Gokarn & Vaidya 1994, pp.56).

Therefore profitability might differ according to the expenses incurred by various firms on marketing. The authors mentioned above have found a negative relationship between profitability and the marketing intensity suggesting that more the marketing expenses more it eats the profit margin. Marketing intensity is measured as the ratio of marketing expenditure to sales.

Table 3.7 gives the marketing intensities for some firms. Out of the firms considered only Shree Vishnu and Modi are classified as over geared in the present study. The rest except Chettinad, which is not included in the sample, are classified as under geared. The ratio for most of the firms is increasing. Modi has the highest marketing intensity consistently over the years and is also increasing. Shree Vishnu Shows an increase initially but a considerable drop in 1992-93. If we see the profit figures of Sri Vishnu then they

are negative until 1992. After that there is a turnaround towards positive profitability pointing to a inverse relation between marketing intensity and profitability.

Table No 3.7

Marketing Intensities For Some of the Firms in Cement Industry: Marketing Costs as a Proportion of Sales (per cent)

Firm	1988-89	1989-90	1990-91	1991-92	1992-93
ACC	10.5	13.7	13.1	12.3	13.9
Chettinad	1.1	1.7	1.4	10.7	11
India	13.7	6.1	7.9	19.2	17.2
Madras	11.9	16.1	16.6	19.6	13.6
Mysore	10.4	11.6	9.3	10.3	10.2
Saurashtra	13.2	18.9	13.4	9.5	11
Guj.Ambuja	14.4	9.3	8.8	8.3	10
Modi	20.1	24.2	23.4	23.5	25.6
Narmada	5.4	6.6	6.1	6.5	6.5
Priyadarshini	13.5	15.8	16.3	16.1	14.3
Rassi	13.4	13.4	10.5	13	10.8
Shree	17.8	19.5	18.5	17.6	18.3
Srivishnu	10.7	22.6	21.7	13.8	3.1

Source: Gokarn & Vaidya (1994)

This trend in profitability explains the variations in the marketing intensity. If this is the trend in the cement industry as a whole then the firms which suffered due to poor profitability must have been put in more jeopardy. This is because if there is a negative relation ship between marketing intensity and profitability, any increase in marketing intensity of these firms would cause profitability of such firms to decline further. Firms which suffer from poor profitability are the over geared firms and due to the above reason there is a probability that they have remained in the trap of low profitability.

Prices: Firms, which are relatively inefficient i.e., which have highest costs, would be more dependent on prices to ensure the required profit margins. In 1986-87 to 1988-89 profits of the cement industry suffered due to the substantial increase in the cost of various inputs of cement and the unremunerative price of levy cement due to production

outstripping the demand for first time (Parthasarthy & Chakravarty 1998 pp.302). After the partial decontrol, due to the new entry in the industry there resulted an excess capacity which further put pressure on prices (Gokarn & Vaidya 1993). In the following table we can see that the price index dropped from 139 in1988 to 133 in 1989. After that the it shows an increase.

Table No 3.8

Years	Whole Sale Price Index of Cement
86-87	139
87-88	139
88-89	133
89-90	148
90-91	173
91-92	197
92-93	210
93-94	208
94-95	236
95-96	273
96-97	284

Source: Economic Survey 1997-98

The picture becomes more clearer when we look at the relative price of cement. Figure no.3 gives the behaviour of the relative price of the cement. The relative price is calculated as percentage increase in the wholesale price index of cement over the last year, net of the percentage increase in the wholesale price index for all manufactured goods. Initially the relative price dips showing the capacity expansion effect. After that it again shows an increase for three years and again a fall in the subsequent two years. In the recent years it again shows an increase. This shows that the prices have been fluctuating in a cyclical manner which must have resulted in fluctuations in the sales realization of firms. However this picture is based on the general price trends. From the firm's point of view sales realization seems to change according to the geographical location as well, south India being a most favorable location. If a product suffers from

lack of geographical mobility, then firms in a region where there is an excess demand situation might engage in collective price rigging.

Increasing Concentration: As discussed in the previous chapter, after the decontrol of the cement industry in 1989 the degree of concentration in terms of group shares is increasing. In 1990-91, Birla group, ACC, J.K. Cement, India Cements and L & T together constituted 50 per cent of the total industry's capacity and 57 per cent of the industry's production. By 1996 with the addition of two companies namely Jaypee Rewa and Gujrat Ambuja, they constituted 63 per cent of the industry's capacity and 67 per cent of the industry's output. In the year 1995-96, these companies constituted 67 per cent of the total cement dispatches. This might eventually lead to marginalization of the other players from the industry.

From the above discussion it is quiet clear that price increases and cost variation, tend to vary in intensity across firms. This might be mainly due to the geographical distribution of capacity and markets. Secondly cement being a bulk commodity its transportation becomes a problem therefore sales realization also depends upon access to the near by markets. Thirdly, the increasing concentration in the cement industry is resulting in marginalization of the other firms in the industry. The combination of these factors causes the costs and sales realization to vary across firms. In terms of profit, the consequence is a combination of the simultaneous movement in cost and realization, yielding a somewhat mixed picture.

The above analysis pertains mostly to the firms classified as under geared firms for the purpose of the present analysis. Obviously it cannot be generalized to all the firms. This is mainly because of, as mentioned above, the lack of data. To get a more comprehensive and a comparative picture we will have to analyze the data available in balance sheets of various companies. Comparison of gross margin and operating margin would reveal a much clearer picture in this regard.

Ratio of cost of goods sold (CGS) to net sales(NS) ratio would indicate the magnitude of the cost of goods purchased or manufactured, or the cost of services provided, in relation to the margin left over for the operating expenses and profit. This is known as

the Gross Margin (1 – CGS/NS). Higher the gross margin better would be the company's position to cover the operating expenses and leave a comfortable profit margin to cover the interest expenses. The operating profit margin would reflect the operational efficiency of the firms. This would reflect the companies position after covering the expenses on general administration and selling. Higher the operating profit margin the better would be the company's position to cover the interest expenses.

The following table gives figures about the cost of goods sold to net sales ratio(CGS/NS) and operating profit margin(OPM) according to categories.

Table No 3.9

Years	UG-CGS/NS	OG-CGS/NS	UG-OPM	OG-OPM
1986	0.21	0.00	0.19	0.07
1987	0.46	1.04	0.17	0.15
1988	0.57	0.74	0.15	0.11
1989	0.74	0.82	0.13	0.08
1990	0.68	0.75	0.15	0.09
1991	0.64	0.71	0.22	0.18
1992	0.63	0.66	0.22	0.19
1993	0.65	0.75	0.16	0.10
1994	0.72	0.76	0.13	0.06
1995	0.70	0.79	0.26	0.09
1996	0.67	0.70	0.29	0.12

Note: UG- Under Geared Firms

OG- Over Geared Firms

If we look at the behaviour of the ratio of cost of goods sold to net sales then for the firms in both the categories, it initially shows fluctuations but from 1991 onwards to 1995 it has been increasing for both the categories. This implies that the cost increases on account of various inputs have affected more or less all the firms evenly. Hence the general increase in these costs does not show a tendency to affect a particular class of firms. This implies that the capacity of both the firms to cover the operating expenses has been deteriorating since decontrol. But if we compare this result with the behaviour of operating profit margin then we find that the under geared firms enjoy a relatively

higher operating profit margin than the over geared firms. Moreover the difference between the two series (OP/NS) is somewhat increases after 1991. This means that the under geared firms were relatively more operationally efficient than the firms in over geared category. Operating expenses mainly comprise of general administration expenses and selling expenses.[5] The above result suggests that the over geared firms suffered more on account of these expenses. If we consider the marketing expenditure argument mentioned above, then it seems obvious that selling expenses must have shown relatively a more increase. One might argue that this tendency is common for both the firms. However, we have to consider the fact that, under geared firms have shown relatively high profits over the period. This puts them in a comfortable position in relation to the availability of funds. In case of over geared firms two factors seem to be at work. One is the track record of low or negative profitability and second is the increasing concentration in the industry. The first factor puts them in relatively disadvantageous position regarding the availability of funds. The second factor might have made them spend more to get the sales through.

However, this still does not explain the fact that some of the firms in the over geared category having operating profit margins comparable to that of under geared firms, suffer on the account of net profitability (refer to table no. 3.2 above). The following section attempts to analyse the phenomenon.

Comment on the Overall Cost/Price Effectiveness of the Business:

The cost/price effectiveness implies the way the costs and the prices have been managed to ensure an overall reasonable rate of return on the operations. The higher operating profit margins for some firms and low for others in the over geared category imply that cost increases have affected the firms even in this category unevenly. Some firms have operating profit margin comparable to that of the under geared firms but still they are classified as over geared. So there have to be factors other than cost explaining this

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[5] Generally depreciation is also included in operating expenses. But in the above calculation it is not included, so that the effect of costs on the profitability could be reflected clearly.

phenomenon. The reasons why the over geared firms remain in the low profitability trap, actually should be a combination of cost increases, uncertainty and the unevenness in the sales realizations and the burden of interest expenses and possibly depreciation. This argument would become clear if we compare the net profit margin(NPM) according to categories. The net profit margin is nothing but the ratio of net profit to net sales. It indicates management's ability to operate the business with sufficient success not only to recover the cost of the merchandise or services, the expenses of operating business (including depreciation), and the cost of borrowed funds, but also to leave a margin of reasonable compensation to the owners for putting their capital at risk. Thus, the ratio signifies the cost/ price effectiveness of the operation (Helfert 1991). If the ratio is low or negative it signifies a low cost/price effectiveness. The following table gives the average net profit margins for the firms according to the categories for the period 1986-1996.

Table No 3.10

Average Net Profit Margin		
Years	Under geared	Over geared
1986	0.10	0.01
1987	0.05	-0.31
1988	0.03	-0.56
1989	0.01	-0.28
1990	0.03	-0.20
1991	0.07	-0.07
1992	0.08	0.00
1993	0.06	-0.05
1994	0.05	-0.05
1995	0.18	0.01
1996	0.18	-0.02

For almost all the years the over geared firms show a negative net profit margin, whereas the under geared firms show a relatively higher margin (at least positive) over the years. This implies that firms having OPM comparable to that of under geared firms also a

negative NPM. This means that the burden of interest expenses and to some extent that of depreciation makes them ultimately loss making and therefore get classified as over geared. This shows that cause of low profitability of over geared firms is the combination of incidence of cost increases, uneven sales realization and burden of obligatory payments and adjustments (depreciation). The low ratio for over geared firms certainly shows a relatively low cost/price effectiveness than the under geared firms.

Hence, on the basis of the above analysis we can say that the firms classified as under geared might be having a relative advantage, in terms of the cost/price effectiveness, compared to the over geared firms. This reflects in the differences in the operational as well as net profitability of these firms. This advantage mainly arises from structural characteristics of the industry discussed above. The over geared firms show poor profitability because of inability to control the increase in the operating expenses and the burden of interest expenses. The under geared firms fair better because they seem to be relatively cost efficient and seem to be having less interest burden. These differences in operational and net profitability in a way explain the category in which the firms are classified.

Implications for the Firms classified as Over Geared :

The important feature of the above analysis is that the firms classified as over geared firms seem to remain in the low profitability trap (and therefore probably in the same class). The factors that have caused the gross margins to decline over the period are one of the reasons for this. Moreover, the increase in the operating expenses (on the account of increase in the selling expenses) squeezed the operating profit margin. These factors must have caused the profits to decline initially. It must have resulted in increased borrowing to meet the funds requirement. This increases the interest burden. This further must have squeezed the profits in subsequent years, thereby further increasing the need for external funds. The circle reaches its starting point of low profitability. This vicious circle of low profitability – higher interest burden- low profitability, must have caused the firms classified as over geared to remain in the low profitability trap. (For figure refer to Appendix no. 1 of this chapter)

3.4 Optimization of Capital Structure and Type of Firms:

The next question to be asked is 'do firms optimize their capital structure?' and is their any relation of this decision with the category in which a firm falls. The following section tries to deal with the above question from the point of view of the index of optimality used for the purpose of present analysis. Generally we can argue that firms which are more likely to optimize their capital structure would be those classified as under geared firms rather than those as over geared firms. This follows logically from the propositions which were tested above. The propositions implied that firms with higher profitability and better growth as indicated by gross fixed assets belonged to the class of under geared firms. The proposition regarding growth in a way is supportive to the propositions regarding profitability. This is because the argument which links these two factors is somewhat circular. It is as follows; only profitable firms would grow and only growing firms would have better profits in the future, ceteris paribus. This suggests that only such firms would be able to keep the total amount of debt in sustainable limits as the interaction between these two factors (profitability and growth) would ensure a consistent capacity of meeting the obligatory payments. If this holds then these firms only would be able to optimize their capital structure. Here a word of caution is called for. By optimization I don't mean that the firm would always be at the optimum point. In the present analytical framework optimal capital structure is a variable. This is because the index of optimality used for classifying firms into under or over geared is based on the concept of sustainability of debt, which is a function of debt servicing capacity (which in turn depends on profitability). If profitability changes every financial year the amount of sustainable debt is bound to change every year. This makes an optimal capital structure in the present framework a moving target. Even otherwise, given the imperfections in the market a firm would never expect an instantaneous adjustment towards the optimal. There will be hindrances in the adjustment of the capital structure to the optimal value. Secondly as implied by the contextuality argument, as the nature of imperfections and constraints the firm faces changes, its optimal capital structure would also change. Though these changes wont happen abruptly and therefore the optimal

wont change frequently as it happens in the present framework, firms with already lopsided capital structures, would find it more difficult to adjust to the optimal than firms with relatively comfortable capital structures. Hence we should find over geared firms taking wide excursions from the so called optimal than the under geared firms. In short we can expect the following to true:

- *Firms which rank high on profitability and growth indices will have less tendency to deviate from the optimal value of the capital structure.*

- *Firms, which rank low on the profitability and growth indices, will have more tendencies to deviate from the optimal value of capital structure.*

The following table tries to shed some light on this aspect.

Table No 3.11

Type of Firms	Average OPDER*	Average ACDER*	Absolute Difference*
Over Geared	0.56	0.74	0.19
Under Geared	0.82	0.74	0.9

Based on average values of OPDER & ACDER of firms.

Figures rounded to the nearest digit

The third column in the above table is important. It gives the absolute difference between the average OPDER and average ACDER for firms. Based on it we can say that firms which less value of absolute deviation are the under geared firms while the firms which have a higher value of absolute deviation are the over geared firms. The table also clearly demonstrates the non-sustainability of the actual capital structure of the firms classified as over geared. We would get a much clearer picture if we look at the difference between the actual and the optimal capital structure over the years. Accordingly firms classified as under geared would show a much lesser fluctuation in this series as their health ensures a consistent repaying capacity. Exactly the opposite would hold for the

firms classified as over geared as their capacity to repay is undermined by over borrowing.

The following table gives the difference between the OPDER & ACDER for firms which is calculated on the basis of average values of different firms under the respective category. This would give a clear picture about what is happening over the years. Given the above proposition, firms classified as under geared would deviate less from the optimal value than those classified as over geared.

Table No 3.12

Behaviour of Actual Debt Equity Ratio with respect to Optimal Debt Equity Ratio		
Years	UG-Difference*	OG-Difference**
1986	0.17	0.00
1987	0.16	-0.30
1988	0.20	-0.44
1989	0.19	-0.46
1990	0.05	-0.34
1991	0.09	-0.02
1992	0.10	0.02
1993	0.07	-0.07
1994	0.03	-0.07
1995	0.09	-0.30
1996	0.12	-0.08
STDEV#	0.06	0.18

*Difference between Actual Debt Equity Ratio and Optimal Debt Equity Ratio for under geared firms.

**Difference between Actual Debt Equity Ratio and Optimal Debt Equity Ratio for over geared firms.

Standard Deviation of the two series.

The last row of the table gives the standard deviation for the two series. The value for the series of firms classified as under geared is much lower than that for firms classified

as over geared. This proves that firms classified as under geared deviate less from the optimal than those classified as over geared.

The swings in the series can be seen more clearly with the help of a diagram(see figure 5). It can be clearly pointed out that firms classified as over geared show larger swings in the series (i.e., showing large and long excursions from the optimal). The series of firms classified as under-geared is relatively more even and therefore more stable.

The above conclusions become more robust when we look at the structural characteristics of the industry for explanation. In case of the over geared firms, due to low profit margins, their dependence on borrowings at least to meet their short term needs, must have increased, which increased their interest burden in the subsequent years, further affecting profitability (refer to table no 3.3). This combined with the cost increases and the uncertainty in sales realizations must have worsened the situation further. The problem was compounded further by low government off take after decontrol. In addition to this most of the over geared companies were referred to the BIFR and under the rehabilitation schemes prepared by it many of these companies got soft loans from the various financial institutions. Though the repayment schedules were renegotiated , these loans had to be repaid some time. This put the profitability of these firms in further jeopardy.

The lending institutions might have lent to such firms hoping that the firms would do better with growing market prospects. However as discussed earlier the increase in the element of concentration in the cement industry might have reduced the possibility of any increase in the market share for the other players. This might have resulted in a situation of a "ponzi" game. A ponzi game is a situation in which a firm must borrow to meet an increase in payments of outstanding debt. The additional borrowing, however, serves to increase the debt load, worsening the financial position of the firm. The firm borrows to survive, but in doing so makes its own position hazardous.(Minsky 1986)[6] However, technically , a company enters a ponzi game only as a result of exogenous rise in the interest rates. So the over geared firms might not be technically in this game

(because the part of the rise in interest rate can be deemed as an endogenous process in case of these firms), but the process of borrowing to service a debt might be applicable. This eats up the profit margin of these firms which further pushes the firms to rely on external funds at least to meet their short term financial needs and this vicious circle goes on.

Besides having enjoyed a relatively high profitability, under geared firms might also have enjoyed a decent build up in reserves prior to the decontrol of the cement industry when capacity expansion was under Government control. This might have reduced their effective requirement of external funds in the subsequent years. This must have ensured sustainable capital structures for these firms.

3.4.1 Behaviour of Equity Financing over the Years:

The assumption underlying the index used above to compare and classify the firms is that firms always prefer debt if the need arises for external funds. This may not be so. However, in the control era sources of financing were controlled by the government. Any expansion plan had to be approved by the government. But in the decontrol era (i.e., even after partial decontrol in 1982) firms in the category of under geared could have been able to issue equity, if necessary, because they would have had a market standing (because of their financial health). Over geared firms would not be in a position to do so exactly because of this reason.

Hence, ceteris paribus, we can say the following:

- *For under geared firms equity will increase as a source of financing*

- *For over geared firms equity as a source of financing would show a decrease.*

The following two table shows the behavior of various components of net worth for over geared firms.

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[6] . Sikorski Trevor M., (1996), *Financial Liberalisation in Developing Countries*, Edward Elgar Publication. (pp. ⁊)

Table No 3.13

Behavior of various components of Net Worth of Over Geared Firms						
	1	2	3	4	5	6
Years	Equity	EQ/NW	Preference	PR/NW	Reserves &Surplus	RS/NW
1986	33926	0.05	11494	0.02	601159	0.93
1987	110960.8	0.46	11494	0.05	120190	0.50
1988	196485.4	1.22		0.00	-35348	-0.22
1989	138551.4	1.51	4250	0.05	-50912	-0.55
1990	138027.9	22.92	4250	0.71	-136257	-22.63
1991	132060.8	-6.23	3986	-0.19	-157230	7.42
1992	132237.8	8.27	3986	0.25	-120227	-7.52
1993	147876.2	1.22	3986	0.03	-30706	-0.25
1994	158431.8	0.75	7878	0.04	46059	0.22
1995	253163.8	0.70	7878	0.02	99009	0.27
1996	282285.3	0.44	8365	0.01	347391	0.54

Note: Amounts in Column number 1, 3, and 5 are in Rs'000

Net Worth = Columns 1+3+5

The above table gives figures of various sources of net worth in absolute and proportional terms. The first and the second columns of the above table give the figures for equity over the years for over geared firms. They show a considerable increase in the both absolute terms, though in proportional terms the picture is somewhat mixed. This because of the negative reserves. The proportion adjusts to make the total one. Share holder reserves and preference capital show a decline.

In the following table the second column clearly demonstrates the stagnant proportion of equity in the net worth for firms classified as under geared. Contribution of preference shares is negligible. Share holder reserves show a marginal increase suggesting ploughing back of profits.

Table No 3.14

Behavior of various components of the Net Worth of Under Geared Firms						
	1	2	3	4	5	6
Years	Equity	EQ/NW	Preference	PR/NW	Reserves and surpluses	RS/NW
1986	33282497	0.99	7491	0.00	172315	0.01
1987	20493911	0.99	8491	0.00	138262	0.01
1988	40082628	1.00	10250	0.00	99932	0.00
1989	24421518	1.00	6490	0.00	46269	0.00
1990	22479227	1.00	7564	0.00	75415	0.00
1991	20826721	0.99	7051	0.00	120142	0.01
1992	18756209	0.99	7773	0.00	221493	0.01
1993	26231062	0.99	7630	0.00	322350	0.01
1994	26252612	0.98	9298	0.00	427875	0.02
1995	27839579	0.98	59749	0.00	646023	0.02
1996	28440839	0.96	56274	0.00	983219	0.03

Note: Amounts in Column number 1, 3, and 5 are in Rs'000

Net Worth = Columns 1+3+5

In the above table, equity shows in crease in the absolute terms (from 1989 onwards) but shows a stagnation in proportional terms. This might be because of growth in reserves being higher than that of equity.

The data supports the propositions regarding under geared firms but contradicts the one regarding over geared firms. The reason why the data shows exactly opposite of the proposition concerning the over geared firms, is the legal framework in which the firms in the cement industry operate. According to the Sick Industrial Companies Act

1985 if the net worth of a firm is eroded by around 50 per cent (as reported in Balance Sheet of Sri Vishnu Cement Ltd. in BSE Official Directory) , it automatically becomes a sick company and is then referred to the BIFR. Then the BIFR works out a rehabilitation scheme most of the times promoters are asked to bring in capital in the form of equity or sometimes place convertible debentures with the term lending financial institutions. The

table in the appendix gives the names of the firms which were referred to BIFR. In case of most of these companies the promoters have been asked to increase their share in the equity capital or in some cases convertible debentures had been issued to the term lending institutions (which eventually have been converted into equity in case of some companies). Therefore, we see an increase in the equity source of financing.

3.5 A Critical Comment on the Approach:

It becomes important to highlight the limitations of the approach used in the above analysis. First, the index of optimality used for the analysis does not take care of inflationary process in the economy. Second, the pitfalls with using averages apply. Third, the trends in the gross fixed assets have to be taken with a pinch of salt. This is because how much of this increase is because of actual additions and how much is due to revaluation of assets is not known. According to the standard theory of capital structure size should have been considered as one of the explanatory factors. However, if we look at the size of the firms in both the categories we see a mixed mixture refer to the appendix at the end of the chapter). It does not suggest a clear relation between the size of the firm and behaviour of the capital structure. It also might suggest that relative size might be an explanatory variable (as implied by the increasing degree of concentration in the industry) rather than the absolute size. The effect of structural characteristics on the individual firm can be analyzed only with a better disclosure of the data from the firm's side. To the extent that this is not the case in Indian cement industry, the above analysis encompasses a margin of error which has to be considered while judging the results of the study.

The next chapter states the conclusions of the analysis done above.

Figure 1

Behaviour of Various Sources of Debt Financing of Under Geared Firms
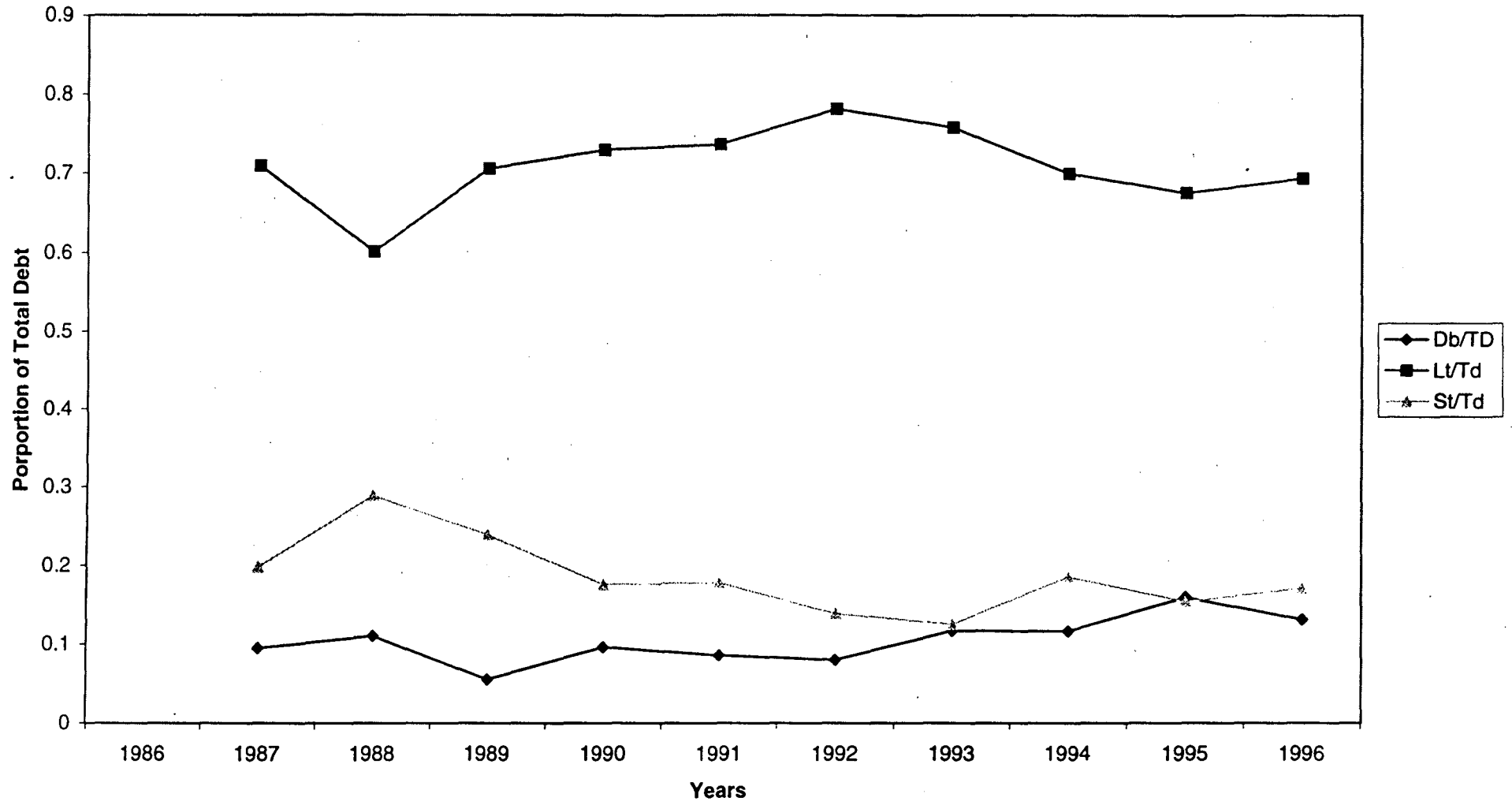
Figure 2

Behaviour of Various Sources of Debt Financing of Over Geared Firms
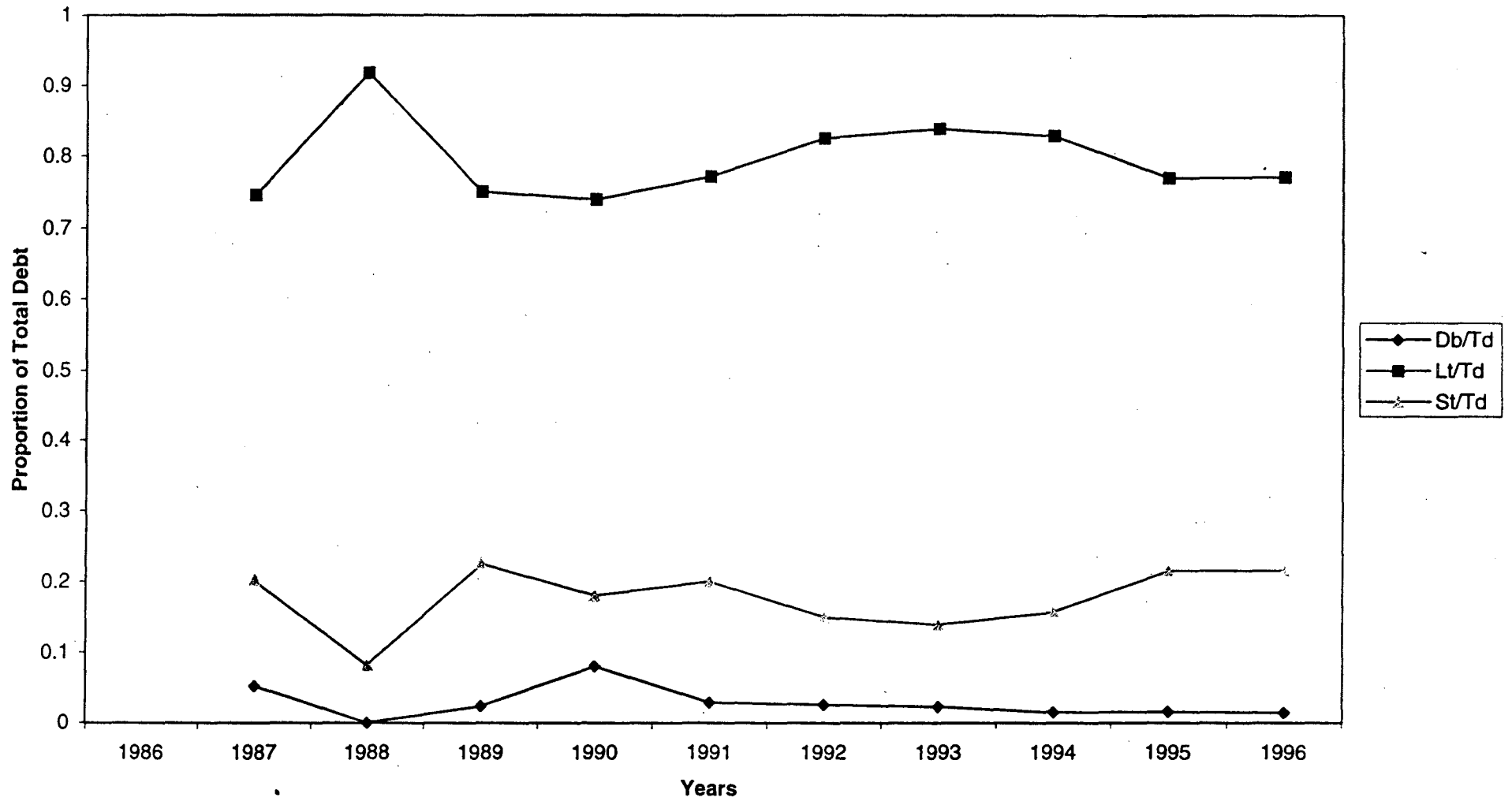
Figure 3

Change in Relative Price of Cement
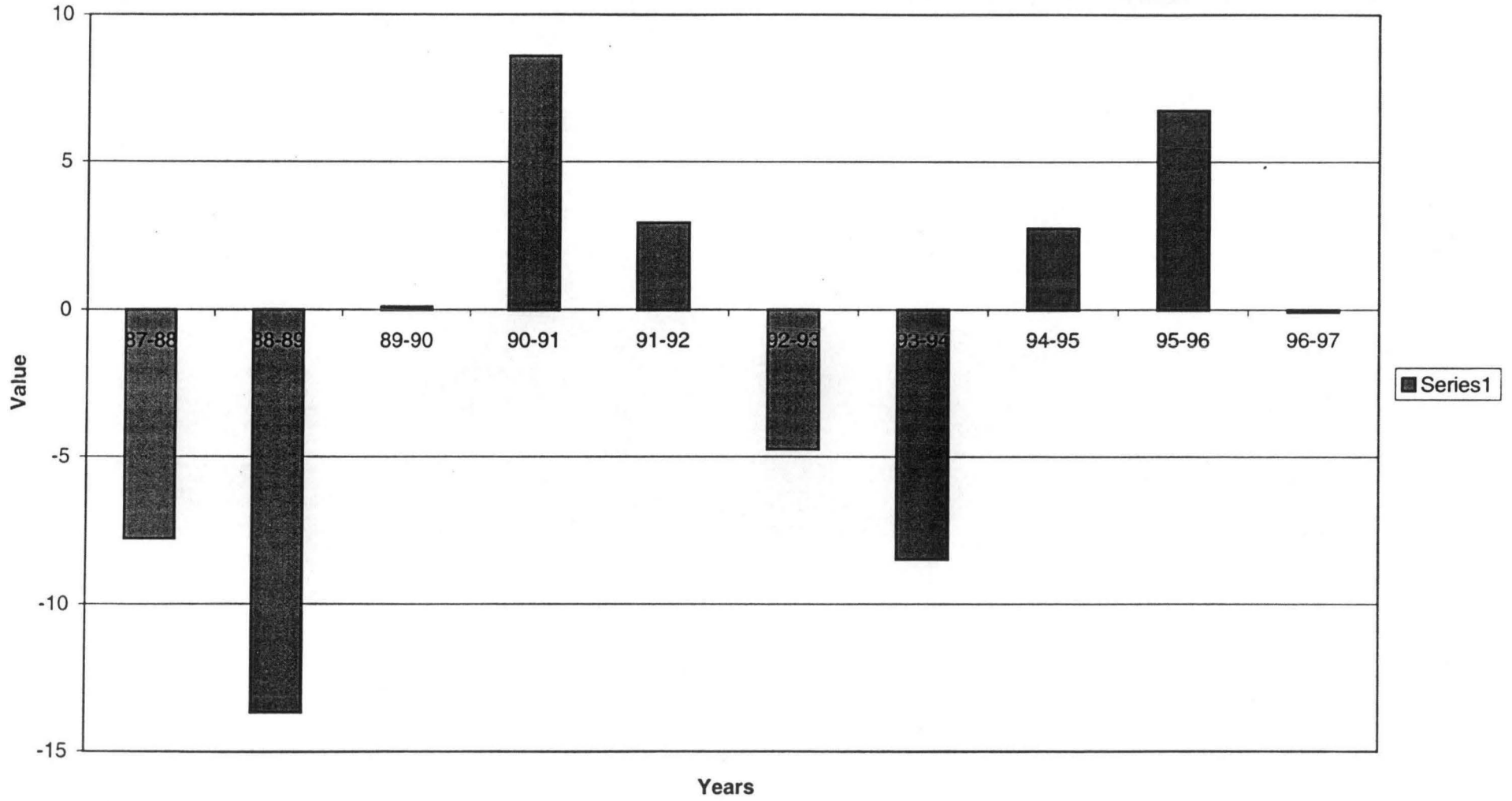
Figure 4

Difference between OPDER and ACDER
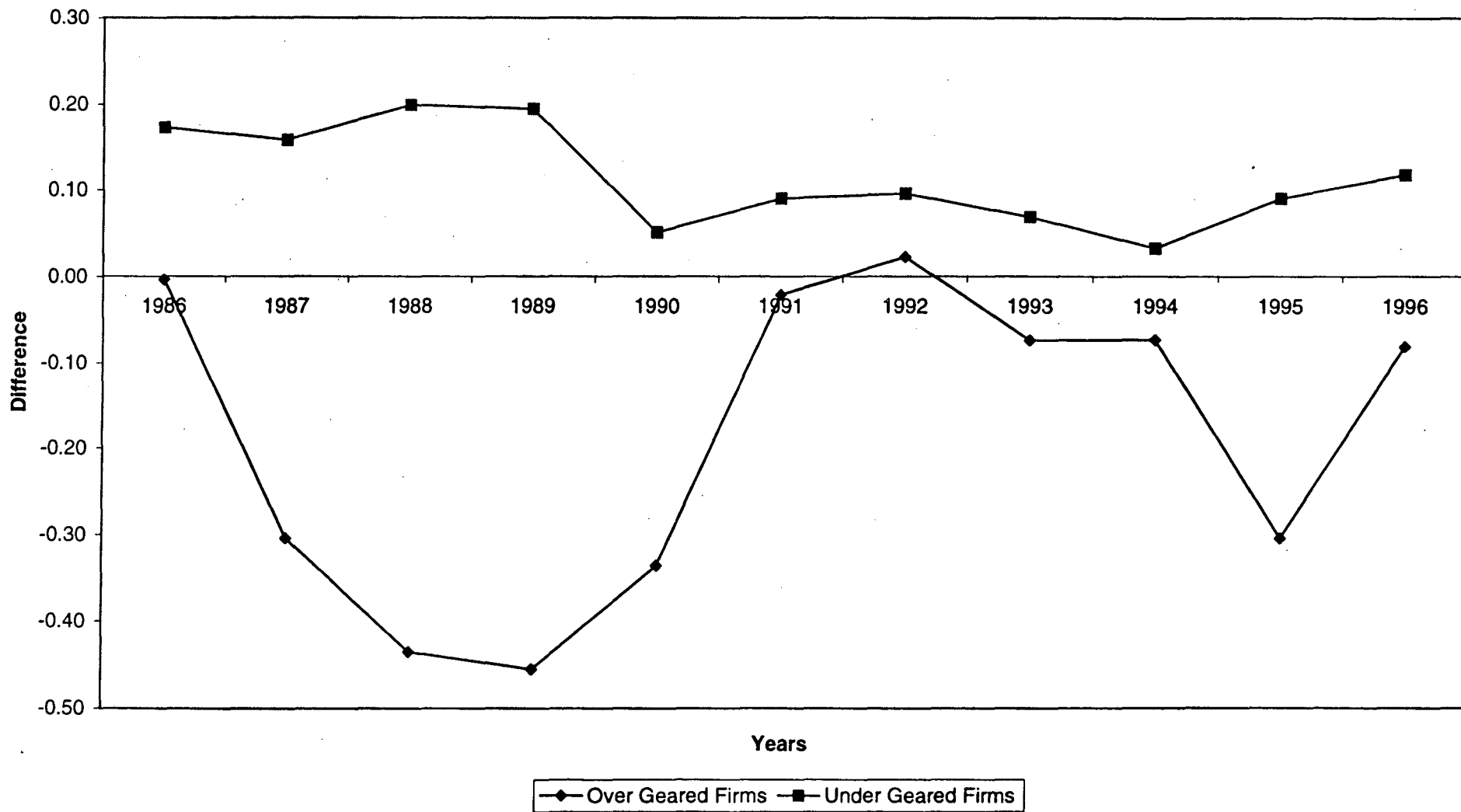
Conclusion

The theory of capital structure encompasses many interesting issues. The concept of optimal capital structure is one of such issues. Theoretical discussions on the concept have tried to define the concept in various ways. The static trade off theory, the agency cost theory or the theory based on the various signaling models, are the best examples of this attempt. However, irrespective of all the theoretical advances, the basic characteristic of the concept, that it is empirically unobservable, remains unaltered.

The present study argues for the strong contextuality of the concept. The logic behind this is quiet intuitive. The idea of optimal capital structure basically stems from the contention that the markets are imperfect. The intensity with which a firm faces these imperfections would differ in accordance with the firm fundamentals. Hence, every firm will have its own optimal capital structure.

There has been considerable number of attempts to test the determinants of the so called optimal capital structure. Factors like asset composition, profitability, size of the firm, nature and type of industry, etc., have been generally found to be significant. The present study tried to probe the issue of the effect of nature of industry on the capital structure a little more deeper. Thirty firms from the cement industry were taken for the purpose of the analysis.

The analysis so made found the nature of industry to be quiet significant in explaining the behaviour of the capital structure of the individual firms in the industry. Generally. it was found that the firms which can be deemed to have sustainable (in relation to the optimal) capital structures are those who rank high on profitability and growth indicators. This typical behaviour of some firms, combined with the fact that the growth rate in sales tends to vary irrespective of the classification made for the purpose of this study, implies that there ought to be some industry wide factors which put the other firms at a disadvantage.

The factors which could at least illustrate this phenomenon were as follows:

➤ Location

➤ Impact of changes in the policy environment

➤ Variability in cost of inputs

➤ Track record of profitability of individual firms

➤ Increasing degree of concentration

➤ Variance in the availability of infrastructural support across states- especially on the power front.

➤ Constraints arising out of geographically distributed markets- more often resulting into unevenness in sales realization

➤ Problems arising out of difficulty in transportation of cement due to its bulkiness.

➤ Inadequate availability of railway wagons

➤ Fluctuations in the market demand due to the strong linkage of Gross Domestic Product and cement consumption

Besides these factors, proximity to relatively efficient fuel source, like the lignite deposits in Gujrat, may also have caused the disparity in the performance of different companies. The analysis tried to capture the effect of these external factors on the working of the firms. Simple concepts like operating profit margin and net profit margin from the standard balance sheet analysis were used to do so.

It was found that the firms which were classified as under geared ranked high on the scale of price/cost effectiveness of business than those classified as over geared. This implies that under geared firms were more efficient in case of cost management than the over geared firms. **In particular, firms classified as over geared seemed to be more hit on account of operating expenses, most of which might be selling expenses, as the evidence in the literature suggests.** This means that the intensity with which these factors affect firms differs across the sample. This again strongly hints at the contextuality argument mentioned, though the classification might imply a certain level of generalization in the incidence of these external factors.

The study also indicates towards the advantages for under geared firms that might have resulted from being a diversified firm, or being a firm in a large influential group (Birla and JK groups are the cases in point).

The analysis particular to the over geared firms reveals the vicious circle of low profitability, unsustainable borrowings, and again low profitability. Combining this with the increasing concentration in the cement industry, it strongly implies that there indeed seems to be a little possibility of these firms coming out of this trap. This has important implications in terms of industrial sickness.

Thus, on the basis of the above study, we can say that the analysis of the behaviour of the capital structure of firms gives important insights in to understanding the key issues like industrial sickness and oligopolistic market structures. It also gives important insights in understanding the relation between the financial system and the so called real sector. It indeed is an important micro aspect of a wider canvas of industrial and economic development.

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- *The Bombay Stock Exchange Official Directory*

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APPENDICES

Deciding on a Financial Policy- A Broad Framework:

The firm has to decide its financial policy depending on the specific constraints it faces and their relative intensity. Hence in a real world situation the financial policy decision depends on the following factors:

❀   Risk

❀   Level of economic activity

❀   Flexibility

❀   Role of Fiscal policy

❀   Role of Monetary policy

❀   Regulatory norms

❀   Growth of financial instruments

I. Risk: Risk can be differentiated broadly in two types viz., Business risk and Financial risk.

a). Business risk: refers to variability of Earnings before Interest and Taxes (EBIT). It is influenced inter alia, by the following factors:

1. Demand variability: Ceteris paribus, higher the variability of demand for the products manufactured by the firm, higher is its business risk.

2. Price variability: Higher is the business risk for a firm that faces a higher degree of volatility for prices of its products and vice versa.

3. Variability of input prices: When input prices are highly variable, the firms business risk tends to be high.

4. Proportion of fixed costs: Higher the proportion of fixed costs in total costs, ceteris paribus, Business risk is likely to be high.

This is because when fixed are high, EBIT is more sensitive to variations in demand.

b). Financial Risk: It represents risk emanating from financial leverage. This gives rise to costs of financial distress. This risk is mainly borne mainly by equity shareholders.

A financial policy should aim at minimizing total risk i.e., business risk plus financial risk. This implies that if the firm is exposed to a high degree of financial risk, its business risk should be kept low and vice versa.

II. Income: This factor asks two questions which a firm has to answer before deciding a debt - equity ratio. They are:

1. What is the implication of alternative financing plans on earnings per share?
2. What is the impact of financial leverage on return on equity?

III. Level of economic activity: The financial decision in relation to level of economic activity can be explained with a simple sources and uses of funds identity for a firm. It can be written as:

$$\Delta A - \Delta RE = \Delta SDBT + \Delta LDBT + \Delta GSTK - \Delta SRET - \Delta LIQ$$

Where:

Δ = Change

A   = Total Net Assets

RE   = Retained Earnings

SDBT = Short term Debt

LDBT = Long term Debt

GSTK = Gross Stock Issues

SRET = Stock Retirements, if any

LIQ   = Liquid Assets

This implies that to the extent that firms' expenditures on plant and equipment and working assets exceed their cash flow ($\Delta A - \Delta RE$), they incur an external financing deficit which must be made up by changes in the right hand side items. This financial

deficit is linked with the level of economic activity. In general, the deficit is lowest when the firm is pulling out of the recession. At this point firms are operating well below capacity, and so even a small increase in sales can produce sharp improvements in profits and retained earnings. But need for funds do not increase sharply. As long as firms have significant spare capacity, management is unlikely to authorize major investment in a new plant. Furthermore, the pickup in sales may reduce inventories releasing cash.

The financial deficit is usually largest when economic activity begins to turn down. The decline in sales brings about a fall in retained earnings but the higher level of investment in plant and inventory continues until firms have managed to adjust their spending to the gathering recession. (Taggart 1977)

The requirement of funds and thus the debt-equity ratio may therefore change according to the phase of a business cycle. The firm has to anticipate these changes while deciding upon its debt-equity ratio.

IV Flexibility: It refers to the ability of a firm to raise capital from any source it wishes to tap. This will defer from firm to firm as well as from industry to industry considering the factors like size and age of the firm, its growth rate and a whole set of other fundamental and non-fundamental factors. A firm can raise funds broadly through equity securities and/or debt securities. It can have a zero debt-equity ratio implying 100 per cent equity finance or can rely heavily on debt securities. However, as the debt-equity ratio is normally not permitted to exceed a certain level (which may be specified by regulation, financial institutions or through the capital market), the firm cannot presume that it can always raise further capital by issuing debt securities. Hence flexibility for practical purposes may mean that the firm should not exhaust fully its debt capacity (Chandra, 1993).

V Role of Fiscal Policy: Government policy regarding corporate income tax and personal income tax has an influence on a company's financial decisions. Generally

corporate borrowing is better if $(1-T_p)$ is greater than $[(1-T_{pe}) \times (1-T_c)]$, otherwise it is worse. Corporate borrowing is irrelevant if $(1-T_p)$ is equal to $[(1-T_{pe}) \times (1-T_c)]$

where:

T_p = personal tax rate

T_{pe} = $\mathrm{e^{sx}} \ \mathrm{w \cdot s}$ personal tax (tax on equity income)

T_c = Corporate tax rate   (Brealey and Myers, 1988)

VI Role of Monetary Policy: Monetary policy is supposed to affect the monetary variables in the economy. In one way, these monetary disturbances work their way through the economy by influencing savings and the rate of return required by investors, and consequently the capital market value of enterprises. A positive shock has a favorable effect on the firm's market value which may have a signaling effect on the firm which may induce it to pursue expansionary product market decisions and to placate bond holders, a firm would then finance the expansion in activity with equity, thereby reducing debt - equity ratio. A negative monetary disturbance may work in the opposite direction (Krainer 1992). Besides monetary policy may alter the interest structure, thereby changing the relative costs of funds. This in turn may effect changes in the debt-equity ratio.

VII Regulatory Framework: A body like say Controller of Capital Issues may prescribe a ceiling of debt equity ratio which may impose constraint on the firm's financial decisions .Here we also consider the effects of financial sector reforms and capital market liberalisation . If the patterns of corporate financing have changed on account of this, it must get reflected in the firm's debt equity ratio.

VIII Growth of Financial Instruments: The growth of financial instruments in recent times has increased the choice of instruments for the investors as well as the corporate sector. Financial Innovations also affect risk in the financial system. This will have an effect on the corporate financial policy.

Definition of Operating Profit and Net Profit:

The following definition of operating profit and net profit has been used:

Net Sales
Less   Cost of Goods Sold
            Stocks
            Wages & Salaries
            Other Manufacturing Expenses

Gross Profit
Less   Operating Expenses
            General Administration
            Selling

Operating Profit
Less   Depreciation
Add   Non Operating surplus/deficit

Earnings Before Interest and Taxes
Less   Interest

Profit Before Tax
Less   Tax

Profit After Tax (Net Profit)
Less   Dividends

Retained Earnings

Operating Profit Margin = Operating Profit/ Net Sales
Net Profit Margin   = Net Profit / Net Sales

Treatment of Depreciation :

Ideally depreciation should have been included as operating expenses while calculating operating profit. But the definition used above is helpful for the purpose of catching the effect of rise in external costs on profitability. Hence the book entry of depreciation is excluded from it. The effect of depreciation as well as interest expenses would get reflected in the net profit margin.

Behaviour of Operating Profit Margin & Net Profit Margin of The Cement Industry
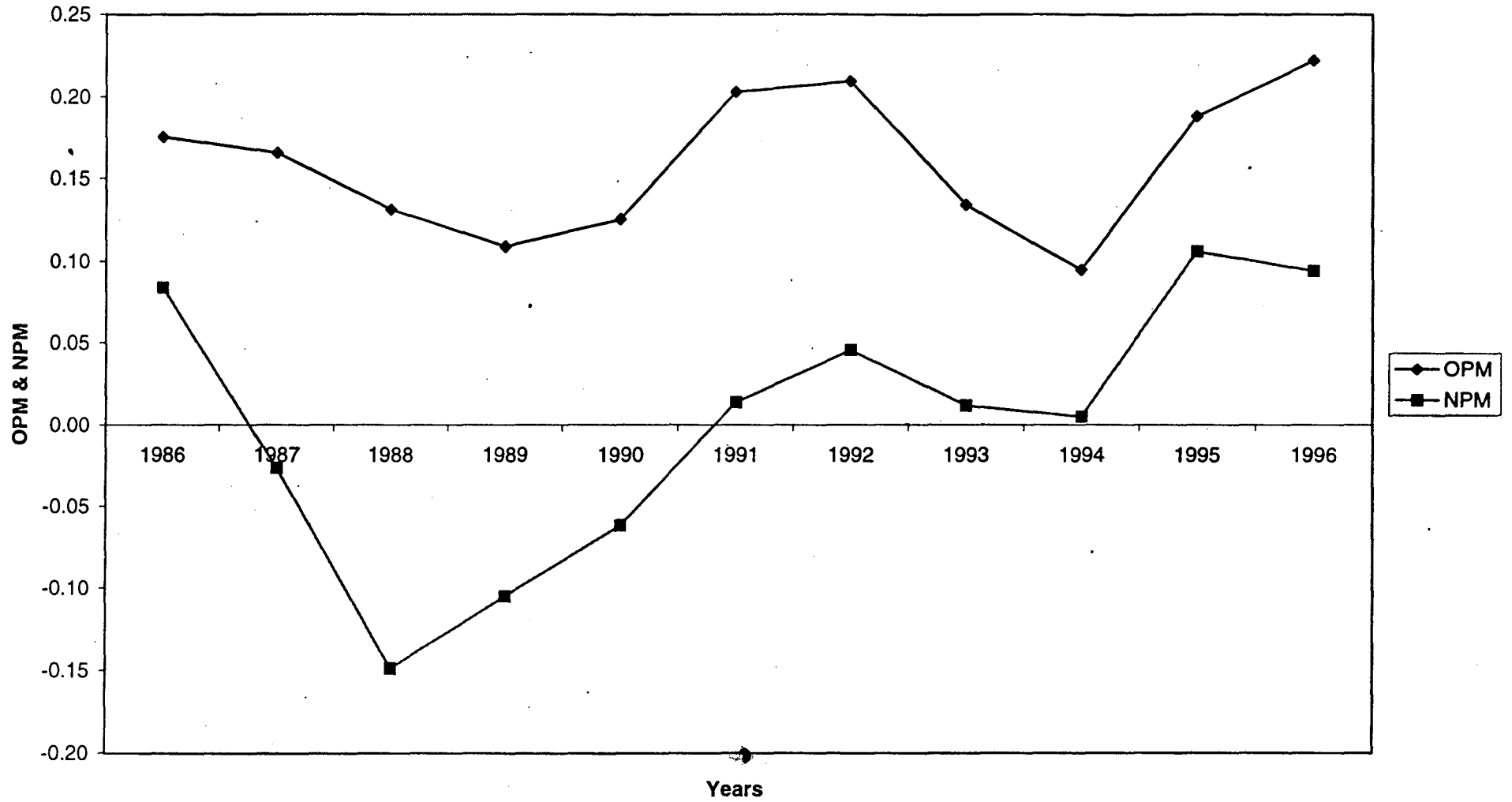
Vicious Circle of Low Profitability for the firms classified as Over Geared:

```
┌──────────┐      ┌──────────────┐        ┌──────────┐
│ External │─────▶│ Low          │◀───────│ Higher   │
│ Factors  │      │ Profitability│        │ Interest │
│          │      │              │        │ Burden   │
└──────────┘      └──────────────┘        └──────────┘
                         │                     ▲
                         │                     │
                         ▼                     │
                  ┌────────────────┐
                  │ Higher         │
                  │ Dependence on  │
                  │ Borrowings     │
                  └────────────────┘
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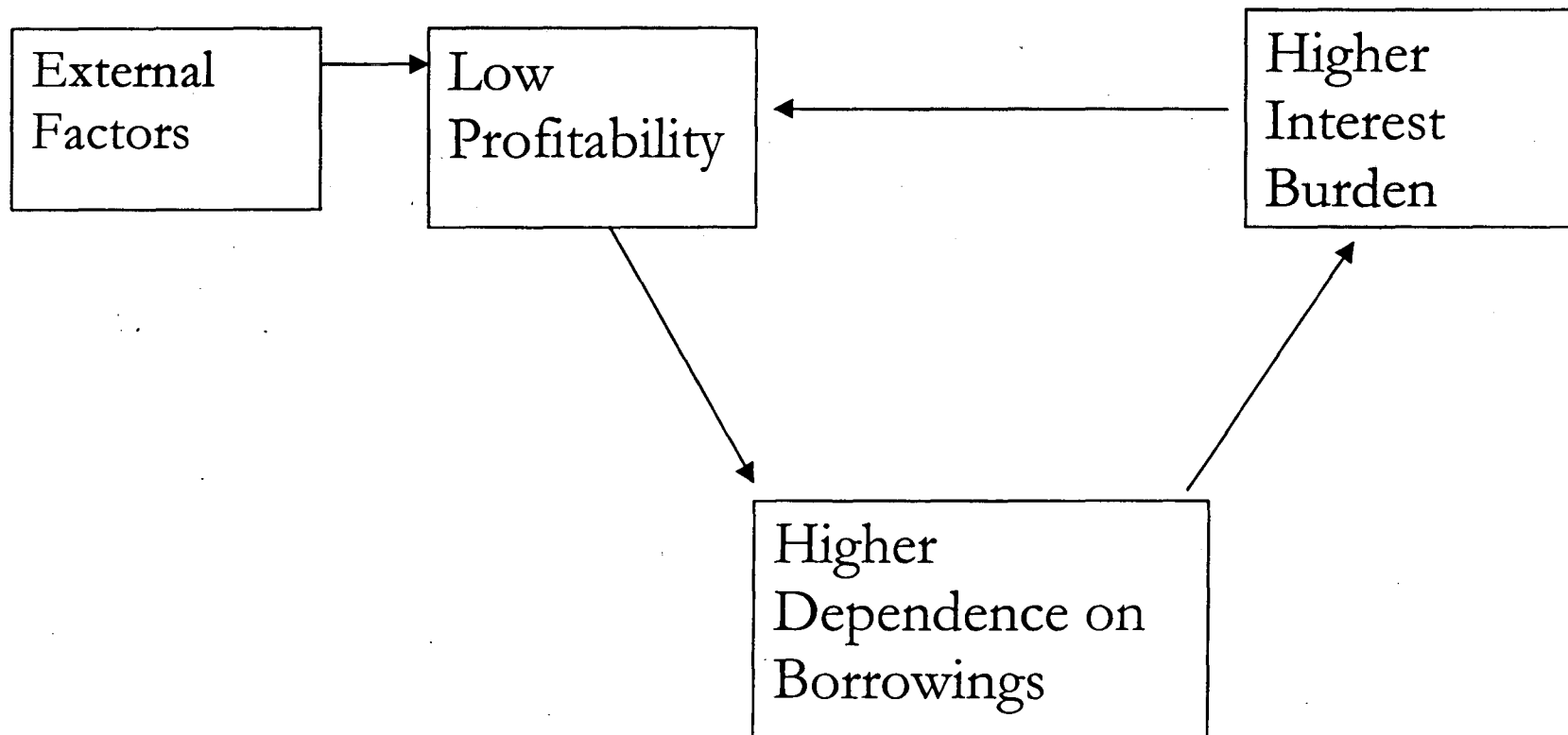
Name of the Company	Year of Entry/Commencement of Business	Size (Tones per day)	Reference to BIFR
ACC	1936	27719	
Dalmia	1951	1750	
Deccan	1982	600	
Dhar	1985	600	
Gujrat Amuja	1986	13700	
India Cements	1964	7800	
Kakaitia Cements	1983	600	
Madras	1937	7650	
Mangalam (Birla Group)	1981	1200	
Mysore (Birla Group)	1958	2000	
NCL Industries	1984	600	
Rassi	1982	3500	
Shree	1985	2300	
Suvarna	1986	300	
Narmada	1982	3000	
OCL	1948	1947	
Saurashtra	1956	–	✓
Balram	1985	600	✓
Hemadri	1985	500	
Modi	1987	3300	✓
Shree Digvijay	1949	3400	✓
Coromandel	1987	300	✓
Gujrat Sidhee	1977	2755	✓
Janapriya	1979	200	
Kalyanpur	1937	1650	
Mahendra	1988	250	
Panyam	1955	1750	✓
Sri Chakra	1981	1900	✓
Sri Vishnu	1987	3000	✓
Priyadarshini	1986	1800	

Source : Bombay Stock Exchange Official Directory

Note: Names in *italics* pertain to the firms classified as under geared.

Relative Movement of Operating Profit Margin(OPM)and Net Profit Margin(NPM) of Over Geared Firms

Years

Operating Profit Margin ▪ Net Profit Margin
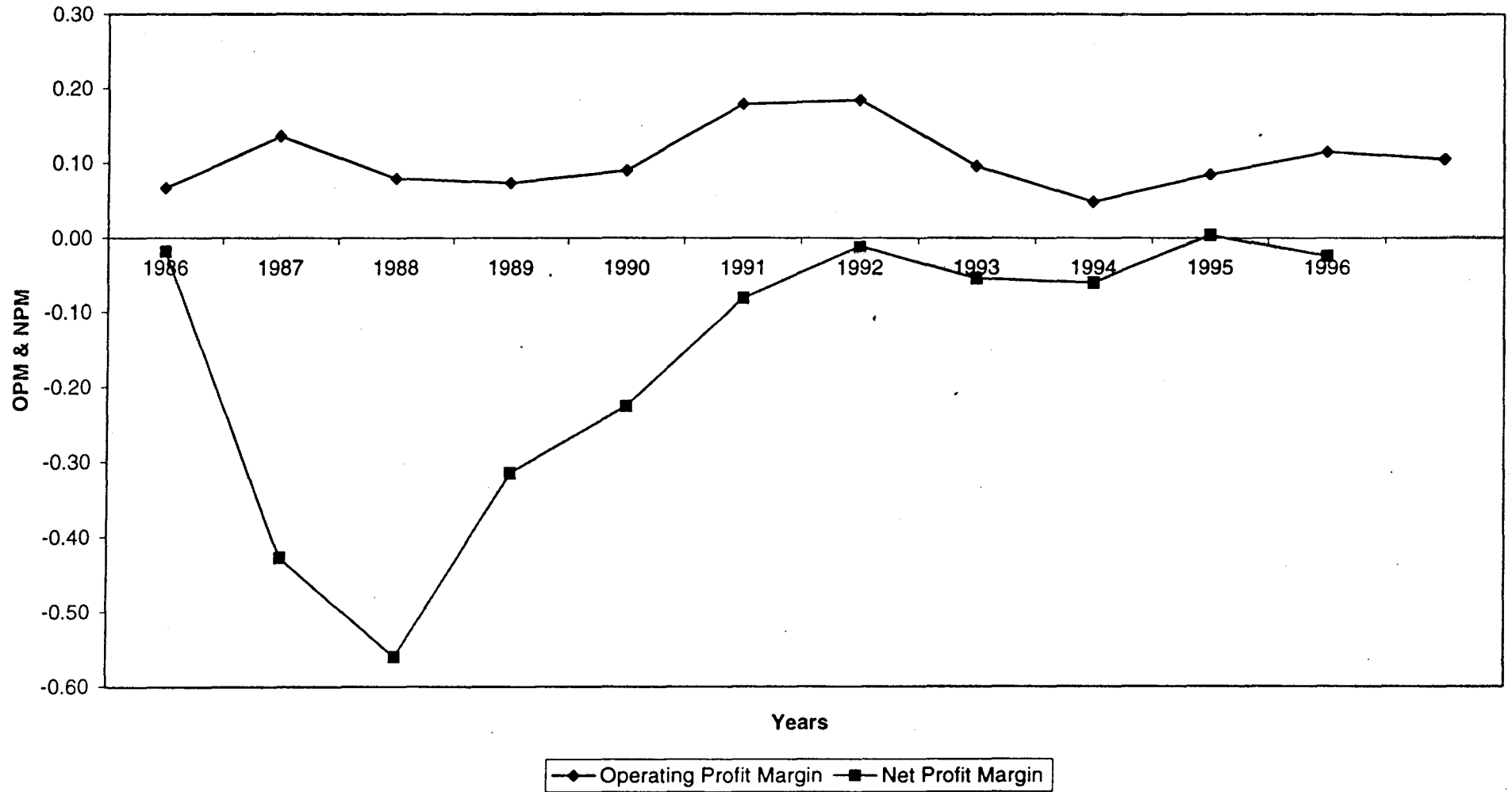
Relative Movement of Operating Profit Margin(OPM) and Net Profit Margin(NPM) of Under Geared firms
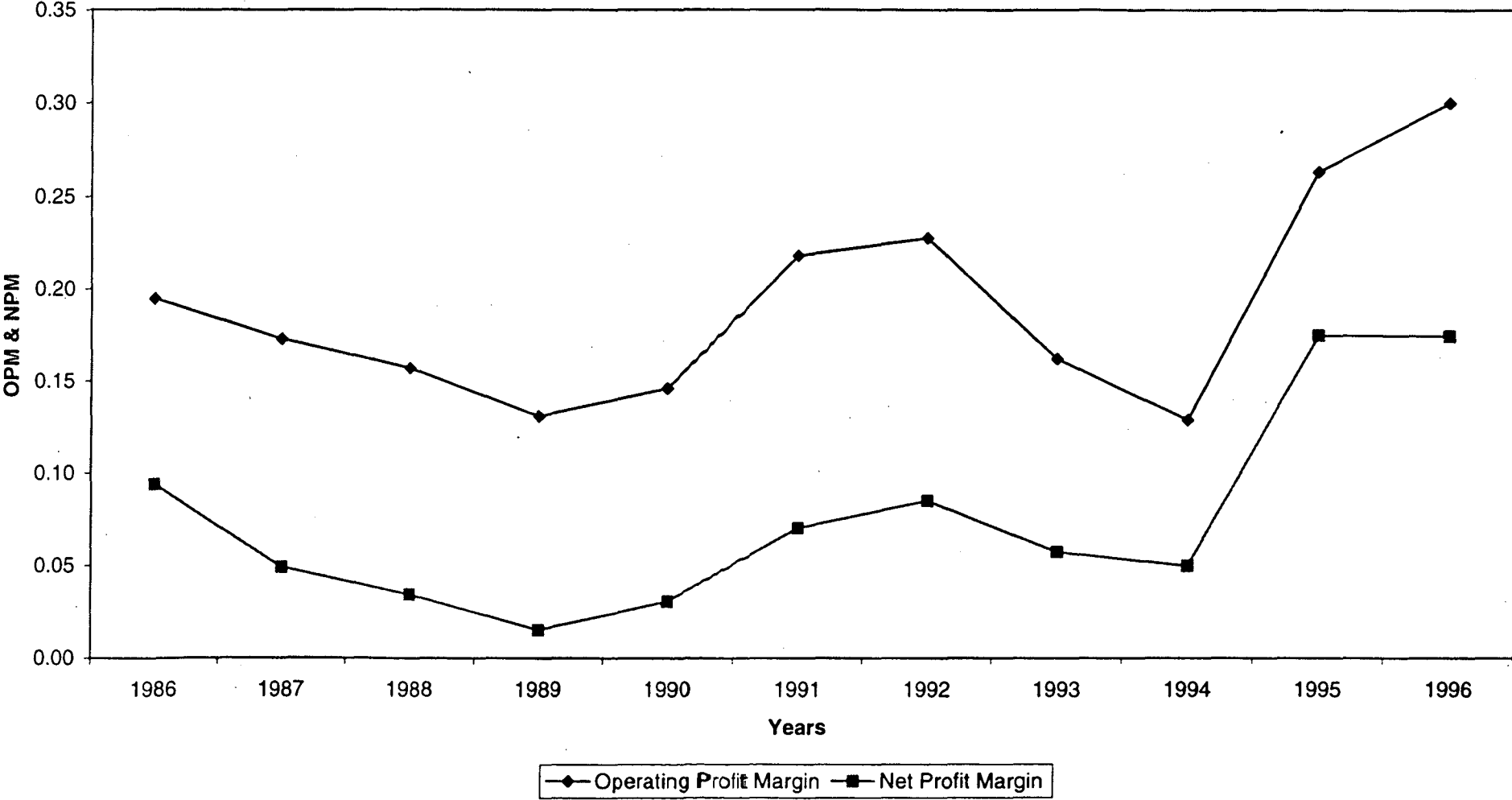
Chapter Three : Appendix 5

Optimal Debt Equity Ratio and Actual Debt Equity Ratio according to Categories													
Under Geared													
Name	Year/Varia	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Average
Associated (	OPDER	_	_	_	_	0.01	0.01	0.02	0.06	0.01	0.02	0.02	*0.02*
	ACDER	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.04	0.01	0.01	0.01	*0.01*
Dalmia Cem	OPDER	_	0.95	0.95	0.97	0.97	0.98	0.96	0.96	0.95	0.97	0.97	*0.96*
	ACDER	_	0.94	0.95	0.95	0.95	0.95	0.88	0.87	0.89	0.93	0.94	*0.92*
Deccan Cem	OPDER	0.85	0.88	0.90	0.92	_	0.93	0.93	0.95	0.90	0.81	0.88	*0.81*
	ACDER	0.55	0.70	0.79	0.88	_	0.89	0.89	0.93	0.88	0.70	0.77	*0.73*
Dhar Cemer	OPDER	0.67	0.74	_	0.78	0.84	0.89	0.91	0.89	0.82	0.68	0.64	*0.72*
	ACDER	0.74	0.73	_	0.77	0.77	0.77	0.78	0.78	0.83	0.85	0.83	*0.71*
Gujrat Amb	OPDER	_	0.81	0.83	0.84	0.88	0.92	0.94	0.96	0.96	0.96	0.96	*0.91*
	ACDER	_	0.79	0.78	0.81	0.80	0.81	0.84	0.91	0.95	0.92	0.89	*0.85*
India cemen	OPDER	_	0.89	0.91	0.89	0.97	0.92	0.95	0.94	0.92	0.91	0.92	*0.92*
	ACDER	_	0.83	0.88	0.94	0.96	0.88	0.94	0.93	0.91	0.86	0.84	*0.90*
Kakatia Cem	OPDER	_	0.81	0.70	0.88	0.96	0.99	0.98	0.89	0.92	0.85	0.90	*0.89*
	ACDER	_	0.05	0.05	0.05	0.63	0.88	0.89	0.85	0.83	0.61	0.63	*0.55*
Madras Cem	OPDER	0.98	0.94	_	0.95	0.96	0.98	0.98	0.96	0.96	0.97	0.98	*0.97*
	ACDER	0.95	0.95	_	0.96	0.96	0.96	0.95	0.93	0.93	0.91	0.94	*0.94*
Mangalam C	OPDER	0.79	0.63	_	0.66	0.72	0.84	0.97	0.94	0.95	0.70	0.86	*0.80*
	ACDER	0.54	0.48	_	0.35	0.45	0.41	0.83	0.91	0.94	0.91	0.90	*0.67*
Mysore Cem	OPDER	0.93	0.96	0.93	_	0.86	0.91	0.93	0.88	0.66	0.79	0.84	*0.87*
	ACDER	0.89	0.93	0.87	_	0.87	0.87	0.88	0.89	0.70	0.62	0.66	*0.82*
NCL Indust	OPDER	0.88	0.83	_	0.92	0.88	0.83	0.86	0.81	0.77	0.68	0.84	*0.83*
	ACDER	0.72	0.74	_	0.86	0.85	0.79	0.81	0.77	0.77	0.80	0.77	*0.79*
Rassi Cemer	OPDER	0.98	0.98	0.89	_	0.85	0.95	0.95	0.94	0.89	0.93	0.91	*0.93*
	ACDER	0.89	0.92	0.92	_	0.93	0.94	0.94	0.94	0.91	0.89	0.82	*0.91*
Shree Ceme	OPDER	0.79	0.78	_	0.74	0.75	0.83	0.84	0.67	0.71	0.86	0.92	*0.79*
	ACDER	0.75	0.76	_	0.69	0.68	0.62	0.60	0.55	0.58	0.63	0.72	*.0.66*
Suvarna Cer	OPDER	_	_	_	_	_	_	0.84	0.80	0.65	0.78	0.81	*0.78*
	ACDER	_	_	_	_	_	0.86	0.78	0.78	0.77	0.74	0.78	*0.79*
Narmada Ce	OPDER	0.69	0.88	_	0.54	0.74	0.84	0.84	0.76	0.44	0.75	0.77	*0.73*

	ACDER	0.83	0.84	_	0.85	0.85	0.81	0.80	0.79	0.68	0.31	0.26	*0.70*
OCL India	OPDER	0.98	0.94	_	0.92	0.93	0.96	0.98	0.96	0.95	0.97	0.98	*0.96*
	ACDER	0.94	0.92	_	0.94	0.94	0.93	0.93	0.94	0.94	0.94	0.95	*0.94*
Saurashtra C	OPDER	_	0.88	0.83	2.02	0.59	0.91	0.90	0.96	0.94	0.95	0.95	*0.88*
	ACDER	_	0.85	0.86	0.88	0.90	0.88	0.75	0.90	0.91	0.92	0.92	*0.88*
Over Geared													
Balram Cem	OPDER	_	_	_	_	_	_	0.56	0.10	0.14	-0.09	0.03	*0.15*
	ACDER	_	_	_	_	_	_	0.66	0.66	0.79	0.71	0.68	*0.70*
Hemadri Ce	OPDER	_	_	_	_	0.68	0.83	0.83	0.79	0.61	0.83	0.76	*0.53*
	ACDER	_	_	_	_	0.75	0.79	0.82	0.79	0.78	0.82	0.74	*0.55*
Modi Ceme	OPDER	_	_	0.61	0.66	0.70	0.79	0.82	0.54	0.87	-0.14	0.89	*0.64*
	ACDER	_	_	0.74	0.75	0.79	0.81	0.81	0.82	0.98	0.90	0.98	*0.84*
Priyadarshin	OPDER	_	0.62	0.66	0.64	0.64	0.65	0.76	0.76	0.70	0.81	0.83	*0.71*
	ACDER	_	0.75	0.75	0.77	0.77	0.77	0.75	0.75	0.75	0.74	0.68	*0.75*
Shree Digvi	OPDER	0.90	0.89	_	0.85	0.92	0.91	0.92	0.62	0.09	0.75	0.88	*0.77*
	ACDER	0.93	0.93	_	0.96	0.98	0.95	0.89	0.89	0.90	0.90	0.90	*0.92*
Sri Vishnu C	OPDER	_	-0.02	_	0.41	0.50	0.78	0.78	0.74	0.79	0.84	0.82	*0.63*
	ACDER	_	0.73	_	0.77	0.77	0.81	0.82	0.82	0.83	0.83	0.77	*0.79*
Cdoromand	OPDER	_	0.57	0.61	0.46	0.40	0.69	0.74	0.76	1.99	0.72	0.77	*0.64*
	ACDER	_	0.72	0.72	0.74	0.74	0.75	0.76	0.78	0.77	0.77	0.77	*0.75*
Gujrat Sidhe	OPDER	_	_	0.64	-0.33	-0.33	0.55	0.63	0.44	0.67	0.46	0.55	*0.36*
	ACDER	_	_	0.76	0.80	0.81	0.82	0.79	0.78	0.78	0.51	0.47	*0.72*
Janapriya Ce	OPDER	_	_	_	0.82	0.78	0.86	0.82	0.57	0.53	0.11	0.33	*0.60*
	ACDER	_	_	_	0.73	0.71	0.72	0.70	0.67	0.69	0.68	0.63	*0.69*
Kalyanpur C	OPDER	_	_	_	0.30	0.71	0.75	0.91	1.34	1.23	0.86	0.71	*0.85*
	ACDER	_	_	_	0.84	0.86	0.77	0.89	0.95	0.91	0.92	0.88	*0.88*
Mahendra C	OPDER	_	_	_	_	_	_	0.92	0.27	0.08	-0.75	0.39	*0.18*
	ACDER	_	_	_	_	_	_	0.83	0.34	0.36	0.39	0.30	*0.45*
Panyam Cer	OPDER	_	_	_	_	_	0.72	0.88	0.84	0.60	0.90	0.92	*0.81*
	ACDER	_	_	_	_	_	0.90	0.89	0.88	0.88	0.86	0.82	*0.87*
Sri Chakra C	OPDER	_	_	-0.76	-0.21	0.06	0.58	0.68	0.68	0.74	0.82	0.23	*0.31*
	ACDER	_	_	0.80	0.76	0.78	0.78	0.76	0.66	0.76	0.78	0.71	*0.76*

Behaviour of Operating Profit Margin

Under geared	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Avg-OP/NS
Associated Cement Companies Ltd					0.10	0.16	0.19	0.09	0.07	0.11	0.16	. 0.12
Dalmia Cement (Bhara	0.01	0.17	0.16	0.15		0.25	0.25	0.22	0.14	0.22	0.26	0.18
Deccan Cer	0.22	0.20	0.18	0.18		0.23	0.22	0.19	0.15	0.17	0.20	0.19
Dhar Ceme	0.14	0.19		0.14	0.20	0.26	0.30	0.19	0.11	0.06	0.13	0.17
Gujrat Ambuja Cement		0.40	0.23	0.22	0.27	0.34	0.33	0.23	0.22	0.28	0.35	0.29
India cements Ltd		0.07	0.07	0.03	0.08	0.19	0.17	0.14	0.13	0.17	0.18	0.12
Kakatia Cemaents Ltd		0.19	0.20	0.09	0.16	0.19	0.20	0.25	0.23	0.23	0.26	0.20
Madras Cer	0.28	0.30		0.20	0.25	0.30	0.26	0.22	0.22	0.30	0.33	0.26
Mangalam (	0.14	0.14		0.13	0.12	0.18	0.24	0.10	0.07	0.13	0.24	0.15
Mysore Cer	0.11	0.10	0.11		0.14	0.20	0.22	0.06	0.08	0.11	0.14	0.13
NCL Indus	0.26	0.20		0.22	0.22	0.22	0.21	0.21	0.15	0.15	1.65	0.35
Rassi Ceme	0.33	0.27	0.14		0.10	0.25	0.20	0.17	0.12	0.18	0.18	0.20
Shree Ceme	0.21	0.18		0.18	0.15	0.20	0.23	0.11	0.08	1.70	0.24	0.33
Suvama Cements Ltd							0.14	0.21	0.10	0.15	0.12	0.14
Narmada C	0.11	0.08		0.03	0.08	0.15	0.17	0.09	0.04	0.14	0.19	0.11
OCL India	0.15	0.15		0.11	0.15	0.21	0.24	0.17	0.16	0.16	0.16	0.17
Saurashtra Cement Ltd	0.10	0.08	-0.04	0.03	0.18	0.26	0.14	0.09	0.19	0.21		0.12
StdDev												0.07
Avg	0.19	0.17	0.15	0.13	0.15	0.22	0.22	0.16	0.13	0.26	0.29	0.19
Over geared												
Balram Cement Ltd							0.23	0.02	0.02	-0.02	0.00	0.05
Hemadri Cements Ltd					0.20	0.29	0.25	0.23	0.09	0.21	0.20	0.21
Modi Cement Ltd			0.13	0.19	0.17	0.21	0.21	0.06	0.05	-0.01	0.07	0.12
Priyadarshini Cement L	0.21	0.22	0.15	0.13	0.19	0.20	0.16	0.13	0.18	0.20		0.18
Shree Digvi	0.07	0.06		0.03	0.03	0.05	0.12	0.02	0.00	0.03	-0.08	0.05
Cdoromandel Cements		-0.01		0.14	0.11	0.23	0.18	0.13	0.17	0.17	0.19	0.14

Gujrat Sidhee Cement l		0.35	0.19	0.12	0.10	0.21	0.20	0.22	-0.16	0.17	0.19	0.16
Janapriya Cement Ltd			0.23	-0.03	-0.04	0.14	0.23	0.10	0.21	0.24	0.24	0.15
Kalyanpur Cements Ltd				0.19	0.20	0.25	0.19	0.07	0.11	0.01	0.08	0.14
Mahendra Cements Ltd				0.01	0.04	0.09	0.13	-0.03	-0.09	0.12	0.11	0.05
Panyam Cements & Mineral Industries Ltd							0.27	0.09	0.02	-0.13	0.09	0.07
Sri Chakra Cements Ltd						0.04	0.06	0.05	0.02	0.06	0.10	0.06
Sri Vishnu Cement Ltd			-0.23	-0.06	0.02	0.28	0.16	0.21	0.14	0.18	0.02	0.08
Std Dev												0.06
Avg	0.07	0.15	0.11	0.08	0.09	0.18	0.19	0.10	0.06	0.09	0.12	0.11

Chapter Three : Appendix 7

Behaviour of Net Profit Margin												
Under geared	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Avg-NP/NS
Associated Cement Companies Ltd					0.02	0.10	0.08	0.04	0.04	0.08	0.10	0.06
Dalmia Cement (Bharat) Ltd		0.01	0.03	0.03	0.09	0.10	0.08	0.07	0.08	0.14	0.15	0.08
Deccan Cement	0.12	0.06	0.09	0.03		0.04	0.05	0.04	0.06	0.12	0.15	0.08
Dhar Cement L	-0.05	0.00		0.00	0.00	0.08	0.17	0.09	0.00	0.03	0.13	0.05
Gujrat Ambuja Cements Ltd		-0.02	-0.07	-0.11	-0.10	-0.11	0.03	0.01	0.01	0.08	0.12	-0.02
India cements Ltd							-0.04	0.05	-0.06	0.02	0.06	0.00
Kakatia Cemaents Ltd		0.00	-0.03	-0.18	-0.13	0.06	0.19	0.12	0.05	0.10	0.05	0.02
Madras Cement Ltd		0.04	0.05	0.04	0.12	0.26	0.20	0.20	0.19	0.23	0.19	0.15
Mangalam Cement Ltd		0.02	0.01	0.01	0.02	0.07	0.05	0.03	0.03	0.08	0.10	0.04
Mysore Cement Ltd		0.05	0.09	0.01	0.06	0.13	0.13	0.08	0.12	0.16	0.22	0.10
NCL Industries	0.24	0.10		0.07	0.01	0.13	0.13	0.09	0.08	0.18	0.23	0.13
Rassi Cement L	0.03	0.01	0.01		0.05	0.01	0.08	0.01	0.03	0.06	0.08	0.04
Shree Cement L	0.16	0.08		0.08	0.03	0.02	0.05	0.02	0.00	0.10	0.98	0.15
Suvarna Cemen	0.14	0.27	0.14		0.17	0.02	0.01	0.01	0.00	0.09	0.10	0.09
Narmada Cemei	0.02	0.02		0.01	0.00	0.10	0.12	0.03	0.07	1.17	0.15	0.17
OCL India Ltd	0.15	0.05		0.15	0.10	0.01	0.03	0.02	0.03	0.37	0.15	0.11
Saurashtra Cem	0.09	0.04		0.04	0.01	0.10	0.09	0.04	0.06	0.08	0.08	0.06
StdDev												**0.05**
Avg	0.10	0.05	0.03	0.01	0.03	0.07	0.08	0.06	0.05	0.18	0.18	0.08
Over geared												
Balram Cement Ltd							-0.17	-0.23	-0.24	0.43	-0.19	-0.08
Hemadri Cements Ltd			-0.13	-0.07	-0.13	-0.05	0.01	-0.08	-0.18	-0.25	-0.18	-0.12
Modi Cement L	-0.02	-0.04		-0.06	-0.07	-0.02	0.06	0.14	0.07	-0.01	0.01	0.00
Priyadarshini Ce	0.03	0.06		0.04	0.02	0.08	0.09	0.06	0.08	0.07	0.08	0.06
Shree Digvijay Cement Ltd					0.13	0.04	0.01	0.02	0.07	0.02	0.07	0.05

Appendix 7

Cdoromandel Cements Ltd			-0.06	-0.03	0.00	0.04	-0.17	-0.13	-0.07	-0.18	-0.08
Gujrat Sidhee Cement Ltd	-0.98		-0.52	-0.24	-0.04	-0.02	-0.06	0.00	0.04	0.08	-0.19
Janapriya Cement Ltd	-0.25	-0.11	-0.14	0.14	0.03	0.06	0.07	-0.32	0.00	0.01	-0.05
Kalyanpur Cements Ltd		-0.04	-0.56	-0.74	-0.36	-0.22	-0.31	0.21	0.01	0.07	-0.22
Mahendra Cements Ltd			0.01	0.00	0.00	0.06	-0.07	-0.17	-0.05	-0.14	-0.04
Panyam Cements & Mineral Industries Ltd						0.15	0.02	-0.03	-0.26	0.07	-0.01
Sri Chakra Cements Ltd					-0.07	0.01	0.01	-0.05	0.07	0.07	0.01
Sri Vishnu Cement Ltd		-1.97	-1.10	-1.09	-0.34	-0.12	0.01	0.04	0.12	0.02	-0.49
Std Dev											**0.15**
Avg	0.01	-0.31	-0.56	-0.28	-0.20	-0.07	0.00	-0.05	-0.05	0.01	-0.02	-0.14