CAPITAL STRUCTURE AND DIVIDEND POLICY: EVIDENCE FROM EMERGING MARKETS

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Abstract

This thesis aims to add empirical evidence to the corporate finance literature by looking at two main financing issues, namely firms' payout policies and capital structure decisions, in the context of emerging markets. The thesis consists of seven chapters, including five main standalone research papers. After an introductory chapter, the first research paper reviews the existing literature on the dividend policy controversy with an emphasis on recent empirical work. The following two chapters consist of two research papers which look separately at the dividend and capital structure decisions of firms in India and in Mauritius. In the second research paper an agency model of dividend policy is estimated and tested on a sample of Indian firms using Weighted Least Squares methodology. The third research paper applies panel data procedures to estimate and test a model of the determinants of leverage, using the entire population of non-financial quoted firms in Mauritius. The last two empirical papers investigate how affiliation with an Indian Business House impacts on the dividend and capital structure decisions of firms. The impact of group-affiliation on the payout decision is tested by Maximum Likelihood qualitative and limited dependent variable techniques. The analysis of the impact of group-affiliation on the capital structure decision is conducted using Ordinary Least Squares methods and incorporates group-level characteristics as explanatory variables. While the main findings of these papers are on the whole consistent with the theory, there are new major insights that represent the special case of emerging markets. These main insights, as well as the main conclusions of the study, are summarised in Chapter 7, including some promising ideas for future research.

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CHAPTER 1: INTRODUCTION

1.1 The background and motivation of the study

Firms can use internal or external sources to finance their investments. Internal sources include retained earnings and depreciation, while external sources basically refer to new borrowings or the issue of stock. Thus the financing decision involves the appraisal of two choices. The first is the dividend choice – the fraction of retained earnings to be ploughed back and the fraction to be paid out as dividends. The second is the capital structure choice – the fraction of external finance to be borrowed and the fraction to be raised in the form of new equity.

On the face of it neither the dividend decision nor the capital structure decision should impact on the value of the firm. This is because both these decisions can be related to either the type of security, form of distribution, or make up of the ownership structure, but not to the investment decision. Thus the financing decision will determine the mix of debt and equity, the relative numbers of shareholders and debtholders, and the distribution of investment proceeds between interest, dividends and capital gains. However, how investment is financed or how and to whom the proceeds are distributed should not have an impact on the investment decision itself, and thus on firm value. In short, financing and investment decisions are independent of each other and the value of the firm is determined by the latter. Thus, as financing decisions have no affect on value, they are irrelevant and should be the residue of the more important investment decisions.

In practice, however, firms, managers, and investors, devote much time and resources to making and analysing financing decisions about dividends and capital structure. Moreover, when market imperfections such as taxation, transaction costs, asymmetric information and agency conflicts, are introduced, devoting time and resources to financing decisions no longer appears a futile pursuit. Subsequently, much theoretical and empirical research has aspired to clarify how the two principle financing decisions, the dividend and capital structure choices, impact on the value of firms that operate in imperfect markets. To date no consensus has been reached.

1.2 The contribution of the study

This study aims to contribute to the corporate finance literature, by looking at both the dividend and the capital structure choices. However, an attempt is made to make a valuable contribution by innovating on the rich existing literature in three major ways. First, in order to provide a more comprehensive view on the subject, both theoretical and empirical approaches are undertaken. Particularly, the second chapter is devoted to a review of existing theoretical and empirical literature on the dividend decision controversy, with emphasis on current thinking. The remaining chapters are equally divided between the dividend and capital structure decisions and are empirically oriented.

The second way by which this study attempts to innovate on existing academic work is by concentrating on emerging, as opposed to developed, markets. As noted in the literature review in the second chapter, most of the theoretical and empirical studies that deal with financing decisions are US based. However, many emerging markets are, as implied by the name, in the middle of a process of change, growth and liberalisation, which provide an interesting testing ground for Western-based corporate theory. Thus Chapter 3, Chapter 5 and Chapter 6 investigate dividend and capital structure decisions of Indian firms, while in order to achieve balance, Chapter 4 is African based.

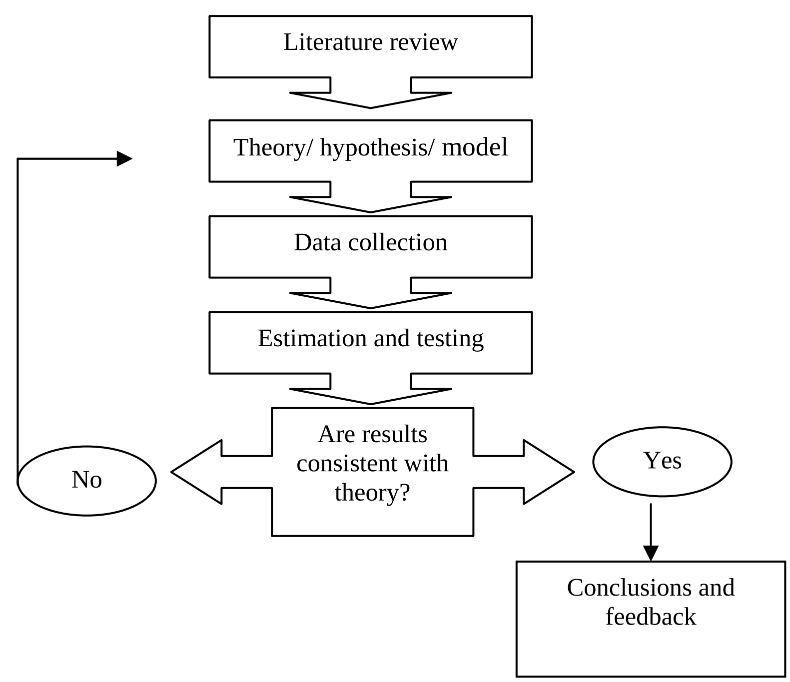
The third way by which innovation is sought in this study is by synthesising corporate financing theory with business groups theory. In particular, Chapter 5 and Chapter 6 investigate the impact of group affiliation on the dividend and capital structure decisions respectively. Thus the second and third innovations are related to each other because business groups are typical of emerging markets, and theories to explain their evolution are often related to market distortions that characterise many of these markets. Furthermore, India is a suitable representative of both an emerging market and an environment where business groups have flourished.

1.3 The methodology of the study

The methodology of the study is illustrated in Figure 1.1, and consists of five major steps namely: review of the literature; construction of hypothesis or theory or model; data collection; estimation and testing; and interpretation of findings to generate conclusions and relate them to the literature and theory.

All the five steps are well explained in Section 1.4, regarding the structure and contents of the study. However, it is useful to explain, as part of the methodology, the testing ground chosen for the empirical chapters, i.e. mainly India.

Figure 1.1 Methodology



True to type, the Indian emerging market has been undergoing economic reforms since 1991, prior to which it was characterised by high controls and extensive public ownership. Prior to reforms a licensing system required firms to obtain clearances for many routine operations. Clearances were typically determined not on economic or social basis but by the relative lobbying power of firms and business groups. Other industry controls, such as monopoly controls and small-scale incentives, limited firms' growth. Indeed, this may explain the large size of the Indian market in terms of number of listed firms while at the same time majority of Indian companies are relatively small (see Green, Murinde and Suppakitjarak, 2001). Similarly, the foreign trade regime prior to reforms was characterised by high protectionism from import competition and restrictions on foreign ownership of Indian companies. Likewise the government was heavily involved with the workings of the financial systems. High reserve requirements were stipulated, interest rates were imposed, and credit was directed to priority sectors giving rise to manipulation and inefficiencies. Furthermore, supervision and financial discipline were slack, and equity markets suffered from lack of transparency and poor investor protection, while the large public sector was similarly inefficient.

In 1991 India suffered a financial crisis which was followed by the initiation of economic reforms. Financial reforms of the banking sector included reduction in the reserve requirements on banks, liberalisation of interest rates, and opening up the banking sector to entry by new private banks. Reforms were also introduced in the non-bank financial sector. For example, capital market reforms included the establishment of the

Securities and Exchange Board of India (SEBI) in 1988, which was given statutory powers in 1992. SEBI was charged with improving disclosure rules in the primary market for equity as well as the transparency of trading practices in the secondary market. Similarly the office of the Controller of Capital Issues, which controlled the issue and pricing of new equity, was abolished in 1992, encouraging firms to sell shares. Other reforms were also launched including relaxing restrictions on foreign ownership, lowering import controls and tariffs, restructuring of the domestic tax system, and phasing out of government subsidies. It is thus in this new and changing environment that Indian firms have been making their financing decisions since the middle of the 1990s, and it is these decisions that are analysed in the third, fifth and sixth chapters of this study.

The population of Indian firms from which the samples were drawn for Chapter 3, Chapter 5 and Chapter 6, is the 4800 or so listed companies on the Bombay Stock Exchange out of a universe of over 6500 listed and unlisted Indian firms. But the size of this population is not typical of developing countries, and thus in order to achieve a more balanced view, the 40 or so listed companies on the Mauritius Stock Exchange form the population from which the sample for Chapter 4 is drawn. The Mauritius economy can be differentiated from the Indian economy in other ways too, although there are also some similarities. In essence, the ownership structure in Mauritius, like in India, is predominantly family oriented with an emphasis being placed on preventing dilution of control. The Mauritius Stock Exchange is much more recent than the Bombay Stock

Exchange, being established in 1988 by the Stock Exchange Act[1]. In the early 1990s it was opened to foreign investors, in spite of which it is still characterised by poor liquidity, low standards of corporate disclosures, and high domination by a few large companies. It is this environment, which provides the backdrop for the capital structure decisions of Mauritian firms in the 1990s as is analysed in Chapter 6.

1.4 The structure and scope of the study

Before turning to the analysis of how Mauritian or Indian firms take financing decisions in the environments described above, Chapter 2 takes stock of current thinking and evidence on the dividend puzzle. The starting point for the debate on how dividend affects firm value, which is often referred to as the dividend puzzle, is typically marked by Miller and Modigliani's (1961) irrelevancy theory. Thus the second chapter begins by describing the irrelevancy theory, and then outlines some of the leading theories that have evolved once the assumptions underlying the irrelevancy theory are relaxed. These include the transaction costs theory, the tax hypothesis, the bird in the hand argument, and the signalling and agency theories. The transaction cost theory of dividends is based on transaction costs, control and other considerations that are associated with paying dividends and then resorting to external finance to fund investments. The tax hypothesis proposes that government distortions by way of taxes have important implications for

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[1] The Bombay Stock Exchange (BSE) was established in 1875 as 'The Native Share and Stockbrokers Association'.

dividend policy and firm value. The bird in the hand argument is based on the idea that dividends reduce risk, while the signalling theory is based on the information content of dividends. Finally the agency theory of dividends deals with the role of dividends in resolving agency conflicts. After reviewing some of the relevant empirical methodologies and evidence, Chapter 2 concludes that no agreement has yet been reached on the dividend policy question.

As in Chapter 2, the subject of Chapter 3 is also the dividend policy puzzle, only here an empirical approach is undertaken and an extended agency theoretic rationale for the dividend decision is investigated. The extended theory considers conflicts and associated costs that broaden beyond the pure owner-manager relations. To this end, a variant of the cost minimisation model is utilised, relaxing the assumption of linearity and using data on Indian firms. As previously hinted, management of the Indian economy has traditionally been based on socialist ideology and a high degree of state-intervention. Chapter 3 suggests that this imply more severe agency conflicts including conflicts that arise between the pursuit of socio-political goals and the goal of shareholder wealth maximisation. The hypothesis is, therefore, that an agency rationale for the dividend puzzle fits especially well in the Indian context. The empirical method is the general to specific approach, starting with an unrestricted model that includes non-linear terms, and carrying out a simplification process based on Wald and t-tests. Chapter 3 presents empirical results that are consistent with the hypothesis put forward. In particular, the degree of government holdings appears to be significant in explaining the target payout ratios of firms in the Private Sector in India.

Chapter 4 turns attention to the second financing decision, namely the capital structure choice. In particular the chapter investigates the power of competing theories in explaining the capital structure decisions of non-financial, quoted companies in Mauritius. For this purpose a measure of leverage is regressed on firm characteristics that have been identified by previous research as important determinants of capital structure. The idea is to distinguish among the various theories by studying the nature of the relationship between leverage and other firm's characteristics. The empirical approach includes both a cross-sectional Ordinary Least Squares analysis and a panel data procedure. The findings support the notion that the trade off, pecking order, and agency theories, as well as control considerations have an important role in explaining the capital structure decision. The strongest and clearest evidence is in support of control considerations, and is obtained from the highly significant and positive impact of size and growth on the firm's leverage decision. These findings sit well with the family oriented ownership structure that dominates the Mauritian business environment as noted in Section 1.3 above. The recording of highly significant and negative impact of asset structure on leverage is puzzling. It could be interpreted as validation of an agency-based explanation, or it could be due to measurement problems. In the latter case, it is plausible that the asset structure variable is a proxy for non-debt tax shields rather than for asset tangibility. In this sense the strong and negative relationship between asset structure and leverage is a further reinforcement of the trade off theory of capital structure.

Chapter 5 introduces the business group phenomenon and investigates the impact of group affiliation on the firm's dividend policy. More specifically, the chapter links the transaction cost theory of dividend with the market failure and political economy theories of business groups in emerging markets. As reviewed in the second and third chapters, the transaction cost theory or dividend asserts that due to the gap between external and internal finance, dividend policy is negatively related to dependency on the former. Furthermore, as this gap is expected to be notably wide in emerging markets, the transaction cost theory of dividend should fit particularly well to data from such markets. However, the market failure and political economy theories of business groups in emerging markets imply that group-affiliation reduces the firm's dependency on external finance. Instead dividend policies of group-affiliated firms are determined by group considerations. To test whether the dividend policies of group-affiliated firms are substantially different to that of independent firms, a number of techniques are applied to data on Indian firms. The empirical procedure begins with a comparative analysis, followed by multivariate analysis that utilises qualitative and limited dependent variable methodologies. Results support the notion that the decision of whether to pay dividend is sensitive to transaction cost considerations regardless of group-affiliation. Results further show that the payout level of group-affiliated firms is less sensitive to transaction cost considerations compared with the case of independent firms. However, one finding which is left unexplained is that once group diversification passes a certain threshold, the transaction cost model appears to once again offer a good fit to the dividend behaviour of firms.

Chapter 6 continues with the theme on business groups but as related to the capital structure decision. In the spirit of the previous chapter, the idea is to synthesize two strands of the corporate finance literature. The synthesis is then used to generate two plausible models that explain the capital structure decisions of group-affiliated and non-group firms. The first model is estimated and tested on a sample of 1472 Indian firms, of which 912 are independent firms and 560 are group-affiliated. The second model expands on the first and is tested on a sample of 1384 firms of which 912 are independent and 472 are group-affiliated. In general, the results confirm that group-affiliated firms approach the capital structure decision in a manner, which is significantly different from their independent counterparts. For example, the results of the comparison analysis show that the mean as well as median leverage of group-affiliated firms is higher than the counterpart measures for non-affiliated firms. Moreover, the multivariate analysis concludes that the capital structure decision of group-affiliated firms is more sensitive to firm's liquidity, assets' intangibility, and profitability compared with independent firms. In contrast the capital structure decision of independent firms display greater sensitivity to firm size and growth compared with group-affiliated firms. Thus of the firm characteristics only age and stock illiquidity prove to have similar impact on the capital structure decision of group and non-group firms. When group-level characteristics are added, only group liquidity appears unimportant while group profitability shows to have strong and negative impact on the leverage decisions of group-affiliated firms. The latter result may be due to profitable groups creating internal capital markets, to avoid having to resort to expensive external finance. Likewise group debt and group size are shown to have significant and negative impact on the leverage decision of group-affiliated firms. This may indicate that groups co-ordinate their policies, and share (in particular) intangible assets, such as reputation. Similar to previous work there is also some evidence of the importance of group diversity to the operations of group-affiliated firms.

In addition to undertaking the above mentioned empirical procedures, each of the second to sixth chapters ends with a list of some promising future research ideas, some of which are subsequently attempted. Finally, Chapter 7 concludes by summarising the key conclusions of the study and by presenting the main future research ideas.

1.5 Limitations of the study

Before proceeding to the main chapters, it is worth noting three main limitations of this thesis. First, the thesis relies on empirical procedures as in the corporate finance literature and as illustrated by Figure 1.1, rather than construction of theoretical proofs on dividend policy and capital structure of firms in emerging markets. Thus the first main limitation of this thesis is that theoretical modelling of these issues as contained in the financial economics literature is not addressed here.

Second, it was purposely intended to produce standalone empirical papers in Chapters 3, 4, 5 and 6. To maintain their standalone status, it was found necessary to include brief reference to the relevant background literature, thereby inevitably leading to some limited amount of duplication between each of the standalone chapters and the literature survey in Chapter 2. However, we maintain that the repetition has bee kept to the strictest minimum.

Third, the empirical findings and conclusions contained in this thesis may be used by financial managers to inform policy decisions. However, it is not the intention of this thesis to generate policy-oriented findings for operation purposes. Thus the third main limitation of this work is that focus is not directed at the practical applicability of the findings. Recognising these limitations the thesis proceeds to the main standalone research papers, commencing with Chapter 2, which surveys the theoretical and empirical literature on the dividend policy controversy.

CHAPTER 2: DIVIDEND POLICY – WHAT DO WE KNOW?

2.1 Introduction

Firms are generally free to select the level of dividend they wish to pay to holders of ordinary shares, although factors such as legal requirements, debt covenants and the availability of cash resources impose some limitations on this decision. It is thus not surprising that the empirical literature has recorded systematic variations in dividend behaviour across firms, countries, time and type of dividend.

Variations amongst firms are noted, for example, in Fama and French (2001). They bring evidence to show that US dividend paying firms tend to be large and profitable, while non-payers are typically small, less profitable but with high investment opportunities. Variations across countries include La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000) who study the dividend policies of over 4000 firms from 33 countries around the world. It is found that dividend policies vary across legal regimes in a way that is consistent with the idea that dividend payment is the outcome of effective pressure by minority shareholders to limit agency behaviour. Thus firms in common law countries with good legal protection of investors tend to have higher payout ratios compared with firms in countries with weaker legal protection. This is consistent with Allen and Michaely (1995), who note that firms in the US, had payout ratios of around 60 percent during the 1980s and early 1990s. However during the same period, Glen, Karmokolias, Miller and Shah (1995) observe a payout ratio of only about 40 percent, for a composite of emerging markets' firms. Time trends in dividend behaviour is investigated by Fama and French (2001), who find that the percentage of US firms that pay dividends fell from 66.5 in 1978 to 20.8 percent in 1999. The study also describes a declining trend in the propensity to pay dividend by US corporations in the time period from the late 1970s to the late 1990s. Likewise DeAngelo, DeAngelo and Skinner (2000) look at time trends in the type of dividends paid by US firms. They find that special dividends have gradually disappeared in the period from the 1940s to the 1990s although incidences of very large special dividends have increased.

In light of the freedom over dividend policy and the observed variations across firms, countries, time and type of dividends, the question of how dividend policy is determined has been the subject of many studies. This question is often referred to as the dividend puzzle, and the debate is generally believed to have been initiated by Miller and Modigliani's (1961) irrelevancy theory. Miller & Modilgiani (1961) show that in a perfect capital market with rational behaviour and perfect certainty and with investment and borrowing decisions given, dividend policy has no effect on the value of the firm[1].

[1] Miller & Modilgiani (1961) specify what they mean by perfect capital market, rational behaviour and perfect certainty. In a perfect capital market all buyers and sellers have equal access to information, and none receives preferential treatment. Thus all traders are price-takers and none can affect the market price. Further, trading does not entail any transaction costs and there are no tax differentials associated with paying dividends either for firms or for individuals. Rational behaviour implies that more wealth is

The value of the firm at the beginning of the period can be expressed as the dividends to be received during the period plus the firm's value at the end of the period, less the amount of external finance raised during the period, all expressed in present value terms. In turn, the amount of external finance is the amount of funds required to finance planned investments, less the firm's earnings after deducting the amount of dividends paid. As the dividends for the period appear twice on the RHS of the equation with opposite signs, they sum to zero and hence eliminated.

$$V_t = PV\,[D_t + V_{t+1} - (I_t - (X_t - D_t))] \qquad (2.1)$$

Where V_t is the value of the firm at time t; PV stands for present value; D_t is the total dividends paid during period t; I_t is investment; and X_t is the firm's net profit for period t.

The firm's value at the end of the period can similarly be defined as the dividend paid during that period plus the value at that period end less external finance raised during the period, and so forth for all future periods. The current value of the firm can therefore be expressed as the infinite sum of the present values of future earnings less investment expenditures. Since profits, investment and the discount rate are all independent of dividend either by their nature or by assumption, the conclusion is that the dividend decision has no effect on value.

When the assumptions underling the irrelevancy theory are relaxed the question is

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preferred to less, and investors are indifferent to whether wealth comes in the form of dividend or capital gains. Perfect certainty means that all investors are certain about the future investment and profits of all firms, thus there is no need to distinguish between debt and equity and an all-equity firm is assumed.

whether it is still reasonable to conclude that dividends will have no effect on expected earnings, investment or on the firm's risk and hence the discount rate. For example, future earnings of a firm that pays dividends may be lower relative to a similar firm that does not pay dividends if paying dividends involves incurring transaction costs or extra taxes. Indeed, much of the dividend literature has focused on the implications of relaxing the Miller & Modilgiani (1961) irrelevancy theory assumptions and of introducing market imperfections.

The literature that deals with dividend policy in the presence of market imperfections may be categorised under two basic views: for and against. On the 'against' camp are theories including the transaction cost theory of dividend and the tax hypothesis that suggest that dividend payments reduce shareholder wealth. On the 'for' camp are theories that suggest that dividend payments increase shareholder wealth, including the bird in the hand argument, the signalling theory and the agency theory of dividend. All these theories have been extensively discussed and tested but to date there is no consensus on how firms determine their dividend policies.

The aim of this chapter is to introduce the leading theoretical themes that have evolved to explain the dividend puzzle. It is also intended to review the main empirical methodologies that have been developed to test these theories and to present some of the evidence that have been collected. The structure of this chapter is as follows. Leading dividend theories are outlined in Section 2.2. In Section 2.3 selected empirical studies testing the various dividend theories are reviewed. Section 2.4 concludes.

2.2 Dividend theories

2.2.1 The transaction cost theory

Firms may incur costs in distributing dividends while investors may incur costs in collecting and reinvesting these payments. Moreover, both firms and investors may incur costs when, due to paying dividends, the firm has to raise external finance in order to meet investment needs. Indeed, the transaction costs incurred in having to resort to external financing, is the cost of dividend in Bhattacharya's (1979) model. In contrast, however, it may be argued that dividend are beneficial as they save the transaction costs associated with selling stocks for consumption purposes[2]. Either way, if there are additional transaction costs that are associated with paying or not paying dividends, then dividend policy should impact earnings expectations and hence share price and firm value.

Alternatively dividends may influence value if dividend policy has an impact on management's investment decisions. For example, managers may decide to forgo positive net present value investments because dividend payments exhausted internal finance and raising external funds involves transaction or other costs. Indeed in Miller and Rock's (1985) model the cost of dividends arise from cutting or distorting the

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[2] Having to sell stock for consumption purposes is the assumption in John and Williams (1985). Indeed, Fama and French (2001) note that one possible explanation for the decline over time in the benefits of dividends may be the increased tendency to hold stocks via mutual funds. Holding via these funds reduces the transaction costs associated with selling stock to meet liquidity needs.

investment decision. However, more typically, the transaction cost theory of dividend retains the assumption of a given level of investment, and focuses on the costs of raising external funds when the firm increases its dividend payment. Transaction costs include flotation costs to the firm of raising additional external finance such as underwriter fees, administration costs, management time, and legal expenses. Further, when the firm pays dividend and then has to raise additional external finance, existing shareholders suffer dilution of control. Thus to maintain control or for other reasons, existing shareholders may subscribe to the new issue, incurring trading costs such as stamp duty and stockbrokers' commissions. Ultimately all these transaction costs are reflected in the share price and firm value.

In addition to explicit transaction costs there are also less obvious costs that are associated with paying dividend and resorting to external finance, and which are due to information asymmetries and pecking order considerations. Particularly, raising new equity can be costly if it comes at a time when the shares are temporarily under-valued or due to the signals this action sends to the market regarding the value of the firm. Similarly, debt issues are also problematic because the announcement of the issue may be associated with increased probability of default and with managers trying to issue debt before such bad news are revealed. Like explicit transaction costs, these less obvious costs should also impact earnings expectations and be reflected in the firm's share price and value.

Subsequently, due to the costs associated with raising external finance, the transaction cost theory of dividend suggests that firms should utilise retained earnings to the extent possible. Dividend should only be paid when this does not result in shortage of internal funds that are required for investment. Thus Rozeff (1982) suggests that firms that have greater dependency on external finance would maximise shareholder wealth by adopting lower payout policies. Leverage, growth potential and volatility are all factors that can increase dependency on costly external funds. High levels of leverage imply high fixed costs that the firm has to ensure it can meet. Growth potential means the firm is faced with good investment opportunities for which it requires funds. Similarly earnings volatility suggests that dependency on external finance is higher because there is less certainty regarding earnings to be generated. This implies that highly leveraged, risky or growth firms should be associated with conservative payout policies.

Another important factor that has implications for control consideration and for the transaction costs of raising external finance and thus for firms' dividend policies, is size. Particularly, the ownership structure of small companies is likely to be less dispersed than that of larger firms. The more dispersed is ownership the less control is exercised by each shareholder and hence the problem of loosing control is more critical for smaller firms. Further, the cost of external finance is likely to be higher for smaller firms compared with larger, well-established firms with easier access to the capital markets. Add to this the observation that growth firms are usually smaller and the conclusion is that small firms are likely to find the payment of dividends more costly compared with larger firms. This conclusion may explain the positive correlation often observed between firm size and the likelihood that the firm is a dividend payer. (Redding, 1997, and Fama and French, 2001).

2.2.2 Tax theories

Another cost associated with dividend payments is taxes. The tax hypothesis proposes that corporate tax on distributions and taxes on dividends in the hand of investors are important costs to be considered when deciding on a dividend policy. More specifically, the difference between tax on dividends and on capital gains should be considered as well as the difference between corporate tax on distributed and on retained earnings. For example, if corporate tax on distributions is higher than that on retained earnings, this may reduce expected earnings of a firm that pays dividends relative to a firm that does not. Similarly, if dividends in the hands of shareholders are taxed higher than capital gains, investors should evaluate expected returns on an after tax basis and share prices will vary inversely with the firm's payout level. Indeed, the basic tax hypothesis proposes that additional taxes on dividends make capital gains a less costly way of returning wealth to shareholders. Thus, the basic tax hypothesis supports a conservative dividend policy, and proposes that if the firm wants to return cash to shareholders then this should be done through share repurchases. It is thus puzzling to find that although repurchases have increased since the 1980s (Allen and Michaely, 1995, Jagannathan, Stephens and Weisbach, 2000, and Fama and French, 2001), they have not substituted for dividends (Fama and French, 2001, DeAngelo, DeAngelo and Skinner, 2000).

However Miller and Scholes (1978) show that under two provisions of the US Internal Revenue Code, taxable investors may still be indifferent to dividends even when the tax regime favours capital gains[3]. Furthermore, Miller and Modigliani (1961) argue that despite the presence of taxes, tax-induced clientele effect greatly reduces the tax costs of dividends. The idea is that there may be clienteles for both high and low dividend yields depending on tax positions. Institutions, which are often tax-exempt and individuals at low tax brackets may prefer companies with high payout policies. Other investors at high tax brackets for whom the relative tax cost of dividends is substantial will prefer firms with low payout policies. Shareholders select firms whose policies suit their preferences. As there are enough firms to satisfy all, no firm can increase its value by changing its dividend policy. Moreover, by changing its dividend policy, a firm may trigger a change in clientele and this could be costly due to trading costs. Thus the clientele effect hypothesis supports the dividend irrelevancy conclusions.

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[3] The first provision used to illustrate the irrelevancy of taxes in Miller and Scholes (1978) is the ability to deduct interest payments from investment income received, in calculating tax liability. The second provision is that insurance companies pay no taxes on investment income. Thus if the firm increases its dividend, a taxable investor can avoid the additional tax liability by increasing his interest liability to the point where it matches the increased level of dividends. To maintain the same level of risk, the investor can use the proceeds from the additional borrowings to buy insurance policy. This increases the investor's level of assets so that his debt ratio is unchanged.

2.2.3 The bird in the hand argument

The traditional argument in favour of dividend is the idea that dividends reduce risk because they bring shareholders' cash inflows forward. Although shareholders can create their own dividends by selling part of their holdings, this entails trading costs, which are saved when the firm pays dividends. The risk reduction or bird in the hand argument is associated with Graham and Dodd (1951) and with Gordon (1959) and it is often defended as follows. By paying dividends the firm brings forward cash inflows to shareholders, thereby reducing the uncertainty associated with future cash flows. In terms of the discounted dividend equation of firm value, the idea is that the required rate of return demanded by investors (the discount rate) increases with the plough-back ratio. Although the increased earnings retention brings about higher expected future dividend, this additional dividend stream is more than offset by the increase in the discount rate.

This argument overlooks the fact that the risk of the firm is determined by its investment decisions and not by how these are financed. The required rate of return is influenced by the risk of the investments and should not change if these are financed from retained earnings rather than from the proceeds of new equity issues. As noted by Easterbrook (1984), in spite of paying dividends the firm does not withdraw from risky investments, thus the risk is merely transferred to new investors.

2.2.4 The signalling theory

A more convincing argument in favour of dividends is the signalling hypothesis, which is associated with propositions put forward in Bhattacharya (1979), Miller and Rock (1985), John and Williams (1985), and others. It is based on the idea of information asymmetries between the different participants in the market and in particular between managers and investors. Under such conditions, the costly payment of dividend is used by managers, to signal information about the firm's prospects to the market. For example, in John and Williams' (1985) model the firm may be temporarily under-valued when investors have to meet their liquidity needs. If investors sell their holdings when the firm is undervalued, then there is a wealth transfer from old to new shareholders. However, the firm can save losses to existing shareholders by paying dividends. Although investors pay taxes on the dividends, the benefits from holding on to the undervalued firm more than offset these extra tax costs. A poor quality firm would not mimic the dividend behaviour of an undervalued firm because holding-on to over-valued shares does not increase wealth.

The signalling hypothesis can explain the preference for dividends over stock repurchases in spite of the tax advantage of the latter[4]. Particularly, as suggested in Jagannathan, Stephens and Weisbach (2000), Guay and Harford (2000) and DeAngelo, DeAngelo and Skinner (2000) among others, the regular dividend signal an ongoing commitment to pay out cash. This signal is consistent with Lintner (1956) observation that managers are typically reluctant to decrease dividend levels. However, unlike regular dividends, repurchases and special dividends can be used to signal prospects without long-term commitment to higher payouts. Therefore announcements of increases in regular dividends signal permanent improvements in performance, and should be interpreted as confidence in the firm on behalf of managers thus triggering a price rise. Conversely, announcements of dividend decreases should be interpreted as signalling poor performance and lack of managerial confidence and should therefore trigger drops in prices.

If changes in the levels of dividend release information to the market, then firms can reduce price volatility and influence share prices by paying dividends. However, it is only unexpected changes which have an informative value and which can thus impact prices. Therefore, the value of the signal depends on the level of information asymmetries in the market. For example, in developing countries where capital markets are typically less efficient and where information is not as reliable as in more sophisticated markets, the signalling function of dividend may be more important. Moreover, it can be argued that information will eventually be revealed whether or not the dividend signal is sent, hence the dividend impact on prices is only temporary.

2.2.5 The agency theory of dividend

Another argument in favour of generous dividend payments is that this shifts the reinvestment decision back to the owners. The underlying assumption is that managers

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[4] Refer to the discussion in Section 2.2.2, on the tax hypothesis.

may not necessarily always act as to maximise shareholders' wealth. The problem here is the separation of ownership and control which gives rise to agency conflicts as defined in Jensen and Meckling (1976). Accordingly when the levels of retained earnings are high managers are expected to channel funds into bad projects either in order to advance their own interests or due to incompetency. Hence generous dividend policy enhances the firm's value because it can be used to reduce the amount of free cash flows in the discretion of management and thus controls the over investment problem (Jensen, 1986).

Another agency theory based explanation of how dividends increase value is described in Easterbrook (1984). While the transaction cost theory of dividend proposes that dividend payments reduce value because they lead to the raising of costly external finance, Easterbrook (1984) argues that it is this process which reduces agency problems. The idea is that the payment of dividends is one possible solution to the problem of collective action that tends to lead to under-monitoring of the firm and its management. Thus the payment of dividends and the subsequent raising of external finance induce investigation of the firm by financial intermediaries such as investment banks, regulators of the securities exchange where the firm's stock is traded, and potential investors. This capital market monitoring reduces agency costs and lead to appreciation in the market value of the firm. Moreover, total agency cost, as defined by Jensen and Meckling (1976), is the sum of the agency cost of equity and the agency cost of debt. The latter is partly due to potential wealth transfer from bond to equity holders through assets substitutions. Thus Easterbrook (1984) note that by paying out dividends and then raising debt, new debt contracts can be negotiated to reduce the potential for wealth transfer.

2.3 Review of selected empirical studies

The dividend theories mentioned in the previous section relate the impact of dividend on value to transaction costs, taxes, risk, signalling and agency conflicts. However, the main empirical studies of the dividend policy puzzle focus in particular on the tax hypothesis, the signalling hypothesis and agency studies[5]. Thus, following the spirit in Prasad, Green and Murinde (2001), it is around these three theories that the following discussion is organised. Transaction costs that are incurred due to changes in dividend policies are normally incorporated into each of these main hypotheses. These costs are commonly assumed to be a function of dependency on external finance and are controlled for by variables such as growth, size or profit. Relatively little empirical work has been conducted on the bird in the hand argument therefore this branch of empirical work is discussed no further[6].

Testing approaches depend to a large extent on the hypothesis under investigation.

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[5] Indeed these three theories (agency, asymmetric information and taxation) also commonly underlie empirical work of the other financing decision, namely the capital structure choice. See for instance the recent and comprehensive survey by Prasad, Green and Murinde (2001).

[6] One exception is Allen and Rachim (1996) who investigate the relation between risk and the dividend policy using 173 Australian listed companies for the period 1972 to 1985. Stock price volatility is regressed on the dividend yield and on six control variables including earnings volatility, payout ratio, debt, growth, size and industry dummies. The study fails to find evidence that dividend yield is significantly correlated with stock price volatility, which suggests rejection of the bird in the hand (or duration) effect.

The clientele effect is often assessed by an event study around the dividend payment days. Other tax studies look at the trading activity rather than the stock price behaviour around ex-dividend days. Some tax hypothesis studies take a different approach, and review the impact of tax reforms on relative prices while other regress the dividend policy on tax proxies to assess the importance of the latter in influencing the former.

Studies that investigate the signalling hypothesis often follow an event study around the dividend announcement period. Other signalling studies assess revisions in earnings forecasts following unexpected changes in dividends. Another approach to testing the validity of the signalling hypothesis is by looking at changes in firm characteristics, following changes in its dividend policy. A particular attention has often been paid to changes in earnings. Cross sectional comparisons between firms of different characteristics are also used to assess how such differences may affect the value of the dividend signal.

Agency theory studies generally use regression analysis to assess the degree of substitutability among alternative mechanisms for controlling agency problems. Another approach, which is typically classified under the agency theory umbrella, is testing the suitability of Rozeff’s (1982) cost minimisation model. The cost minimisation model actually combines transaction costs theory with agency theory, and proposes that the optimal payout ratio is that which minimises the sum of costs of paying dividends. Thus Rozeff (1982) and subsequent studies regress a proxy of the optimal payout ratio on proxies for agency costs that may be controlled by paying dividends and on proxies for transaction costs that are associated with dividend payment.

The literature review of this section will proceed by examining a limited number of studies dealing with each of the above mentioned theories in turn. However, some researchers have attempted to model the management's decision-making process that determines dividend changes. Some of these behavioural models, notably Lintner's (1956), have important implications in particular for the signalling theory and are hence described first.

2.3.1 Behavioural models – The partial adjustment model[7]

2.3.1.1 The main studies

One approach to addressing the dividend puzzle is to understand the management's decision-making process that determines dividend changes. Indeed, this is the approach in Lintner (1956), who carry out a series of interviews with the managers of 28 US industrial firms about their firms' dividend policies in the 7 years from 1947 to 1953. From the survey it emerges that firms tend to establish dividend policies with target payout ratios that are applied to current earnings. It is also found that firms have adjustment rates that determine the percentage of the target change by which dividend levels are actually changed. Lintner (1956) also reports that although the target payout ratios and speed of adjustments vary across firms, in most cases they stay reasonably

[7] The studies reviewed in this section are summarised in Table 2.1. This table, as well as the rest of the

stable over time[8].

Based on his findings, Lintner (1956) develops the partial adjustment model of the change in the dividend level from the previous to the current period. The model reflects management's belief that investors dislike erratic patterns in dividend levels and hence the emphasis is on the change from the previous actual level:

$$\Delta D_{i,t} = \alpha_i + C_i \; [\, D^*_{i,t} - D_{i\,(t-1)} \,] + U_{i,t} \tag{2.2}$$

Where

$$\Delta D_{i,t} = D_{i,t} - D_{i\,(t-1)} \tag{2.3}$$

$$D^*_{i,t} = R_i \, (P_{i,t}) \tag{2.4}$$

Thus $\Delta D_{i,t}$ is the change in the dividend payment; $D_{i,t}$ and $D_{i(t-1)}$ are the amounts of dividends paid in years t and $t-1$ respectively; $D^*_{i,t}$ is the target dividend amount where R_i is the target payout ratio and $P_{i,t}$ is current profits after tax; C_i is the speed of adjustment; α_i is a constant which in general will be positive to reflect management's reluctance to reduce dividends; $U_{i,t}$ is an error term. Equation (2.2) can alternatively be expressed as follows:

$$D_{i,t} = \alpha_{i,t} + \beta \, P_{i,t} + \gamma \, D_{i\,(t-1)} + U_{i,t} \tag{2.5}$$

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tables of this chapter are collected together in Appendix 2A at the chapter's end.

[8] The target payout ratios in the Lintner (1956) survey vary from 20% to 80% with 50% being the most common. The speed with which the firms in the study move toward the target payout ratio ranges from 20% to around 50%.

Where

$\beta = C_i (R_i)$ and $\gamma = 1 - C_i$

According to Lintner (1956), current net earnings, P_t, play the most important role in determining dividend changes. This is because current earnings are widely available and hence managers' view is that investors expect dividends to reflect changes in this variable. Expanding (2.5), noting that $D_{i(t-1)}$ can be expressed as a function of that period's profits and the previous period's dividends, the dividend level in each period is a weighted average of current and past profits. Hence the dividend pattern is a smoothed pattern of earnings and is indicative of the time path of permanent earnings. The degree of smoothing depends on the speed of adjustment coefficient, C_i.

Thus the three key factors in the partial adjustment model are the speed of adjustment coefficient, C_i, the target payout ratio, R_i, and current earnings, P_t. Indeed, the three questions that are commonly raised about the Lintner model concern these factors. First, some researches have investigated what determines the speed of adjustment and hence the degree to which smoothing takes place. Second, some researches try to establish whether firms have long-term target payout ratios towards which they move. Third, the question of whether current earnings are the key determinant of dividends has been investigated. In general, however, empirical tests of the Lintner model have confirmed its validity. One of the earliest and widely quoted such study is by Fama and Babiak (1968). Another, which is going to be reviewed here for the reason explained below, is by Mookerjee (1992).

Mookerjee (1992) is unique in that it applies the Lintner model, which has been developed on the basis of a US survey, to a developing rather than a developed country. Particularly, annual data for the aggregate Indian corporate sector for the period 1949 to 1981, before significant reforms were introduced, is utilised to show that the basic Lintner model performs well in explaining dividend behaviour in India. Modification of the basic model, by adding the availability of external finance as an explanatory variable, improves the fit of the model. Indeed, the lagged external finance enters with a significant and positive estimated coefficient reflecting access to subsidised borrowing and hence tendency to use borrowing to finance higher dividends. Mookerjee (1992) also notes that the constant in the Lintner model is hypothesised to be significant and positive, reflecting the fact that firms are more willing to raise rather than lower dividends. Although the study finds the constant to be significant under all specifications, it enters with a negative sign in all regressions. It is suggested that this could be a reflection of the impact of taxes[9].

Although the study by Mookerjee (1992) is supportive of the Lintner's model, it also addresses the third of the three questions mentioned above, that are often raised with reference to this model. Namely this is the question of whether management set the desired dividend level as a fraction of current earnings or as a fraction of permanent

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[9] Mookerjee (1992) note that traditionally income tax had been very high in India, disadvantaging dividend payments over capital gains. It is also noted, however, that this trend began to reverse in the mid-1970s.

earnings. If the latter is the case and it is assumed that earnings follow a random walk with a drift, than the lagged profit after tax, should enter with a negative and significant coefficient. Mookerjee (1992) finds that although the lagged earnings enter with a negative coefficient, in all cases it is also insignificant. In contrast, Lee (1996) finds stronger support for the view that it is permanent earnings as oppose to current earnings that determine dividend.

The study by Lee (1996) assesses whether there is long-term relationship between various definitions of earnings and dividends. The study utilises a bivariate time-series model of earnings and dividend obtained from annual observations on the Standard & Poor's Index for the period 1871 to 1992. The model is sufficiently general to allow various specification of target dividend to be nested within it. These restrictions are then tested, taking into account the non-stationarity of the dividend and earnings series and the cointegration between them. The results indicate that dividend behaviour is determined primarily by changes in permanent earnings and that the Lintner model performs better when the target payout ratio is a function of permanent rather than current earnings. This is supportive of the signalling hypothesis in the sense that current earnings are not a good indicator of the long-term financial position, hence managers utilise dividends to signal this position.

Shirvani and Wilbratte (1997) also use cointegration (albeit multivariate rather than bivariate) techniques to test the validity of the Lintner model. However, their main aim is to address the second of the three questions mentioned above, namely whether firms have long-term payout ratios. Using quarterly observations on the Standard & Poor's 500 index for the period 1948 to 1994, the first stage is to confirm the non-stationarity of the dividends, earnings and price index series. Further, as these three series are found to cointegrate, tests of the coefficients in the cointegrated equation point to a long-run relationship between earnings and dividends. In particular the hypothesis that the coefficients on the logs of the dividend and earnings variables, are equal and of the opposite signs is not rejected.

The Shirvani and Wilbratte's (1997) study further estimates the error correction model to capture short-run deviations from the long-run target payout ratio and the speed of adjustment. Thus the study also touches on the first of the three questions about the Lintner model, namely the question of what determines the speed of adjustment. It is found that firms apply different adjustment rates in raising and lowering dividends. When the payout ratio is below its long-run target, the firm will increase dividends. However, when the payout ratio is above its target, the firm will hold the dividend level constant and wait for earnings to grow so that the target payout ratio is achieved. This ratchet effect is interpreted in terms of the signalling theory, and in particular as a way of avoiding the bad signals associated with dividend reductions.

The idea that the speed of adjustment is determined by the signalling role of dividends is also supported in Dewenter and Warther (1998). The study reports the results from running the partial adjustment model for each of 180 Japanese firms and 313 US firms with at least five years of nonzero dividend during the period 1982 to 1993. It is found that the median speed of adjustment is higher for Japanese firms compared with US firms, and higher still for Keiretsu members. This pattern is explained by the observation that the Japanese business environment is characterised by less information problems, thus there is less need for the dividend-smoothing device in the case of these firms[10].

Returning to the question about the existence of long-term payout ratios, Hines (1996) looks at possible reasons for the Lintner (1956) observation that payout ratios vary across firms. In particular, the payout rates of 505 US firms for the period 1984 to 1989 as well as the dividend patterns for the aggregate US corporate sector during the period 1950 to 1986 are investigated. Hines (1996) finds that the payout rates applied to profits from foreign sources are about three times higher than the payout rates applied to domestic profits. These findings support the signalling hypothesis since information asymmetries surrounding overseas operations are likely to be more acute than for

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[10] Dewenter and Warther (1998) note that corporate governance in Japanese firms, and in Keiretsu-member firms in particular, differs from that in the US. Specifically it is noted that close links between managers and investors reduce information asymmetries problems in Japanese firms relative to US. Furthermore, it is argued that investors in Keiretsu-member firms have longer-term investment horizon and hence can wait until the information signalled through dividend changes is eventually revealed through other mediums. Thus the higher speed of adjustment for Japanese firms is explained by the smaller role that dividends in these firms play in conveying information. Consequently, firms are less concerned with smoothing their dividend pattern and can adjust their dividend quicker towards the target payout rates. These conclusions are further supported by the findings that Japanese firms experience smaller stock price reactions to dividend omissions and initiations, and the findings that Japanese managers are less reluctant to cut dividends compared with US managers.

domestic activities. Managers, therefore, may feel a stronger need to send signals regarding the prospects of foreign operations.

2.3.1.2 Conclusions on the empirical studies of the Partial Adjustment Model

Table 2.1 summarises the relevant key issues of each of the empirical studies reviewed in this section. Empirical findings appear to support the validity of the partial adjustment model, not only in respect to the behaviour of US firms, as shown in Fama and Babiak (1968), but also with respect to the behaviour in less developed countries as in Mookerjee (1992)[11]. The other studies reviewed above address the three questions that are associated with the Lintner model regarding the existence of a target payout ratio, the determinants of the speed of adjustment coefficient, and the degree to which current earnings explain dividend levels.

The Lintner's idea of a long-term payout ratio is supported in Shirvani and Wilbratte (1997), while Hines (1996) provides evidence supporting the notion that variation in the payout target is due to the signalling role of dividends and the degree of information asymmetries faced by the firm. The signalling role of dividends is likewise supported by Shirvani and Wilbratte (1997), who show that firms apply different

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[11] There are, however, some inconsistencies, for example, with regards to the constant, which Lintner (1956) proposes should be positive to reflect management desire to establish a gradual upward trend in dividend. However, while Fama and Babiak (1968) find the model improves when the constant is dropped, Mookerjee (1992) records significant but negatively signed constants in all of the regressions.

adjustment rates to dividend increases and decreases. Further evidence on what determines the speed of adjustment towards target dividend is given in Dewenter and Warther (1998). Finally, Lee (1996) shows that the partial adjustment model works better when the target dividend is modelled as a function of permanent as opposed to transitory earnings.

Before proceeding to the next section, it is important to note that other behavioural model to that of Lintner (1956) have been suggested and tested. For example, Cyert, Kang and Kumar (1996) develop a behavioural model where firms do not have a target long-term payout ratio because managers do not like predicting long term future events. Instead, the model is based on the notion that managers seek to avoid uncertainty and to optimise self welfare[12].

However, whether managers have long-term target payout ratios or whether they follow shorter-term goals, the behavioural models imply that managers' intentions and information on the firm and its future can be inferred from the dividend decision. This is the notion underlying the signalling hypothesis, the empirical evidence on which is reviewed immediately after the following review of selected empirical studies of the tax hypothesis of dividends.

[12] Cyert, Kang and Kumar (1996) suggest the if managers increase dividend today, this is associated with a short-term reward for themselves, but also reduces funds available for investment and can increase the probability of a dividend cut in the next period. The dividend policy is therefore the result of balancing the

2.3.2 Empirical studies of the tax hypothesis

2.3.2.1 Tax effect[13]

The basic tax hypothesis suggests that because personal taxes on dividends tend to exceed those on capital gains, firms have an incentive to adopt a conservative payout policy and such policy should be value enhancing. A possible method to assess the validity of this hypothesis is to study stock price and dividend policy changes in respond to tax reforms. Hubbard and Michaely (1997) and Papaioannou and Savarese (1994) adopt this methodology. Alternatively the importance of taxes to the dividend decision may be assessed by regressing dividend policy on proxies for the tax cost of dividends. Gentry (1994) and Lasfer (1996) adopt this methodology.

Using data on firms that are listed on either the NYSE or the AMEX for 1987 (65 firms) and 1988 (64 firms), Gentry (1994) finds support for the tax hypothesis. The study investigates the dividend policies of corporations versus Publicly Traded Partnerships (PTPs) in the oil and gas exploration industry. PTPs and corporations in the oil and gas industry are of similar size and this makes them comparable. The main distinction between PTPs and corporations is that during the period studied PTPs were not taxed at the corporate level and hence escaped the US double taxation system. Accordingly, if the tax hypothesis is valid, as PTPs have lower tax cost associated with the payment of dividends, their payout rates should be larger. Using cross sectional instrumental variable

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short-term rewards from dividend increases with the need to maintain a stable pattern.

technique, the dividend payout is regressed on an organisational form dummy as well as on a number of other control variables[14]. Results of the study indicate that firms consider taxes when formulating their dividend policies and that, coherent with the tax hypothesis, PTP pay more dividends than corporations.

Further support for the tax hypothesis, is provided by Lasfer (1996) who uses 108 firms quoted on the LSE for the period 1973 to 1983. The study considers both personal and corporate taxes by running a regression of the partial adjustment model. The original partial adjustment model is adapted to incorporate the effects of both personal and corporate taxes on the determination of the long run target dividend level. Lasfer (1996) tests whether the target dividend (and therefore also the actual dividend) is a function of earnings, of a tax discrimination variable and of a tax exhaustion dummy. The tax discrimination variable, surrogating for the effects of personal taxes, varies inversely with the personal income tax rate. When the tax discrimination is larger than one, income tax on dividends is cheaper than tax on capital gain and the firm is expected to prefer a high payout policy[15]. The tax exhaustion dummy, surrogating for the effects of the firm's tax

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[13] The studies reviewed in this sub section are summarised in Table 2.2.

[14] Gentry (1994) notes that the organisational form may be endogenous to the dividend decision. In particular, firms that want to pay high dividends may select the PTP form to avoid double taxation. Therefore, in order to obtain consistent estimate for the organisational form, an instrument is used in place of the PTP dummy. Specifically, a Probit model for the PTP dummy is run and the predicted probabilities replace the PTP dummy in the dividend policy regression. Other explanatory variables in the dividend regression are included to control for differences in growth, profitability and debt levels.

[15] The tax discrimination variable, *TD,* is defined as: $TD = (1-m) / [(1-z)(1-s)]$. Where *m* is the marginal

position, is set to one if the taxable profit is lower than gross dividends and advanced corporation tax (ACT) is irrecoverable. When ACT is irrecoverable, the firm is expected to prefer a low dividend payout, and hence the coefficient is expected to be negatively signed.

Results in Lasfer (1996) show all variables to be significant and to enter with the signs predicted by the tax hypothesis. Further, results of an event study in the second part of the paper are also supportive of the tax hypothesis, rejecting the tax induced clientele effect. Specifically, significant and positive abnormal returns are reported on the ex dividend day consistent with the notion that the price drop on the ex dividend day is systematically less than the value of the dividends. The reason for this is dividend taxation, which causes the value of the dividends to investors to be less than their nominal amount. The study concludes that taxes affects both the dividend policy and ex-dividend day returns, and that firms set their dividend policies so as to maximise the after tax returns to their shareholders as well as to minimise their own tax liabilities.

In a similar fashion to Lasfer (1996), Papaioannou and Savarese (1994) also utilise an extended dividend partial adjustment model on a sample of 236 industrial and 40 utility US firms for the period 1983 to 1991. However, they focus on firms' reaction to the US Tax Reform Act of 1986 (TRA). Indeed the study provides evidence that firms adjust their dividend policies in response to changes in the tax system and this is

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income tax on dividend, z is the effective capital gains tax rate and s is the basic rate of income tax and is the rate at which corporations pay ACT on gross dividend.

interpreted as supportive of the tax hypothesis. It is reported that a total of 23.2% of the sample firms experience shifts significant at the 10 percent level in their target payout ratios in the post-TRA period. This provides further support for the notion that firms consider taxes when setting their dividend policies.

The Tax Reform Act, 1986 is also utilised by Hubbard and Michaely (1997) to assess the implications of taxes on dividend policy. In particular, it is investigated whether shifts in tax policies have led to shifts in the relative values of two classes of common shares of a single firm, the Citizen Utilities Company (CU). It is noted that during the period studied holders of class A stock received stock-dividends while holders of class B stock received cash-dividends. The relative price of the shares should therefore reflect preference or aversion to cash dividends. Further, the TRA reduced the relative aversion of investors paying tax on dividends at the personal income tax rate to dividend[16]. Thus if taxes are important than the relative value of class B should have increase after 1987.

Hubbard and Michaely (1997) begin by obtaining the dividend-adjusted average relative price of CU for each of the periods 1982-1984 (pre-TRA), 1985-1986 (TRA implementation period) and 1987-1989 (post-TRA). The relative price is calculated as the ratio of the average price of class A to the average price of class B divided by the respective dividend ratio. It is found that although the relative price declined

[16] The reforms equalised the tax rate on dividends and on capital gains by reducing the rate of the former to 28%.

significantly from 1.01 in the pre-TRA period to 0.91 in the implementation period, this relative increase in the value of class B shares did not have a lasting impact. The relative price in the post-TRA increased to its pre-TRA level. Further, over the period 1978 to 1993 the relative price is found to be around unity. This is in spite of the tax disadvantage of cash dividends during that period, and is thus inconsistent with the tax hypothesis.

Possible explanations for the inconsistency between the tax hypothesis and the observed price behaviour of the two classes of CU's shares are explored in Hubbard and Michaely (1997). One suggested explanation is that clientele effects may be the reason that value is not affected by the tax changes. Indeed it is noted that clientele effects could also explain the temporary change in value during the TRA implementation period in terms of shifts in clientele. Although Hubbard and Michaely (1997) do not find evidence in support of clientele effect, other empirical studies do. Some of these studies are reviewed in the next sub section.

2.3.2.2 Tax clientele effect[17]

The tax clientele effect refers to the preference of various categories of investors, on the basis of their tax position, for various types of stock. Accordingly firms adjust their dividend policies and investors move to satisfy their tax requirements, until, in

[17] The studies reviewed in this sub section are summarised in Table 2.3.

equilibrium, no value can be added by changing dividend policy. One possible method of establishing whether a tax-induced clientele exists is to investigate the relationship between the dividend yield on stocks and the marginal income tax rate of investors. In particular, the finding of an inverse relation between dividend yield and marginal tax rates is supportive of the presence of a clientele effect. Elton and Gruber (1970) suggest that clienteles' marginal tax rates can be inferred from the ex-dividend day price behaviour. This point, for the case of preferential tax treatment for capital gains, is explained in Green and Rydqvist (1999) as follows.

If stocks offer no ex-dividend-day compensations then investors will be unwilling to sell ex-dividend. Selling on ex-dividend days implies paying higher taxes on the dividends and this can be avoided by selling cum-dividend. On the cum-dividend day the price includes the present value of the dividends to be paid but this is taxed at the (lower) capital gains rate. To ensure investors are willing to hold stock through the payment day and sell ex-dividend, the after tax receipts to the seller who trade on the cum-dividend day must, in equilibrium, be equal to the after tax receipts to the seller who trade on the ex-dividend day. This equilibrium position is shown in Elton and Gruber (1970) to be:

$$P_c - T_g\,(P_c - P_o) = P_e - T_g\,[\,P_e - P_o] + D\,(1 - T_d) \tag{2.6}$$

Where P_c is the cum-dividend day stock price; P_o is the price for which the stock was purchased; P_e is the ex-dividend day price; D is the amount of dividend; and T_g and T_d are the personal tax rates on capital gains and dividends respectively.

An expression for the ex-dividend day price drop is obtained from Equation (2.6) and is shown to reflect the marginal tax rate on dividend relative to capital gains of the clientele holding that stock:

$$(P_c - P_e) / D = (1- T_d)/ (1- T_g) \tag{2.7}$$

If tax clientele exists than the ratio of the drop in price relative to the nominal dividend amount should be closer to unity for high-yield stock and less than unity for low-yield stock. This is because high-yield stock is held by investors who face lower tax rates on dividends. In contrast, investors in low-yield stock are those facing high taxes on dividends. For these high tax payers, the after tax value of the dividend is substantially less than the amount actually received (*D*) and the required compensation for receiving the dividends is therefore higher.

Elton and Gruber (1970) divide their sample, of 4148 stock listed on the NYSE which paid dividend in the 12 month period from 1 April 1966, into 10 groups according to the value of the dividend yield. They find that tax brackets are negatively related to firms' dividend policies. This is supportive of the tax clientele effect and suggests that a change in dividend policy rather then the dividend policy itself could affect value.

However, the Elton and Gruber (1970) approach to inferring the existence of a tax induced clientele effect has been criticised on a number of points. First, it has been suggested that an observed ex-dividend-day-premium (i.e. a price drop, which is less than the dividend amount) could be the result of factors other than a reflection of marginal taxes. Second, it has been argued that short term trading could obscure tax clientele effect on ex-day returns even if tax clientele exists. Third, it is claimed that the volatility of equity prices invalidates inferences about tax effects from ex-dividend-day price behaviour.

Frank and Jagannathan (1998) address the first point. Namely, that ex-dividend day price behaviour may not necessarily be the result of a tax clientele effect. It is shown that prices fall on ex-dividend days by less than the value of the dividend even in markets where there are no taxes on either dividends or capital gains. The ex-day premium therefore does not reflect the tax rate faced by the stock's clientele but is explained by the costs associated with collecting and reinvesting the dividends.

The study by Frank and Jagannathan (1998) examine 1,896 cash dividend payments by 351 firms listed on the Hong Kong Stock Exchange between 1980 and 1993. The sample is split into a low-dividend group and a high-dividend group. The percentage price drop on the ex-dividend day is regressed on the dividend yield for the full sample as well as for the sub samples of low and high dividends. The regression is based on a model of the form

$$(P_c-P_e)/P_c = \alpha + \beta(\textit{dividend yield}) \qquad (2.8)$$

$\alpha = -\Pi(SPREAD)$ (2.9)

Where P_c and P_e are the prices on the last cum dividend trading day and on the first day on which the stock is traded ex-dividend respectively. Π is the ratio of rational to total traders; *SPREAD* is the average bid-ask spread around the ex-dividend day expressed as a percentage of the cum-price. The slope coefficient, β, represents the value of the dividend to market makers.

Frank and Jagannathan (1998) find support for the notion that rational traders try to avoid receiving dividends due to their lack of skill and experience in collecting and reinvesting these payments relative to market makers. Subsequently, on the last cum-day there is a selling pressure while on the ex-day there is a buying pressure. This results in a price drop that is smaller than the value of the dividend and this is reflected in the negatively signed constant. As the dividend amount increases, Π also increases because of the wealth implications of ignoring the dividends. As Π rises, the ex-day premiums increase and this is reflected in the observation that for the high-dividend sample the constant is larger in absolute value. However, even for the low-dividend group, where Π can be expected to be at its lowest, the price drop is still lower than the value of the dividend as the constant is significantly different from zero. Finally, the slope β is significantly lower than one for the low-dividend sample but insignificantly so for the high-dividend sample. This indicates the ability of market makers to benefit from economies of scale in handling the dividends.

While Frank and Jagannathan (1998) address the first criticism of Elton and Gruber (1970), namely that ex-dividend-day-premiums are not necessarily a reflection of marginal taxes, Koski and Scruggs (1998) address the second criticism. Namely this is the criticism that short term trading may reduce or eliminate (depending on the level of trading costs) the tax effect on ex-dividend-day prices. Thus the Koski and Scruggs (1998) approach is based on what Allen and Michaely (1995) term a dynamic tax-clientele effect which involves investigating trading volume around ex-dividend days. The argument put forward is that short-term trading, motivated by traders exploiting ex-dividend day premiums, results in abnormal trading volume. Therefore, even if the existence of a tax clientele can not be inferred from ex-dividend day premiums, it can still be inferred from abnormal trading volume around the dividend payment days.

If taxes impact ex-dividend returns then security dealers, who are tax neutral, will increase their trading around ex-dividend days. Also, if low dividend-yield stock is held by dividend averse investors (as predicted by the clientele effect) then it should be associated with ex-day premiums. Under such circumstances security dealers are expected to take long positions to capture the dividends. (They will increase their cum-dividend buying and sell at the ex-dividend price, which will drop by less than the value of the dividend they collected). Similarly for high-dividend yield stock, held by investors with preference for dividends, the ex-dividend price is expected to drop by more than the nominal amount of the dividends. In that case, dealers can be expected to take short positions. Furthermore, as US firms were exempt from taxes on 70% of their intercorporate dividends received during the period investigated, they are also expected to engage in dividend capturing by establishing short positions.

Koski and Scruggs (1998) collect data on trading volume by dealers and by individuals/firms for 70 ex-dividend days between November 1990 and January 1991. The abnormal trading volumes on the ex-dividend day and on the previous day are based on an event window of 11 days centred on the ex-dividend date. Abnormal trading volume is obtained as actual volume less the average volume during normal trading period and is standardised by the standard deviation of the normal trading volume. The means of the standardised abnormal volumes provide strong evidence that tax-neutral securities dealers engage in short selling of high yield stock around ex-dividend.

The study further tests the hypothesis that abnormal trading volumes around ex dividend days are positively related to the dividend yield and negatively related to transaction costs. Results of the ordinary least squares regressions of the standardised abnormal volume on the last cum-dividend day indicate that securities dealers engage in short term trading on cum-dividend days. This is supportive of a dynamic tax clientele effect according to which tax-neutral dealers engage in trading around the ex-dividend date in order to capture tax-driven differences between the ex-dividend capital loss and the amount of dividend paid. However, it is precisely this arbitrage activity by securities dealer that can eliminate tax clientele effect on ex-dividend day returns.

Thus Koski and Scruggs (1998) address the second criticism of the Elton and Gruber (1970) approach by showing that short term trading could obscure tax clientele effect on ex-day returns. Green and Rdyqvist (1999) address the third criticism of the Elton and Gruber (1970) approach, namely the notion that equity price volatility invalidates inferences about tax effects from ex-dividend-day price behaviour. They do this by studying ex-day price behaviour of Swedish lottery bonds, which are more stable than equity shares, thus reducing noise from ex-distribution price behaviour[18].

However, while more stable than equity shares, lottery bonds are similar to equity shares as there are tax implications to whether the bond is sold cum-lottery or ex-lottery. Particularly, if the lottery bond is sold on the cum-lottery day, the extra payment to the seller forms part of the bond price and is treated as capital gains not as accrued coupon payment. Moreover, for the buyer the extra payment is treated as a capital loss and form part of his/her tax basis. The implication of this feature of the lottery bond is that, if tax differentials on capital gains and distributions matter, then ex-lottery returns, like in the case of equities, should reflect the marginal tax rates of their holders.

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[18] The name of the Swedish lottery bonds refers to the fact that coupon payments are distributed by lottery. Green and Rdyqvist (1999) justify the choice of the Swedish lottery bonds by the argument that as bonds are more stable than equities, studying bonds removes noise from ex-distribution price behaviour. Further, unlike most other bonds, lottery bonds are taxed in a manner similar to equity shares, which enables the testing of the dynamic tax clientele. Particularly, in the case of most bonds, there is no difference in taxation to whether the bond is sold before or after the coupon payment date. When a bond is sold before the coupon payment date, the interest accrued to the seller is paid over to him by the buyer. This extra payment is treated as interest paid or received by both parties and is taxed as such. For lottery bonds, however, the tax treatment differs depending on whether the bond is traded before or after the ex-coupon date.

Green and Rdyqvist (1999) note that another advantage of looking at the Swedish lottery bonds is that distributions are tax-exempt. In most cases, where the tax system favours capital gains, factors such as transaction costs of handling dividends can substitute for the effects of taxes, making ex-days behaviour difficult to assess[19]. In the lottery bonds market such factors have an opposite effect to that of taxes because the tax system favours distributions. These non-tax factors, such as transaction costs, may therefore reduce the effects of taxes on lottery-bonds ex-day price behaviour, but they do not offer potential alternative explanation for them.

The data in Green and Rdyqvist (1999) include 46 lottery bonds of two types (mixed and sequenced) with between 5-10 years to maturity, trading on the Stockholm Stock Exchange in the period 1986 to 1997. There are 455 lottery payments with 287 lottery days (due to lotteries that pay their coupons on the same days). The sample is sub-divided according to the tax regime at the time when they were issued. The oldest sample, issues pre-1981, has the largest tax advantage as capital losses on these bonds can be fully used to offset tax due on any other income. Cumulative abnormal trading volumes of 10 days around the ex-distribution day are calculated for each tax regime sample. Abnormal volume is calculated as that day's volume divided by the average daily volume over the period beginning 6 trading days after the previous distribution and ending 6 days before the current distribution. In a similar manner, 20 days cumulative

[19] This is the second criticism of the Elton and Gruber's (1970) approach.

abnormal trading volumes are also obtained.

Green and Rdyqvist (1999) find evidence of high abnormal trading volumes for lottery bonds issued under all tax regimes, but the highest abnormal volumes are recorded for the pre-1981 sample. This evidence is supportive of the dynamic tax clientele. There is an increase in trading activity around distribution days due to tax differentials amongst market participants, and this abnormal activity is stronger, the higher the tax benefits attached to the bonds. To further investigate how taxes influence the returns around lottery days, these returns are regressed on the coupon yield as in the following model:

$$P_{(t+k)} - P_t = P_t (\gamma_0 k) + C (\gamma_1 - 1) \tag{2.10}$$

$$\gamma_0 = E(r) / (1-T) \tag{2.11}$$

$$\gamma_1 = -T / (1-T) \tag{2.12}$$

Where $P_{(t+k)}$ is the price on day (t+k) and P_t is the price on day t. Thus the LHS of Equation (2.10) is the change in price over the period k.

Similarly, on the RHS, k is the number of days in the trading period and the coefficient γ_0 is defined by Equation (2.11), where $E(r)$ is the expected after-tax daily return and T is the tax rate faced by the marginal investor. So the first expression on the RHS of (2.10) is the pre-tax expected return over the period k. The second expression on the RHS of (2.10) is the pre-tax change in price that is due to the coupon payment, C. The coefficient γ_1 is defined in Equation (2.12), thus the implied tax rate, T, can be obtained from the estimates of γ_1.

When $(\gamma_1\text{-}1)$ is equal to –1 (i.e. γ_1 is equal to 0), the pre-tax price on the ex-coupon day falls by C, the value of the coupon, providing evidence of tax irrelevancy. When $(\gamma_1\text{-}1)$ is greater than –1 (i.e. γ_1 is greater than 0), then the pre-tax price on the ex-coupon day falls by less than C, the value of the coupon. This provides evidence in support of the view that taxes drive coupon payment to be worth less than their nominal amount. When $(\gamma_1\text{-}1)$ is less than –1 (i.e. γ_1 is less than 0), then the pre-tax price on the ex-coupon day falls by more than C, the value of the coupon. This provides evidence in support of the tax advantage of coupon payments, and is also the hypothesis put forward for empirical testing. To empirically test for the value of γ_1, C is added to both sides of Equation (2.10), which is then dividend through by P_t:

$$R = \gamma_0\, k + \gamma_1\, C/P_t \tag{2.13}$$

$$R = [P_{(t+k)} + C - P_t]/\, P_t \tag{2.14}$$

Where R is the pre-tax return over the trading period, k, as defined in Equation (2.14), and C/P_t is the coupon yield. Green and Rdyqvist (1999) run the Weighted Least Squares regressions on the two types of lottery bonds. The findings of a negative γ_1 imply that the price on the ex-lottery day falls by more than the value of the coupon. This is consistent with the tax clientele effect in markets where distributions have tax advantages.

Thus, to summarise the evidence on the tax clientele effect, Green and Rdyqvist (1999) find support for Elton and Gruber (1970) proposition that clientele effects can be observed from ex-days price behaviour. However, the implications from Koski and

Scruggs (1998) is that short term trading may eliminate the tax clientele effects on ex-day returns even if investors consider taxes when choosing stock. In contrast Frank and Jagannathan (1998) note that price behaviour around ex-days may be driven by factors other than tax clientele effects.

2.3.2.3 Conclusions on the empirical studies on dividend and taxes

The empirical studies reviewed in this section are summarised in Tables 2.2 and 2.3. Table 2.2 summarises the studies of the traditional tax hypothesis, while Table 2.3 presents key issues relating to tax clientele effects. The general conclusion that emerges from the above discussion is that the presence of taxes invalidates the irrelevancy theory of dividend. Indeed using various methodologies, Gentry (1994), Lasfer (1996) and Papaioannou and Savarese (1994) provide evidence that taxes are important determinants of the firm payout decision. Further, even if taxes do not have a permanent impact on stock prices, as concluded in Hubbard and Michaely (1997), tax effects on prices may still be observed around ex-dividend days as shown in Elton and Gruber (1970) and Green and Rdyqvist (1999).

However, if there are tax clienteles for different dividend policies such that there are no permanent premiums in the market for one dividend policy over another, is it still valid to argue that dividend policy is important? [Particularly given that even these temporary price effects are not necessarily due to taxes, as shown in Frank and Jagannathan (1998)]. Moreover, as shown in Koski and Scruggs (1998) and subject to transaction costs, if tax clientele effects have temporary impact on prices, in efficient markets such effects would be eliminated through short term trading. It is thus clear that taxes alone can not explain the dividend puzzle.

2.3.3 Empirical studies of the signalling hypothesis

2.3.3.1 From theory to empirics

The signalling hypothesis is based on the notion of asymmetric information particularly between managers and investors. Under this assumption dividend changes are valuable in that they convey information about the firm's prospects. Indeed, Lintner (1956) observes that managers are more willing to raise rather than reduce dividend levels, and this has been widely interpreted as indicating that dividend decreases are associated with negative signals while dividend increases signal positive news. But what precisely is the nature of the information contained in dividend changes?

The risk-information hypothesis claims that dividend increases signal risk reduction. Alternatively, according to the cash flow signalling hypothesis, dividend changes contain information about future cash flows. Another opinion is that dividend changes signal permanent shifts in current earnings. In any event, as noted by Allen and Michaely (1995), regardless of the precise information contained in the dividend signal, there are principally two conditions that have to be met in order for the signalling hypothesis to be valid.

The first condition requires that market participants understand dividends as signals. For example, if the unexpected dividend change signals future earnings changes, then market participants should revise their future earnings forecasts following the dividend announcement. More generally, if unexpected dividend changes are interpreted as signals of new developments in the firm's prospects, then a price reaction should be observed in the same direction as the unexpected dividend change announced. The second condition that have to be met to validate the signalling hypothesis, is that the dividend change is followed by a change in the same direction in earnings or other firm's characteristics that the dividend change is assumed to predict. Empirical methods in studies of the signalling hypothesis have therefore focused on assessing the extent to which these conditions are met.

The following empirical review looks at each of these two conditions in turn. It begins with studies that are concerned with assessing market interpretation of the dividend signal. This first condition is commonly tested by event studies around the announcement period and by studying analysts' earnings forecasts revisions. The validity of the second condition is then assessed, by reviewing empirical evidence on actual changes in firm's characteristics following dividend change announcements.

Finally, some empirical studies of the conditional signalling hypothesis are discussed. The conditional signalling hypothesis proposes that the dividend signal is conditional on firm specific characteristics. This implies that both the interpretation of the dividend signal, and actual long-term changes in the firm following the signal, are conditional on firm characteristics. Thus empirical evidence on the conditional signalling hypothesis looks at cross sectional variations in the immediate reaction to dividend announcements. It further looks at variations in long term changes in performance and other characteristics following dividend changes. These cross sectional variations are tested either by comparison analyses or by regression analyses.

2.3.3.2 Interpretation of the dividend signal[20]

Interpretation of the dividend signal is typically assessed by event studies around the dividend change announcement period as has been done by numerous papers. However, Laux, Starks and Yoon (1998) and Howe and Shen (1998) innovate by studying price reaction of rivals of firms that announce dividend changes. Both these studies use US firms and define the event window as the two days including the day of the dividend change announcement and the previous day. Both also utilise the market model, estimated post event, to generate abnormal returns.

Laux, Starks and Yoon (1998) study dividend announcements in the period 1969-1988, but restrict observations to dividend changes of at least 25 percent. They calculate the averages of the cumulative two-day abnormal returns across the sub samples of firms declaring dividend increases and firms declaring reductions. Consistent with the signalling hypothesis, it is found that firms experience significant abnormal reactions at

[20] The studies reviewed in this sub section are summarised in Table 2.4.

the time of the announcement and in the same direction. Particularly, the mean two-day abnormal reaction of the 217 firms declaring dividend increases is significant at 1.01 percent. In contrast, the mean abnormal reaction of the 105 firms announcing dividend decreases, is significant at –6.35 percent. Further, the findings that the reaction to dividend reductions is stronger than for dividend increases confirm Lintner's (1956) observation of managers' particular dislike for dividend cuts.

Laux, Starks and Yoon (1998) also try to determine the information that market participants perceive to be contained in the dividend change announcements. They do this by looking at the price reaction of non-announcing firms to dividend change announcements by firms in the same industry. Specifically, it is proposed that rivals' price reaction should be of the same direction as that of the announcing firm if the dividend change announcement is interpreted as indicating industry-wide information (contagion effect). In contrast, if the announcement is interpreted as signalling a shift in the competitive position of the announcer then the price reaction of rivals should be in the opposite direction (competition effects). The two-day average abnormal return, for 1,243 firms, rivals to dividend-increasing firms, is recorded at 0.05 percent while for 667 firms, rivals to dividend-decreasing firms, the corresponding figure is –0.32 percent. As the price reaction of rivals is in the same direction as that of the announcer, this indicates that announcements are interpreted as containing information about common factors for the industry as a whole.

However, Laux, Starks and Yoon (1998) note that dividend change announcements may also contain information about shifts in the competitive balance in the industry. First, the average reactions of rivals to dividend change announcements are not significant, which may be the result of contagion and competition effects offsetting each other. Second, it is found that rivals' same-direction reactions are strongest for those rivals least likely to be affected by changes in the competitive position of the announcer. Specifically, the most competitive rivals display a significant positive reaction to increase announcements while the least competitive rivals display a significant negative reaction to decrease announcements.

Howe and Shen (1998) also investigate market's interpretation of the nature of the dividend signal by studying non-announcing rivals. The sample used in the study consist of rivals of dividend initiating firms traded on the NYSE/AMEX, in the period 1968 to 1992. The price reaction and analysts' forecast earnings revisions, following dividend initiation announcements by rival firms in the same industry, are analysed. The average announcement period's two-day cumulative abnormal price reaction of 3540 rivals is recorded as insignificant at –0.07 percent. Similarly analysts do not revise their earnings forecasts for rivals of announcing firms. The mean, unadjusted, earnings forecast revision across 345 rivals of dividend initiating firms is insignificant at 0.1677, while the mean abnormal forecast revision is insignificant at 0.1671[21]. It is thus concluded that the

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[21] Howe and Shen (1998) calculate unadjusted earnings forecast revisions by analysts as the difference between consecutive monthly forecasts divided by the stock price 15 days before the dividend announcement. The abnormal forecast revision is calculated as the difference between actual forecast

information contained in the initiation announcement is interpreted as firm specific without any evidence of intra-industry contagion or competition effects.

Thus the findings in Howe and Shen (1998) are not fully consistent with those in Laux, Starks and Yoon (1998). Particularly, while Laux, Starks and Yoon (1998) show that dividend change announcements signal information about rivals of the announcers, Howe and Shen (1998) do not support this view. However, evidence in Laux, Starks and Yoon (1998) supports the validity of the first condition for the signalling hypothesis to hold, namely that dividend changes are interpreted as signals. As the first condition is shown to be valid, the question is whether the second condition is also met. Particularly for the second condition to be valid, the dividend change announcement should be followed by actual changes in the firm characteristics, which the dividend change is predicted to signal. This is the subject to be discussed next.

2.3.3.3 Actual changes following the dividend change announcements[22].

Assessing actual changes in firms' characteristics, following dividend change announcements is the subject of various empirical studies. This is because the findings that dividend change announcements are followed by particular changes in the firm may help in establishing two things. First, it confirms the validity of the signalling hypothesis

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revision and the expected revision, where the expected revision is obtained using a fourth-order moving-average model.

[22] The studies reviewed in this sub section are summarised in Table 2.5.

because it makes sense to interpret the dividend change as a signal of an unexpected change if indeed it is followed by such a change. Second, it can shed light on the precise nature of the information contained in the announcement.

DeAngelo DeAngelo and Skinner (1996) investigate whether dividend change announcements are followed by changes in earnings that are in the same direction. In order to isolate the effects of the signalling hypothesis from other effects that may influence firms' dividend policy, DeAngelo DeAngelo and Skinner (1996) select firms experiencing a sudden earnings decline after a long period of stable growth. In particular, the sample contains 145 US firms experiencing a decline in annual earnings between 1980 and 1987 after consistent earnings growth over at least nine years. This selection method ensures that the dividend change is a signal of future rather than past changes. The selection method also implies greater need for signalling because firms that expect the current decline to be corrected in the near future, have to convey this information to market participants.

The initial results in DeAngelo DeAngelo and Skinner (1996) do not support the signalling hypothesis of dividends, as there is no indication that dividend increases represent reliable signals that the current earning problem is only temporary. Specifically, it is found that the 99 firms that increased their dividends in the first year of the earnings decline experienced no positive abnormal earnings in the subsequent three years[23]. To further investigate the robustness of these results, DeAngelo DeAngelo and Skinner (1996) use 135 firms with complete earnings data, and regress the abnormal future earnings on a dividend signal and a number of control variables assumed to help in predicting future earnings. They find the coefficient on the dividend signal to be insignificantly different from zero and this result holds when alternative proxies for the dividend-signal are used. Thus the results from the regression analysis confirm the earlier findings that dividend increases are not a reliable signal of improved future earnings performance.

Two possible explanations are offered in DeAngelo DeAngelo and Skinner (1996) for the unreliability of the dividend signal. The first is mangers' tendency to send over-optimistic signals either naively or deliberately. Second, it is suggested that the cash commitment associated with the dividend increase is relatively small. The median firm's dividend increase in the year of the earnings decline, amounts to only 3.5 percent of earnings, hence weaker firms can afford to send misleading signals. A similar figure of

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[23] DeAngelo DeAngelo and Skinner (1996) obtain estimates of annual average abnormal future earnings over the three years following the year of the earnings decline as follows. The abnormal earnings figure for each year is calculated as that year's earnings minus the predicted level of earnings under either the random walk or the growth-adjusted model. The random walk model predicts earnings in each future year simply as the earnings in year 0 (the year of the earnings decline). The growth adjusted model predicts earnings in each future year as year 0 earnings compounded forward at the earnings growth rate which is calculated over the years –5 to –1 relative to the year of the earnings decline. All abnormal earnings are standardised by the book value of stockholders' equity in year –1. The annual average abnormal future earnings figure for a given firm, is the average of the annual abnormal earnings over the three years following the earnings decline.

5 percent of earnings is recorded in Lipson, Maquieira and Meggison (1998) with respect to the dividend initiations of newly listed firms.

Lipson, Maquieira and Meggison (1998) compare the performance of 99 newly public US firms that initiated dividends in the period 1980 to 1986, with similar firms that did not. The argument for the choice of newly listed firms is similar to that of DeAngelo DeAngelo and Skinner (1996) for choosing firms experiencing earnings decline after a long period of earnings growth. Specifically, it is noted that the need for signalling as a way of distinguishing quality may be more important for these firms. Indeed, it is found that earnings surprises in the first and second years following dividend initiations are significantly greater compared with similar newly listed firms that did not initiate dividends. Furthermore, the dividend cash commitment represents about 5 percent of earnings of the newly listed firms that initiated dividends. This is significantly lower than 8.5 percent of earnings that similar non-initiating firms would have had to commit to, if they wanted to match the dividend yield, dividend to sales ratio or dividend to assets ratio of initiating firms[24].

Thus, Lipson, Maquieira and Meggison (1998) provide support for the view that dividend initiations signal future earnings prospects, as they distinguish one newly listed

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[24] Lipson, Maquieira and Meggison (1998) calculate earnings surprises in a similar manner to that in DeAngelo DeAngelo and Skinner (1996). Particularly, earnings surprises are calculated relative to a simple random walk or relative to growth-adjusted models. However, while DeAngelo DeAngelo and Skinner (1996) take the average earnings surprise over the three year following the event year, Lipson, Maquieira and Meggison (1998) study each of the two years following the event.

public firm from another newly listed firms. However, it is also shown that dividend initiations do not distinguish newly listed firms from established firms in the same industry.[25] This provides partial support for the signalling theory and for the second condition, namely that the dividend changes are followed by actual changes in the firm's characteristics. It is, however, inconsistent with DeAngelo DeAngelo and Skinner (1996), as is the conclusion that dividend initiations are a valid signal of future performance, because weaker firms would find the implied resource commitment, required in order to match the actions of quality firms, too costly to mimic. Thus more evidence is needed on the question of whether dividend changes are a reliable signal, and this is provided in Benartzi, Michaely and Thaler (1997).

Benartzi, Michaely and Thaler (1997) take an empirical approach similar to DeAngelo DeAngelo and Skinner (1996), comparing the unexpected earnings of firms that changed their dividends with those that did not. The sample contains 7186 firm-year observations of 1025 US firms that trade on the NYSE or the AMEX for at least two years during the period 1979 to 1991 and which meet various other requirements. The hypothesis is that firms that increase their dividends in a given year should enjoy positive

[25] Lipson, Maquieira and Meggison (1998) record the mean relative surprise in earnings (based on a random walk) of initiating firms versus non-initiating firms as 0.101 in the first year following the dividend initiation and as 0.141 in the second year. These two figures are significant at the 10 and 1 percent levels respectively. However, the average relative earnings surprise of initiating firms are indistinguishable from similar but established firms that already pay dividends. Particularly the mean relative surprise of initiating firms compared with a size-matched sample of established firms is 0.034 in the first year and 0.082 in the second, both figures being insignificant.

unexpected earnings in years that follow. Similarly, firms that decrease their dividends in a given year should experience negative unexpected earnings in years that follow. Benartzi, Michaely and Thaler (1997) also investigate variation in the unexpected earnings across dividends increasing firms. The hypothesis is that if signalling is costly, then the larger the dividend-increase, the greater should the unexpected earnings in the following year be[26].

Results in Benartzi, Michaely and Thaler (1997) show a strong contemporaneous correlation between dividend changes and earnings changes. Firms that increase their dividends in year 0, experience earnings increases in that year, which are significantly higher than the mean earnings change of the group of firms that did not change their dividends. Similarly, firms decreasing their dividends, experience significantly more severe earnings decreases in the same year compared with the group of firms that did not change their dividends. However contrary to the signalling hypothesis no correlation is found between the sign and size of dividend increases in a given year, and earnings changes in future years. Furthermore firms that cut dividends in a given year, experience significant earnings increases in the following year.

Thus the results in Benartzi, Michaely and Thaler (1997) are supportive of

[26] Benartzi, Michaely and Thaler (1997) calculate dividend changes as the difference between the last quarterly dividend per share in year 0 and in year –1, expressed as a percentage of the last quarterly dividend per share in year –1. Raw earnings changes are calculated as the annual change in earnings before extraordinary items deflated by the market value at the start of year 0.

DeAngelo DeAngelo and Skinner (1996), as they also reject the link between dividend changes and unexpected future earnings growth. This rejection of the traditional interpretation of the signalling hypothesis is also the conclusion in Jensen and Johnson (1995). However, what set Jensen and Johnson (1995) apart from these studies is that they concentrate specifically on dividend decrease announcements rather than on dividend changes. The study investigates whether firms reducing dividend by at least 20 percent after twelve consecutive quarters of positive, non-decreasing dividends, also experience a decline in earnings.

The sample in Jensen and Johnson (1995) consists of 268 observations of 218 reductions and 50 omissions by 242 different US firms in the period 1974 to 1989. It is found that while earnings decline significantly in the period before the dividend cut they rise significantly afterwards. The stock price, however, is found to drop at the time of the dividend reduction announcement and this is explained by the observation that although the cut marks a turning point in earnings pattern, there are still lingering problems. For example, it is observed that the earnings level at the end of the second year after the dividend cut is still below its level three years before the cut. The study thus proceeds to assess the nature of the problem more closely.

To do that, and to investigate the precise information the reduction announcements contain, Jensen and Johnson (1995) look at a range of changes in various other firm's financial variables. The patterns of these variables over the three years before and three years after a dividend reduction are examined. Findings indicate that firms use the funds, saved from the dividend cut, to improve their positions. The dividend cuts thus lead to improvements in liquidity position and to reduction in the level of debt. The conclusion is that dividend reductions do not necessarily signal a decline in earnings. Rather such cuts appear to signal the beginning of restructuring activities and a turn around in financial decline.

Thus the implications of Jensen and Johnson (1995) are similar to those of Lipson, Maquieira and Meggison (1998) in the sense that both provide some evidence to support the notion that dividend changes are followed by actual changes in the firm. However, both also illustrate that dividend changes should not be simply interpreted as signalling future earnings increases or decreases. Furthermore, such a blanket view on the nature of the dividend signal is strongly rejected in DeAngelo DeAngelo and Skinner (1996), and in Benartzi, Michaely and Thaler (1997). Results from these studies clearly call for further investigation into the precise nature of the information contained in dividend change announcements. Alternative hypotheses, which have been put forward, include the permanent earnings hypothesis, the cash flow hypothesis and the risk information hypothesis. Some of the relevant empirical work in these areas is discussed below.

2.3.3.4 Permanent earnings, cash flow and risk information hypotheses of dividends[27]

The permanent earnings hypothesis proposes that changes in dividends do not necessarily signal future growth or contraction in the levels of current earnings. Instead, announcements of dividend changes contained information about permanent as oppose to temporary shifts in current earnings. This view is consistent with the survey findings by Lintner (1956) and with Lee (1996) who finds that the partial adjustment model performs better when the target dividend is expressed as a function of permanent earnings. (Refer to Section 2.3.1 and to Table 2.1.)

Lintner (1956) finds that mangers tend to smooth dividends, and this tendency is reflected in the partial adjustment model. Indeed, the model can be manipulated so as to express dividends in terms of a weighted-average of current and past earnings. Thus according to this model, dividend trends reflect the smoothed pattern of current earnings, eliminating transitory fluctuations. A signalling theory interpretation of this is that by smoothing out temporary fluctuations in the factors that determine dividends, the dividend pattern reflects the stable pattern of those factors. As it is current earnings, which determine dividend levels in the partial adjustment model, a dividend change has to be the result of a permanent shift in current earnings.

The second part of Benartzi, Michaely and Thaler (1997) assesses the hypothesis that dividend changes signal earnings stability rather than future earnings growth. The study compares the likelihood of a dividend-increasing firm experiencing a decline in its following year's earnings with the probability of a firm that does not change its dividends

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[27] The studies reviewed in this sub section are summarised in Table 2.6.

to experience such an event[28]. The results indicate that compared with firms that maintain their dividend levels, dividend-increasing firms are less likely to experience unexpected declines in earnings at least in the first year after the dividend change. As no correlation is found between dividend increases and future earnings changes, the conclusion arrived at is that dividends do not signal unexpected future earnings increases. Instead, it is concluded that, consistent with Lintner (1956), dividend increases signal that current earnings levels are permanent.

This distinction between permanent and temporary changes is also explored in Brook, Charlton, and Hendershott (1998). That study, however, is based on the hypothesis that dividend changes contain information about cash flow rather than about earnings. This is the cash flow signalling hypothesis, which proposes that dividend changes signal changes in expected cash flows.

Brook, Charlton, and Hendershott (1998) investigate this hypothesis and in particular whether dividend changes signal permanent as opposed to temporary changes in firms' cash flows. For that purpose a sample of non-regulated, US firms is divided into three groups on the basis of expectations regarding changes in cash flows in years 1 through 4 where 1992 is year 0[29]. Classification into groups is then carried out as

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[28] Benartzi, Michaely and Thaler (1997) measure the probability of an unexpected earnings decrease as the percentage of firms in the sample that have experienced unexpected negative changes in earnings. Unexpected earnings changes are calculated as raw earnings changes as defined in the previous footnote, which are then adjusted by the average change for a control group of non-dividend-changing firms.

[29] However, in order to isolate the signalling effects from other factors, Brook, Charlton, and Hendershott

follows. The first group, the permanent-increase group, contains 101 firms whose cash flows remain at least 30% above year 0 in each of the subsequent four years. The second group, the temporary-increase group, contains 45 firms whose cash flows increase by at least 40% in year 1 but then fall to less than 20% above year 0 level in either of the subsequent two years. The third group, the no-increase group, consists of 34 firms whose cash flows increase by less than 30% over the four-year period and by less than 15% in each year.

Results from the comparison analysis in Brook, Charlton, and Hendershott (1998) are consistent with the notion that firms use dividends to signal a permanent increase in cash inflows. Specifically, it is reported that the permanent-increase group's average dividend per share changed by 16.5 percent in year 0, before the cash flow increase. This is significantly larger than the 6.8 percent change experienced by the temporary-increase group. Furthermore, comparing annual abnormal stock returns, across the three groups, indicates that the dividend signal is understood by market participants. The permanent-increase group experiences an average annual stock return, net of the CRSP value-weighted index, of 17.5 percent in year 0. This is statistically different from zero, and statistically different from the 6.5 percent experienced by the temporary-increase group.

(1998) restrict the sample to firms with a four-year stable cash flow pattern in the period preceding the change. It is noted that these firms are prime candidates to signal. The imposed restriction is therefore that the difference between year –3 (1989) cash flow and year 0 (1992) cash flow must be less than 30% for a firm to be included in the sample. Cash flow is measured as operating income before depreciation, minus interest expense and preferred stock dividends.

Thus consistent with the cash flow signalling hypothesis, Brook, Charlton, and Hendershott (1998) find a positive link between increases in permanent cash flows, dividend rises and stock price reaction. Firms expecting a permanent improvement in their cash flows, signal this information by increasing their dividends. The market understands the signals and the stock price rises before the actual cash flow increase occurs.

Thus while Benartzi, Michaely and Thaler (1997) suggest that dividend changes signal changes in permanent earnings, Brook, Charlton, and Hendershott (1998) find it is permanent cash flows that dividend changes signal. In both cases, however, dividends are used to signal changes in the pattern of long-term performance. An alternative explanation is that dividend changes signal information about changes in the firm's risk. This is the risk information hypothesis, which is investigated in Dyl and Weigand (1998). In particular, Dyl and Weigand (1998) distinguish the risk information effect by investigating whether dividend initiation announcements are followed by reduction in earnings volatility and risk or by earnings increases.

The sample in Dyl and Weigand (1998) consists of 240 firms listed on the NYSE/AMEX, and which initiated dividends during the period 1972 to 1993. In order to assess the change in risk following dividend initiations, the total risk of returns, market risk of returns and earnings-per-share volatility, before and after the dividend initiation, are compared. Thus proxies for these variables are calculated for each firm in respect of the period before the dividend initiation and in respect of the period after the initiation.

The means and medians for each of these proxies are obtained and the significance of the change from the pre-initiation period to the post-initiation period is assessed[30].

Dyl and Weigand (1998) find that 70 percent of the sample firms have lower variances in the post dividend initiation period. Furthermore, the hypothesis of equal mean variances before and after the dividend initiation is rejected. Likewise, 68 percent of the sample firms have lower market risk as measured by β after the dividend initiation and the difference in the mean β pre and post initiation is statistically significant. There is also evidence to show that earnings volatility declines in the period following the dividend announcement, as the post-initiation earnings volatility is significantly lower compared with the pre-initiation period. In contrast, however, there is no significant difference in the mean of the standardised earnings per share in the pre- and post-initiation periods. Thus, it appears that announcements of dividend initiations are not followed by increases in future profitability[31].

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[30] Dyl and Weigand (1998) measure risk of returns using daily returns. The pre-event period is defined as day –252 before the dividend initiation to day –6. The post event period is defined as day 6 to day 252 relative to the dividend initiation event. Total risk of return is calculated as the variance of returns. Alternatively, a conditional variance is estimated using a GARCH(1,1) which is estimated by Maximum Likelihood . The market risk is measured by beta which is estimated using an extended market model by regressing daily stock returns on 15 lagged, 1 contemporaneous and 5 leads market returns, using returns on the CRSP equally weighted index as a proxy for market returns. Earnings volatility is measured as the variance of sample means earnings per share in the 12 quarters preceding and following the dividend initiation.

[31] The results in Dyl and Weigand (1998) are somewhat inconsistent with the results in Lipson, Maquieira and Meggison (1998) as discussed above and summarised in Table 2.5. Both studies assess changes in

Based on their findings Dyl and Weigand (1998) conclude that announcements of dividend initiations do not signal enhanced profitability, but instead they are signals of stability. This risk-information hypothesis of dividend signalling is particularly interesting as it highlights a weakness in the bird in the hand argument in favour of generous dividends. Accordingly, the reason that stock price reaction to dividend increases is typically positive, this is not because dividend cause risk reduction, but because they are signals of risk reduction and future stability.

From the discussion in this sub section it emerges that the nature of the information, conveyed from the dividend change announcement, is ambiguous. The studies by Benartzi, Michaely and Thaler (1997) and Brook, Charlton, and Hendershott (1998) conclude that dividend signal shifts in permanent as opposed to transitory performance. Although the emphasis in the former study is on earnings performance while in the latter it is cash flow, over the long-term these are essentially the same. These conclusions tie-in well with Lintner's (1956) observation that managers seek to achieve a gradual upward progression in dividends that reflect long-term, permanent changes in performance. In contrast, Dyl and Weigand (1998) find that dividend changes indicate shifts in risk and earnings volatility rather than changes in performance[32].

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earnings following dividend initiation announcements. However, while Lipson, Maquieira and Meggison (1998) find some support for the notion that dividend initiations signal future earnings surprises, Dyl and Weigand (1998) find that the dividend initiations do not mark a significant change in profitability.

[32] The permanent earnings hypothesis and the risk-information hypothesis do not necessarily conflicts with each other. Dyl and Weigand (1998) note that permanent income can be interpreted as stable income,

A possible resolution for this confusion is the idea that dividend changes convey different information to different firms. The reaction to dividend-change announcements therefore depends on particular characteristics of the announcing firm and its circumstances. This hypothesis is termed the conditional signalling hypothesis and is typically investigated by cross sectional comparisons, or by regression analysis where firm characteristics are entered as explanatory variables.

2.3.3.5 The conditional signalling hypothesis[33]

Researches have investigated three main factors that may cause variations in the signalling function of dividends across firms or even over time for the same firm. First, such variations may be due to the combination of activities with which the firm engages prior to the dividend change announcement. Second, variations in the meaning and interpretation of the dividend signal may be caused by differences in the environment in which the firm operates. Third, cross sectional differences in the meaning of the dividend signal may be the result of differences in firms' characteristics. The discussion that follows presents some of the empirical work on each of these three factors, namely, prior activities, the environment and firm's characteristics[34].

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which implies reduction in the volatility of income.

[33] The studies reviewed in this sub section are summarised in Table 2.7.

[34] Two caveats are in order at this point. First, the distinction between prior activities, environmental influences and firm's characteristics as three separate factors is somewhat artificial. For instance, Tobin's

Related to the first factor, the effect of prior activities on the dividend signal, is the idea that the value of the dividend signal depends on the surprise with which it is met by market participants. For example, a dividend change announcement that comes after certain activities, such as the publication of earnings data, may be less informative than if such prior activity did not occur. Similarly, a dividend change announcement that follows a particular activity may contain different information than if it came after a different activity. The first issue is dealt with in Balachandran, Cadle and Theobald (1999), while the second issue is the subject of Born and Rimbey (1993).

Born and Rimbey (1993) argue that financing activity, undertaken prior to dividend increase announcements, can distinguish dividend increasing firms with future growth prospects from those firms that disinvest. The study investigates this hypothesis by regression analysis methodology of the price reactions to surprise dividend increase announcements. To ensure only surprise and hence informative increases, enter the sample, the selection procedure imposes the restriction that only firms initiating or resuming dividends after at least ten years of omissions are included. This selection

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Q is generally defined as the ratio of the market value of the firm's debt and equity to its total assets, and in that sense it is a firm's characteristic. However, to the extent that Tobin's Q represents investment opportunities, it can also be viewed as an environmental factor. In the discussion that follows, Tobin's Q is treated as a firm's characteristic. The second caveat is with reference to the limited coverage of the review. For example, variation in the signalling function of dividends that are due to stock ownership patterns is not discussed. Yet DeAngelo DeAngelo and Skinner (2000) provides some empirical support for the notion that the long-term decline in special dividends is related to ownership patterns and in particular to the shift from individual investors to institutional domination.

procedure results in a sample of 490 US firms that have initiated or resumed dividend in the period 1962 to 1989. For these firms the whole of the dividend is taken as unexpected. The sample is then partitioned on the basis of whether the firm has been engaged in financing activity in the twelve months prior to the dividend change announcement. This provides a sub sample of 102 firms that were engaged in prior financing activity, and a sub sample of 388 firms that were not.

Born and Rimbey (1993) begins their empirical investigation by running separate regressions for each sub sample, of the reaction to the dividend increase announcement on a constant and the dividend yield[35]. Results indicate that the intercept is lower for the sub sample of prior-financing firms compared with the sub sample of non-financing firms. This is consistent with the notion that prior financing activity leads to partial anticipation of a dividend increase, which impacts the share price prior to the actual increase announcement. Results also show that for the sub sample of prior-financing firms, the abnormal return per unit of dividend yield is much larger than for the non-financing firms. (2.800 as oppose to 1.745). This is consistent with the notion that prior financing activity alters market reaction to dividend increase announcements as it

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[35] Born and Rimbey (1993) define the capital market response to the dividend announcement as the cumulative abnormal return for the period (–1, 0) where 0 is the day the dividend is announced in the Wall Street Journal. Abnormal Returns are obtained using the market model, which is estimated pre-event over sixty trading days. The explanatory variable, the dividend yield, is obtained by dividing the dividend amount by the closing price of the share two trading days before the announcement.

distinguishes firms with good growth prospects from those with poor growth opportunities.

Based on these results Born and Rimbey (1993) proceed to assess the effect of the size of the prior financing activity on the reaction to the dividend announcement. Utilising the sub sample of prior-financing firms only, the price reaction to the dividend announcement is regressed on the dividend yield and on the financing yield[36]. The estimated coefficient on the financing yield is shown to be positive and significant. This is taken to indicate that the larger the amount of finance, raised prior to the dividend increase announcement, the stronger is the positive price reaction to the announcement. Thus Born and Rimbey (1993) conclude that a dividend increase announcement that follows prior financing activity, is interpreted as a stronger indication of growth compared with announcements that do not follow such activity. However, the prior activity also reveals information and results in anticipation of a dividend change, therefore the actual dividend change announcement has less informative value. This last point is further taken in Balachandran, Cadle and Theobald (1999), who also investigate the effects of prior activities (albeit not financing) on the dividend signalling function.

[36] Born and Rimbey (1993) define the financing yield as the ratio of per-share-financing divided by the closing price of the share two trading days before the announcement. Per-share-financing is defined as total financing divided by the number of common shares outstanding at the time of the dividend announcement. Total financing is defined as total financing in the twelve months before the dividend announcement and includes the value of new securities, new loans received, and increases in credit agreements in place.

Balachandran, Cadle and Theobald (1999) look at the extent to which interim dividend reductions (IDR) announcements can be anticipated from prior dividend cuts or other factor. It is proposed that anticipations of IDR should lead to weaker price reaction on the announcement date compared to situations where these announcements come as a surprise. To test this proposition, price reactions to IDR announced by 242 non-financial UK firms, in the period 1986 to 1993 are studied[37]. The study, however, begins by testing the traditional signalling hypothesis assumption consistent with which the IDR announcements should lead to negative price reactions. Indeed, the unadjusted mean abnormal return in the event window around the IDR announcement is found to be negative and significantly different from zero across the five return generating processes.

In the next stage of the investigation, Balachandran, Cadle and Theobald (1999) look at differences in price reaction between IDR that follow previous dividend reductions and IDR that do not. To do this the sample of IDR announcements is divided into 142 First Interim Dividend Reductions (FIDR) and 100 Subsequent Interim Dividend Reductions (SIDR)[38]. The hypothesis put forward is that FIDR lead to more negative

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[37] Balachandran, Cadle and Theobald (1999) measure price reaction to IDR announcement as the cumulative abnormal daily return over a three-day event window, that is centred around the IDR announcement. Abnormal daily returns are measured using five alternative return generating models but all models give results similar to those obtained using the market model. The coefficients for the market model are estimated using one hundred pre-event daily returns from day –120 relative to the event date. The market return proxy is the FTA All Share Index.

[38] Balachandran, Cadle and Theobald (1999) define FIDR as IDR announcements, where there were no dividend reductions in the three years preceding the IDR. SIDR are defined as IDR announcements that

price reactions than SIDR because the former provide more information to the market while SIDR are to some extent anticipated. Using the market model, the mean unadjusted price reaction to FIDR announcements is recorded as significant at –0.094 while reaction to SIDR announcements is significant at –0.053. As the difference between these reactions is significant, the results support the hypothesis that price reaction to dividend signals are weaker the more they are anticipated.

In the third stage of the investigation, Balachandran, Cadle and Theobald (1999) focus on SIDR announcements. It is proposed that when the subsequent interim dividend reduction is greater than the Prior Final Dividend Reduction (PFDR), the price reaction should be stronger compared with when the SIDR is less than the PFDR. This may be the case if the increased dividend reduction at the interim stage provide further information and is tested by splitting the SIDR sample into two groups. The first group consists of 39 SIDR where the percentage dividend reduction is greater than the percentage PFDR, and the second group consists of 61 SIDR where the percentage dividend reduction is less or equal to the percentage PFDR. Using the market model, the mean unadjusted reaction when the SIDR is greater than the PFDR is –0.098, while when the SIDR is not greater than the PFDR the mean reaction declines to –0.025. Thus the results are supportive the proposition that price reaction should be stronger, the stronger the surprise.

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follow a Prior Final Dividend Reduction (PFDR) immediately before the IDR but where there have been no reductions in the previous three year period.

In the final stage of the investigation, Balachandran, Cadle and Theobald (1999) search for factors that could explain cross sectional differences in price reactions to IDR. For this purpose, the cumulative abnormal returns around the IDR, generated from the market model, is regressed on various variables that are hypothesised to impact the surprise in the IDR[39]. Results indicate that, consistent with signalling hypothesis, the price reaction to the IDR is significantly related to the size of the reduction. Furthermore, there are mixed results about the importance of changes in interim earnings in influencing price reaction. This is consistent with the view that the dividend signal is valuable because the information in the earnings change is a noisy signal of future performance. The regression results also support the conditional signalling hypothesis and the notion that cross sectional differences may result in variations in the signalling function of dividends. Particularly, the price reaction is significantly influenced by whether the firm has previously reduced its dividends and by the gearing ratio. The environment in which the firm operates also appears important as the surprise in the IDR and thus the price reaction to it, are influenced by prior dividend reductions by other firms in the industry.

The impact of the environment in which the firm operates on market

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[39] Balachandran, Cadle and Theobald (1999) include the following factors as possible explanatory variables. The information content of the reduction as measured by the magnitude of the reduction. Availability of other information as reflected by the change in interim earnings. Degree of surprise as reflected by prior dividend reductions either by the firm itself or by other firms in the same industry. The gearing ratio, because highly geared firms are expected to experience higher earnings volatility, and information leakage and size control variables.

interpretation of the dividend signal is also the subject in Impson (1997). However, the emphasis there is on differences between regulated and unregulated firms. The hypothesis is that, due to the particular circumstances faced by utilities, dividend reduction announcements by these firms result in stronger reaction than in the case of other firms. The study uses 262 regulated and unregulated US firms declaring dividend reductions/omissions between 1974 and 1993 and the Weighted Least Squares cross sectional regression approach. Thus the price reaction to the dividend announcement is regressed on a regulated-firm dummy and on control variables[40].

Results in Impson (1997) indicate that regulated utilities experience significantly more severe reaction to dividend reduction announcements compared with unregulated firms. It is suggested that the surprise in the dividend reduction announcements may be greater for regulated utilities as these firms have traditionally been associated with high

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[40] Impson (1997) measures the dependent variable, the price reaction to the dividend reduction announcement, as the two-day cumulative prediction error obtained from the market model. The event window includes the day of the dividend announcement and the previous day. The parameters for the market model are estimated from the pre-event period from day –280 to day –31 relative to the dividend announcement day. The regulated-firm explanatory variable is a dummy variable that equals 1 for public utilities and 0 otherwise. The control variables include the average quarterly dividend yield, calculated over the four quarters before the announcement, as well as the change in the quarterly dividend, standardised by the price at the month-end before the announcement. Other control variables include a firm size variable which is measured by the log of the market value of equity at the month-end before the announcement, and an over-investment variable which is measured by Tobin's Q. It is calculated as the ratio of the market value of the firm, to the replacement cost of its assets, and a low value indicates over-investment.

yields and stable pattern of dividends. Furthermore, the coefficients on the Tobin's Q and size control variables are positive and significant. The former indicates that the higher the over-investment, the more negative is the price reaction to the dividend cut announcement. The latter indicates that the smaller the firm, the more severe is the reaction. Thus, consistent with the conditional signalling theory, firm's characteristic and environmental factors are found to be important in explaining price reaction to dividend change announcements.

The importance of Tobin's Q and firm size recorded in Impson (1997), as well as the importance of the gearing level recorded in Balachandran, Cadle and Theobald (1999), are suggestive of a link between firms' characteristics and the dividend signal. Akhigbe and Madura (1996) investigate this issue further, by assessing cross sectional variation in long-term price performance following dividend change announcements. The study is based on a sample of US firms announcing dividend changes during the period 1972 to 1990. However, prior to assessing cross sectional variations in long-term performance following dividend change announcement, a basic signalling hypothesis' prediction is tested. This is the prediction that dividend increase signals should be realised by improvements in long-term performance while decreases should be realised by future decline in performance. For this end, the mean long-term price performance of 128 firms initiating dividends is compared to the mean for the 299 firms omitting dividends[41]. Indeed, it is found that firms tend to experience a favourable share price performance, over the longer term, following dividend initiations and unfavourable performance following omissions.

To assess cross sectional variations in long-term price performance following dividend initiations and omissions Akhigbe and Madura (1996) regress the 36-month cumulative abnormal return on firm characteristics and the size of the dividend change. Results of this procedure indicate that larger cuts in dividends are associated with more severe long-term price performance. Further, the coefficient on the past profitability measure is negative and significant in the initiation sample, suggesting that firms with inefficient management improve their performance following dividend initiations. With regards firm size it is found that smaller firms tend to perform significantly better in the three years following dividend initiations while large firms tend to perform significantly worse following dividend omissions. Finally, long term reaction to dividend initiations is influenced by the Tobin's Q measure, implying that firms that over-invest perform significantly better following dividend initiations. These findings are consistent with the conditional signalling hypothesis and with the findings in Gombola and Liu (1999)[42].

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[41] Akhigbe and Madura (1996) measure the performance following the dividend change announcement by estimating the average abnormal monthly return for the sub-samples of dividend increasing and decreasing firms over the first, second and third years starting one month after the dividend announcement. The size and beta adjusted model is used to generate the monthly abnormal stock return for each firm, where the parameters are estimated from month +1 to month +36 after the month of the dividend announcement.

[42] The results in Akhigbe and Madura (1996) with regards to size can be contrasted with those in Impson

Gombola and Liu (1999) explore the link between Tobin's Q and the short-term price reaction to dividend increase announcements. In particular, the study analyses the price reaction to 196 Special Designated Dividend announcements made by US firms between 1977 and 1989. It is hypothesised that firms facing low investment opportunities, with low Tobin's Q, should experience stronger price reaction to the announcement of Special Designated Dividend. This is consistent with the signalling hypothesis, because the surprise in the special dividend announcement should be greater for firms with little investment opportunities. Indeed the event study methodology finds that the mean three-day cumulative abnormal return around the Special Designated Dividend announcement for the low Tobin's Q sample is positive and significant. However, the mean price reaction for the high Tobin's Q sample is insignificantly different from zero, while the mean difference between the two groups is significant[43].

(1997) who finds that the immediate price reaction to dividend reduction announcements tend to be more severe the smaller the firm. The contradiction may be suggestive of miss-interpretation by the market of the dividend omission signal. In particular, the severity of the information contained in the dividend omission may be under-reacted to, in the case of large firms and over-reacted to, in the case of smaller firms. Akhigbe and Madura (1996) also find that long term reactions to dividend omissions are unrelated to the degree of over or under investment as measured by Tobin's Q. This can also be contrasted with Impson (1997) who finds that over investment is significantly and positively related to the immediate price reaction to dividend reductions/omissions. This again can be indicative of lack of understanding of the dividend omission signal. If the long-term performance of firms omitting dividends is not significantly worse for over-investing relative to other firms, then the immediate price reaction to the announcement should also not be significantly different.

[43] Gombola and Liu (1999) use the market model with CRSP equally weighted index as a proxy for market returns. The coefficients for the model are estimated over the pre-event period in days –260 to –61 relative

The approach in Gombola and Liu (1999) is based on an earlier study by Lang and Litzenberger (1989). Both studies investigate the validity of the conditional signalling hypothesis with respect to Tobin's Q, but while the former focuses on price reaction to special dividend, the focus of the latter in on substantial changes in regular dividends. According to the conditional signalling hypothesis the reaction to substantial dividend change announcements should be larger for firms with low investment opportunities. The rationale for this is explained as follows. Investors expect an increase in cash flows for firms with good investment opportunities and they also expect these firms to announce dividend increases to signal this. Therefore the reaction to dividend increase announcements should not be strong for high Tobin's Q firms while the reaction to announcements of substantial dividend cuts should be strong. In contrast firms without high investment opportunities are not expected to enjoy an increase in cash flows, thus large dividend increases or decreases are not expected for low Tobin's Q firms. If such dividend changes are announced, market reaction should be strong.

Lang and Litzenberger (1989) therefore predict that if the price reaction is measured as the average to all dividend changes (increases and decreases), the average reaction in the case of low Tobin's Q firms should be stronger than for high Tobin's Q

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to the special dividend announcement. The cumulative abnormal return includes the three days centred around the announcement day. In addition to the event study, the authors also use regression analysis of the cumulative abnormal return on the investment opportunities variable as measured by Tobin's Q and other control variables. Further, abnormal earnings forecast revisions, following the special dividend announcement, are analysed to give support for signalling but not for agency theories.

firms. To test this prediction the study utilises 429 substantial dividend change announcements made between 1979 to 1984 by US firms. To ensure the dividend change is substantial, a restriction is imposed where the absolute value of the percentage dividend change of each observation must be greater then 10%. The average reaction on the day of the announcement for firms with Tobin's Q less than unity is recorded as 0.011, as opposed to 0.003 in the case of high Tobin's Q firms. Further, the 0.008 difference in the mean reaction between low and high Tobin's Q firms is highly significant.

However, Lang and Litzenberger (1989) point out that a stronger price reaction to substantial dividend changes by low Tobin's Q firms compared with high Tobin's Q firms is also consistent with the over-investment hypothesis. Large dividend increases by firms with low investment opportunities reduce the potential for over-investment by these firms. Such announcements should therefore be received with more positive reaction compared with reaction to similar changes by firms that face many investment opportunities. Similarly, large dividend decrease announcements by firms with low investment opportunities indicate an increase in the probability of over investment by management. Such announcements by low Tobin's Q firms should therefore be met by more severe reaction. Thus similar to the conditional signalling hypothesis, the over-investment hypothesis also predicts a stronger reaction to substantial dividend increases or decreases by low Tobin's Q firms.

To distinguish between the conditional signalling hypothesis and the over-investment hypothesis, Lang and Litzenberger (1989) further partition their sample of low and high Tobin's Q groups into dividend increase and dividend decrease announcements. The reaction to announcements of substantial dividend decreases is the key to distinguishing between the two hypotheses. Particularly, the conditional signalling hypothesis predicts strong reactions to dividend decreases regardless of the firm's Tobin's Q, which is due to the negative information such announcements contain regarding future expected cash flows. In contrast, the over-investment hypothesis predicts that the reaction to dividend changes will always be greater for low Tobin's Q firms because the potential for over-investment in the case of firms with little investment opportunities is greater.

Based on this distinguishing feature between the two alternative hypotheses, Lang and Litzenberger (1989) compare the mean price reaction to dividend decrease announcements. They find that the average reaction to dividend decreases by high Tobin's Q firms is insignificant, at –0.003, while for low Tobin's Q firms the reaction is significant at –0.027. These results indicate that there is a significant difference in the price reaction to dividend cut announcements between firms with high and low investment opportunities. These findings are consistent with the over-investment hypothesis and inconsistent with the conditional signalling hypothesis. Similar results in support of the over-investment hypothesis over the conditional signalling hypothesis are also obtained from comparing the post-announcement revisions of analysts' current earnings forecasts.

Thus the results in Lang and Litzenberger (1989) in favour of an agency theory based explanation for market reaction to dividend changes contradict the conclusions in Gombola and Liu (1999) in favour of conditional signalling theory. However, the results in Akhigbe and Madura (1996), Impson (1997), and Balachandran, Cadle and Theobald (1999) are consistent with Gombola and Liu (1999). These studies show that firms' characteristics, and in particular investment opportunities (Tobin's Q), are important in determining how the dividend signal is interpreted. Impson (1997) and Balachandran, Cadle and Theobald (1999) further illustrate that environmental factors, such as whether the firm is regulated or the dividend behaviour of other firms in the industry, also influence the price reaction to the dividend signal. Finally, Balachandran, Cadle and Theobald (1999) and Born and Rimbey (1993) show that activities undertaken by the firm prior to declaring dividend changes have implications for how this signal is interpreted. In particular, Balachandran, Cadle and Theobald (1999) show that prior activities such as past dividend announcements by the firm, influence the amount of surprise and hence the value of the dividend signal. Similarly, Born and Rimbey (1993) show that past activities such as prior financing can distinguish dividend initiating firms that signal quality from dividend initiating firms that disinvest.

2.3.3.6 Conclusions from the empirical studies on the signalling theory of dividend

The empirical studies of the signalling theory that were reviewed in this section are summarised in Tables 2.4 to 2.7. Table 2.4 focuses on studies that seek to clarify the market's interpretation of the information contained in the dividend change announcement. Table 2.5 summarises some of the empirical work that assesses whether dividend signals are realised by actual changes. Table 2.6 extends on Table 2.5 by presenting work that puts forward and tests various theories of what information the dividend announcements convey. Table 2.7 is devoted to empirical work on the conditional signalling hypothesis. The importance of the signalling theory is apparent from the huge amount of empirical work on the area as is also reflected in the selected review provided above.

There is substantial empirical evidence to support the view that dividends are perceived to contain important information, and that the dividend signal is picked-up by market participants. Indeed consistent with Lintner (1956), it is generally found that dividend increases are typically perceived as good news with positive price reaction while the reverse is typically true for dividend reductions. However, evidence is not conclusive on the precise information that the dividend change announcement is perceived to convey. Furthermore, as noted in Allen and Michaely (1995), most if not all of the empirical work in the area can not distinguish whether dividend policy are intended as a signalling device by firms. Evidence is also not conclusive on whether market's interpretation of dividend changes is justified by actual future changes in performance. Finally it is noted that cross sectional differences among firms can make the dividend signal difficult to understand. Such variation, however, are sometimes utilised to disentangle the effects of signalling from agency related effects such as the over-investment theory. It is evidence on the effects of the latter on dividend policy that is discussed next.

2.3.4 Empirical studies of the agency theory of dividends

2.3.4.1 From theory to empirics

Agency theory predicts that managers abuse their position as agents of the firm to appropriate benefits to themselves. A number of studies have investigated the validity of this assumption. Opler, Pinkowitz, Stulz and Williamson (1999) show that managers tend to accumulate excess cash when they have the opportunity to do so. However, they also find that firms with excess cash do not use it to over-invest as predicted by agency theory. There is also no evidence of reluctance by managers to return cash to shareholders in the form of dividends when investment opportunities are low.

Similar conclusions are also reported in Long, Malitz and Sefcik (1994) who investigate the validity of the agency cost of debt. In particular, the study investigates the under investment problem, which predicts that firms will increase dividends following the issuance of debt as a means of expropriating wealth from debt holders to equity holders. However, Long, Malitz and Sefcik (1994) find no evidence to support the view that firms act in a manner consistent with the wealth expropriation hypothesis. It is therefore concluded that reputation has greater value to the firm and its management than the value of the benefits to be obtained by a one off wealth expropriation.

If reputation is important to managers and acting as predicted by agency theory can harm their reputation, then it may be in managers' interests to show that the firm is free of potential agency problems. One way for managers to create reputation, particularly in countries with poor protection for minority shareholders, is by paying dividends which signals decent treatment of minority shareholders. This idea is developed in La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000) who term it the substitute model of dividends. However, La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000) reject the substitute model in favour of what they term the outcome model of dividends. In the outcome model dividends are the outcome of effective pressure by minority shareholders and therefore higher payout ratios tend to be observed in countries with good protection for minority shareholders.

Whether the motivation to pay dividends is due to the need by insiders to create reputation for good treatment of minority shareholders, or is the outcome of pressure by minority shareholders, dividends derive their value from reducing agency problems. Dividends can reduce agency problems by reducing the free cash flows (Jensen, 1986) or by forcing the firm to the capital market thus inducing capital market monitoring of the firm and its management (Easterbrook, 1984). Rozeff (1982) incorporates the agency-related value of dividends into a model, which he calls the cost minimisation model and which allows for empirical testing of the agency theory of dividends.

There are, however, other ways to control agency costs which may be less costly than the dividend device. For example, growing firms are likely to resort to external financing on a regular basis, and thus subject themselves to external monitoring even without using dividends. Similarly Jensen (1986) proposes that agency costs may be controlled by debt. Other alternatives to dividends in controlling agency costs include managerial ownership and management compensation schemes that are designed to align the interests of managers and outside shareholders. Indeed, Fama and French (2001) propose that the declining trends in dividends by US firms may be due to growing use of stock options by managers, which lower the benefits of dividends in controlling agency costs. Thus the availability and cost of non-dividend monitoring mechanisms may impact the degree to which the dividend device is used and thus the validity of the cost minimisation model.

In light of the above discussion, the following selective review of empirical studies of the agency theory of dividends is dividend into two sub sections. The first sub section describes some studies of the cost minimisation model. The second sub section is devoted to some of the studies that seek to assess the degree of substitutability amongst the various methods by which firms can control agency costs.

2.3.4.2 The cost minimisation model[44]

Rozeff (1982) introduces the cost minimisation model according to which the optimal

[44] The studies reviewed in this sub section are summarised in Table 2.8.

dividend payout is at the level that minimises the sum of transaction costs and agency costs. Transaction costs are incurred when external finance is raised, which may be necessary when internal funds are paid out as dividends. Agency costs are the costs associated with the agency problem. These costs can be reduced by the payment of dividends as suggested by Easterbrook (1984).

Rozeff (1982) tests the cost minimisation model using Ordinary Least Squares cross sectional regression and 1000 US firms with data relating to 1981. Transactions costs faced by the firm are measured by past and forecasted growth rates in revenues and by the firm's beta, which represents risk. An agency cost variable is taken as the natural logarithm of the number of outside shareholders, which measures ownership dispersion. It is expected to be positively related to the payout ratio because the more dispersed is the ownership structure, the more difficult monitoring becomes. An inverse agency cost variables is the fraction of the firm owned by insiders. It is expected to be negatively related to the payout ratio, because by increasing their holdings in the firm, managers align their interests with that of outside investors. Rozeff (1982) shows the estimated coefficients on the five explanatory variables to be significant and to bear the signs predicted by the cost minimisation model.

Innovations on the Rozeff's (1982) model can basically be split into three types, including adding new variables, improving the empirical technique or focusing on particular types of firms. Llyod, Jahera and Page (1985) innovate by adding a new variable, namely firm size, and by refining the empirical approach. The empirical approach follows Rozeff (1982) by employing the Ordinary Least Squares method and data on 957 US firms for 1984. However, innovation comes in an attempt to reduce correlation between the explanatory variables by regressing the agency variables on the size variable, and using the residuals obtained in place of the original agency variables. Results indicate that after multicollinearity is properly controlled for, the cost minimisation model is still valid. All the explanatory variables appear important and enter the model with the expected signs. Further, the study concludes that size is also an important explanatory variable.

Schooley and Barney (1994) also innovate on the Rozeff's (1982) model by adding a new variable, namely the squared of insider holding, and by attempting to improve the technique. In particular they relax the linearity assumption with regard insider holdings and assess whether the relationship between this variable and the optimal payout ratio may be more complex than originally assumed. Rozeff (1982) suggests that the optimal payout ratio should decline monotonically with rises in insider ownership. As insider ownership increases, insiders' interests are more aligned with that of shareholders, hence agency costs are reduced and the need for the dividend tool to control these costs is lessened. Schooley and Barney (1994) suggest that at low level of ownership the relationship between dividends and insider ownership is as predicted by Rozeff (1982). However, when the level of insider ownership reaches a certain level, further increases cause agency costs to start rising and the need for the dividend control tool becomes necessary. This occurs due to two reasons. First, when high proportion of their wealth is invested in the firm, insiders become less diversified. They then tend to evaluate projects based on total risk and may reject projects even when these are justified based on systematic risk. Second, when insiders hold substantial percentage of voting rights they achieve a sufficient level of control that diminishes their risk of being replaced. The results of the Ordinary Least Squares regression, using 1980 data of 235 industrial US firms provide support for the cost minimisation model. Further, the relationship between insider ownership and the firm's dividend policy appears to confirm to expectation[45].

Moh'd, Perry and Rimbey (1995) innovate on the cost minimisation model by adding a number of new variables, and by using Weighted Least Square methodology and panel data for 341 US firms over 18 years from 1972 to 1989. The aim is to test whether variation in payout ratios across time can be explained by changes in the agency cost/transaction cost structure. To capture the dynamics in the dividend process, variables are not aggregated and the previous period's dividend payout ratio is added to the RHS of the model. The study also decomposes beta, the systematic risk, into its components to assess more directly the separate effects of financial leverage, operating

[45] Schooley and Barney (1994) propose another innovation to improve Rozeff (1982) model. They replace the payout ratio as the dependent variable in the cost minimisation model, with the dividend yield. It is suggested that this modification ensures that the denominator of the dependent variable is a market measure (share price), rather than an accounting measure (net income). Further, replacing the payout ratio with the dividend yield avoids the problems of negative or very high dependent variables when the firm net income is negative or zero.

leverage and the intrinsic business risk. Further, institutional ownership is added as an explanatory variable. According to agency theory, the presence of institutional investors should reduce payout ratios due to their role in monitoring managers' activities as suggested in Shleifer and Vishny (1986). However, if investors consider taxes on dividends and on capital gains, then the presence of institutional ownership should increase the firm's payout ratio as suggested in Redding (1997). Indeed, results with respect to institutional holdings indicate support for the tax hypothesis of dividends. The study also provides supports for the dynamic nature of the dividend process according to which firms adjust their dividend each year, as new information becomes available.

Holder, Langrehr and Hexter (1998) add two new variables to the cost minimisation model. Free cash flow is added as an agency proxy and the firm's focus is added to test stakeholder theory. Stakeholder theory proposes that non-investors that have implicit contracts with the firm, such as employees, customers, suppliers and others, also influence the firm's decisions including its dividend policy decisions. Particularly, dividend policy can create value because by reducing its payout ratio, the firm signals to implicit claimants an increase in its ability to meet implicit claims. Using panel data for 477 US firms each with eight years of observations from 1983 to 1990, the study provides support for both the agency model and stakeholder theory.

All the innovations to Rozeff (1982) reviewed above focused on adding new variables to variants of the cost minimisation model. In contrast the innovation in Hansen, Kumar and Shome (1994) is with respect to the type of firms for which the model is applied, namely the regulated electric utility industry. It is proposed that the agency theory of dividend should fit particularly well to the behaviour of regulated firms for two main reasons. First, agency conflicts in regulated firms are predicted to be particularly severe as they include conflicts between shareholders and regulators. However, by paying dividends the regulated firm exposes its managers and its regulators to capital market monitoring, which in turn contributes to reducing agency costs. Second, it is proposed that the costs associated with dividend-induced capital monitoring are lower for utilities because direct flotation costs of issuing new equity can be passed on, at least in part, to ratepayers. The study begins by comparing the mean payout ratios of utilities and S&P400 industrial firms over the period 1981-1985 and over the period 1986-1990. Results are consistent with the prediction that utilities have higher payout rates as in both periods the averages payout ratio of utilities are significantly greater than that of non-regulated firms. Further, results of cross sectional Ordinary Least Squares regressions offer support for the monitoring rationale for dividends in the case of regulated firms. Indeed, it is concluded that the monitoring rationale for dividends could be the answer to the puzzle of why firms often issue new equity while at the same time paying large dividends.

The innovation in Hansen, Kumar and Shome (1994) of applying the cost minimisation model to a particular type of firms, is also the approach in Rao and White (1994). However, while the former study applies the model to firms for which the monitoring rationale for dividend is predicted to be particularly suited, the latter study applies the model to the opposite type of firms. Thus, Rao and White (1994) apply the cost minimisation model to private firms for which the monitoring rationale for dividend is predicted to be particularly unsuitable. Indeed, it is noted that the motivation to use dividend as an agency-cost controlling device may be less important for private firms due to less agency problems. Moreover, as private firms do not participate in the capital market, the rationale for dividends as inducing further equity issues leading to capital market monitoring also loses some of its momentum.

Another innovation in Hansen, Kumar and Shome (1994) is that they incorporate taxes into the model, as it is argued that tax savings considerations may contribute to private firms' preference for low payout policies. This is explained as follows. Owners/managers of private firms receive returns in the form of either salary, which is a tax deductible business expense, or dividends. There is therefore incentive to minimise the dividends and to increase the salary component. Although limits are imposed on the amount of salary that can be paid, owners may still have incentive to minimise dividends due to tax differentials between dividends and capital gains. However, it is noted that if the Internal Revenue Service suspects that a firm is retaining its earnings for the purpose of avoiding taxes, it may take steps to impose Accumulated Earnings Tax on that firm. Thus AET is added to the model to proxy for the tax cost of not paying dividends.

The third innovation in Rao and White (1994) is the empirical technique, which is the limited dependent variable regression as opposed to Ordinary Least Squares. The rationale for this is as follows. The sample includes 66 private US firms that had been challenged in court by the Internal Revenue Service for Accumulated Earnings Tax liability between 1928 and 1988. However, as the Internal Revenue Service is unlikely to challenge firms with high payout ratios, the sample excludes firms with payout ratios greater than some high latent level. This implies that the dependent variable of the firms included in the sample is not normally distributed but truncated from above, and Ordinary Least Squares method is inappropriate.

Results in Rao and White (1994) show that the agency cost variables, namely the fraction of shares held by insiders, and the dispersion of ownership as reflected in the number of shareholders, influence the payout ratio in the manner predicted. This suggests that the agency cost argument for dividends appears applicable even for private firms that do not participate in the capital market. It is suggested that by paying dividends private firms can still induce monitoring by bankers, accountants and tax authorities. The proxy for the Accumulated Earnings Tax cost is also found to be important and to enter the model with the predicted sign. This suggests that tax cost considerations influence the dividend decisions of private firms. Thus firms that are likely to be challenged and charged by the Internal Revenue Service for Accumulated Earnings Tax, reduce the probability of facing such costs by increasing their payouts.

Rao and White (1994) demonstrate the relevance of agency considerations to dividend decisions not merely in the most likely cases as shown in Hansen, Kumar and Shome (1994) for regulated firms, but rather in the least likely cases such as private firms. Hansen, Kumar and Shome (1994) contribute to the discussion by emphasising the use of dividend to control conflicts beyond shareholders and managers, such as conflicts with regulators. In the same trend, Holder, Langrehr and Hexter (1998) discuss how dividend can be used to control conflicts relating to non-investor stakeholders in the firm. The complexity of agency behaviour, and in particular how insider holdings influences agency costs, is emphasised in Schooley and Barney (1994), while Moh'd, Perry and Rimbey (1995) address the dynamic nature of the agency/transaction cost structure. The latter study also illustrates the importance of tax considerations in determining the payout ratio of firms as reflected in the positive and significant impact of institutional investors on payout levels. The importance of incorporating tax into the model is also picked-up in Rao and White (1994), while the importance of firm size is shown in Holder, Langrehr and Hexter (1998), Moh'd, Perry and Rimbey (1995), and Llyod, Jahera and Page (1985).

One thread, however, common to all the above-mentioned studies is that they provide support for the monitoring rationale of dividend and for Rozeff's (1982) cost minimisation model. However, as predicted by tax and transaction cost theories, and indeed as incorporated in the cost minimisation model, using the dividend monitoring device is not costless. It has therefore been suggested by a number of studies, that the extent to which the dividend-monitoring device is used to control agency cost should display sensitivity to the availability of alternative mechanisms. Some of the empirical work in this area is reviewed in the next sub section.

2.3.4.3 The partiality of the monitoring rationale for dividends (or substitutability among dividend and non-dividend mechanisms for controlling agency costs)[46]

Easterbrook (1984) points to two important implications of the monitoring rationale for dividends. First, it is noted that dividends must influence the firm's financing policies, if the reason that they are paid is to drive the firm to the capital market. Second, as the dividend-monitoring device is costly, the presence of alternative mechanisms that limit agency problems, or conditions that force the firm to the capital market, should reduce the use of the dividend device[47]. The implications of these two points are that the dividend rationale is applicable only in some cases. Further, in these cases, the dividend and capital structure decisions are endogenous variables and should be modelled as a pair of simultaneous equations in a signal model.

Noronha, Shome and Morgan (1996) test whether the presence of growth-induced monitoring or other non-dividend devices that limit agency problems, lessen the monitoring role of dividends and the simultaneity of dividend and capital structure decisions. For that purpose a sample of 341 US industrial firms is stratified according to the presence of growth opportunities as measured by Tobin's Q. A firm with Tobin's Q

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[46] The studies reviewed in this sub section are summarised in Table 2.9.

[47] Indeed Hansen, Kumar and Shome (1994) illustrate the validity of this point by studying the time trend in the payout ratios of their sample of utility firms. They find that while the average asset growth rate declined significantly from 7.88% in 1985 to 6.47% in 1990, the mean payout ratio has increased significantly from 69.16% in 1985 to 76.43% in 1990. Thus when conditions of growth force firms to the capital market, the use of the dividend device to achieve the same results is reduced.

value above the sample average is classified as high on growth opportunities. The sample is then further stratified according to the presence of alternative non-dividend monitoring mechanisms. A firm is classified as possessing alternative non-dividend monitoring mechanism if it satisfies two conditions. First, the firm has to have an above average incentive component in its managerial compensation package, which serves to align managers-shareholder interests. Second, the firm has to have a single large outside shareholder holding at least 5% of the firm's equity, because a large outside shareholder serves as an external monitor and a potential take-over threat.[48]

The stratification procedure, in Noronha, Shome and Morgan (1996), results in two sub-samples. Sample A consists of 131 firms with high alternative control mechanisms and/or growth-induced capital market monitoring. Sample B consists of 210 firms with low alternative control mechanisms and low growth opportunities. The sample data is pooled from the period 1986 to 1988 following a Chow test that fails to reject the null of stability. The monitoring rationale for dividends is tested by an Ordinary Least Squares regression of a variant of the cost minimisation model, where firm size is taken as a proxy for transaction costs. Results for group A are weak, as none of the agency cost/transaction cost structure variables are insignificant. In contrast,

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[48] Noronha, Shome and Morgan, (1996) measure Tobin's Q as the market to book ratio which is defined as the market value of equity plus book value of long-term debt and preferred stock all divide by the book value of total assets. The incentive component in the managerial compensation package is measured as total compensation to the firm's top executives less the salary component, expressed as a ratio of total compensation.

results for group B support the cost minimisation model as the coefficients on all the variables bear the expected signs, and all but the coefficient on firm size, are significant.

In the second part of the study, Noronha, Shome and Morgan (1996) test for simultaneity between dividend and capital structure decisions. It is predicted that simultaneity should be evident only in cases where the dividend monitoring rationale applies. Indeed, results of a Three Stage Least Squares tests show no evidence of simultaneity of dividend and capital structure decisions for group A. The equity ratio explanatory variable in the payout equation, and the payout variable in the equity ratio equation are both not significant. In contrast, for group B both, the equity ratio variable in the payout equation and the payout variable in the equity ratio equation are negative and significant. These results as well as the results from testing the validity of the cost minimisation model, support the partial explanation of the monitoring rationale for dividends.

More support for the partial explanation of the monitoring rationale for dividends is provided by Johnson (1995), who studies 129 straight debt offerings by NYSE/AMEX industrial firms between 1977 and 1983. However, while in Noronha, Shome and Morgan (1996) alternative agency cost controlling devices include growth opportunities, management incentive schemes and a large outside shareholder, in Johnson (1995) it is debt. In particular it is shown that dividends and debt are alternative devices to reduce the agency problem associated with free cash flow (Jensen, 1986). This is because both debt and dividend signal a commitment to pay out cash and both may increase visits to the capital market thus inducing capital market monitoring of management's actions. Indeed, the study finds the average two-day excess return around the debt issue announcement day is positive and significantly different from zero for low payout firms (0.78 percent). This is interpreted as implying that the issue is indicative of reduced agency problems. However, for high payout firms, the average excess return on the debt issue announcement is insignificantly different from zero (-0.18 percent).

Johnson (1995) further utilises a Weighted Least Squares methodology to regress the two-day excess return around the debt issue announcement day on a payout variable. The results from this procedure also support the notion that dividends and debt are alternative mechanisms for controlling agency problems. Particularly, the intercept is positive and significant suggesting that the price reaction to debt issue announcement is generally positive. However, the coefficient on the payout variable is negative and significant suggesting that the reaction to the debt issue announcement is weaker for dividends paying firms. These effects are stronger when the regression is run on a sub sample of 64 low growth firms but weaker when run on a sub sample of 65 high growth firms. This is consistent with the view that the potential for wasting free cash flow is greater when profitable investment opportunities are low. Thus Johnson (1995) provides further support for the conclusions in Noronha, Shome and Morgan (1996) regarding the substitutability of growth opportunities and dividend as agency costs controlling devices[49].

Johnson (1995) illustrates the importance of debt as an alternative to dividends in controlling agency costs. Crutchley and Hansen (1989) make the same point and suggest that leverage can achieve these results because debt finance reduces equity financing and hence manager-shareholder conflicts. Crutchley and Hansen (1989) further note that manager-shareholder conflicts may also be reduced by increasing insider holdings. However, the crucial point in the study is the realisation that each of the three agency control devices, namely managerial ownership, leverage and dividends, is costly. For example, while increasing management's ownership helps to align manger-shareholder interests, it also increases the proportion of the manager's total personal wealth, which is invested in the firm. As the manager suffers increasing lack of diversification, she will be more risk averse even when this is not in line with shareholder interests.

To test the agency theory of managerial ownership, leverage and dividends, Crutchley and Hansen (1989) use 603, US industrial firms for the period 1981 to 1985, and Ordinary Least Squares analysis. Particularly, each of the three policy decisions is

[49] Another important point made in Johnson (1995) relates to distinguishing between the two possible ways by which both debt and dividends can control agency costs. Easterbrook (1984) suggests that the issuance of debt in a series ensures that refinancing is continuous and thus debt, just like dividends, induce capital market monitoring, which is a solution to the free rider problem. However, Johnson (1995) finds no significant relationship between the frequency of visits to the capital markets and the price reaction to debt issue announcements. It is thus concluded that the other method by which debt and dividend can reduce agency costs, namely the commitment to pay out cash and thus reducing the discretionary resources under management's control, dominates the Easterbrook's (1984) explanation, at least in the case of debt.

regressed on five firm's characteristics that are hypothesised to influence the levels of the costs associated with each policy. These explanatory variables include firm diversification, earnings volatility, flotation costs, advertising and R&D expenditure, and firm size. The results support the notion that managers employ a mix of policies including leverage policy, dividend policy and managerial ownership incentives in an effort to control for agency costs in the most efficient manner. The precise combination of policies varies across firms and is determined by firm's characteristics.

First Crutchley and Hansen (1989) find that managers of diversified firms bear relatively lower costs in increasing the percentage of their wealth invested in the firm's equity. Thus diversified firms tend to use more of the managerial ownership device and less of the debt and dividend devices to control agency costs. Second firms with volatile earnings face higher bankruptcy risk thus managers reduce leverage and increase dependency on managerial ownership and dividends. Third firms with volatile stock expect to pay higher underwriting fees when issuing new equity thus they tend to increase the use of managerial ownership and leverage, but avoid using dividends. Forth, firms with high R&D expenditure have more freedom to engage in wealth expropriation from both debt and share holders, thus these firms tend to use less debt and dividends and more managerial ownership. Fifth, large firms face lower bankruptcy costs and lower flotation costs on the issue of new equity, while managers of these firms find it more expensive in terms of diversification costs to increase their percentage holdings. Thus large firms tend to rely more on the debt and dividend policy devices and less on managerial ownership.

Similar to Crutchley and Hansen (1989), Agrawal and Jayaraman (1994) also investigate the substitutability between leverage, dividends and management ownership in controlling agency costs. The study utilises 71 industry-size matched pairs of all-equity and levered firms for the year 1981, and an Ordinary Least Squares regression analysis. Specifically, proxies for dividend policy are regressed on leverage, managerial ownership, an interaction term, and on two control variables including free cash flow and growth. Results show the coefficient on the leverage dummy, to be negative and significant, which is consistent with the prediction that all-equity firms follow a policy of higher payout ratios than levered firms. Similarly, consistent with the prediction that firms with lower insider ownership adopt higher payout ratios, the coefficient on this variable is reported as negative and significant. This negative correlation between dividends and insider ownership is stronger in all-equity firms as observed by the positive and significant coefficient on the interaction term between leverage and insider ownership.

Bathala and Rao (1995) introduce Board composition as a possible agency-cost-controlling device. They investigate the interrelation between Board composition, insider ownership, dividends and leverage as alternative mechanisms for reducing manager-shareholder conflicts. It is argued that outside directors on the Board can reduce conflicts due to their independence and due to the need to maintain reputation in the market for their services. To test this, 261 non-regulated, US firms are used in a cross sectional Ordinary Least Squares regression of a measure of Board composition on alternative agency-cost control devices and on a set of control variables. The results from this procedure show that the alternative agency-cost control devices, including insider holdings, dividends and leverage, have a negative and significant impact on the fraction of outside directors on the Board. These findings are consistent with the notion of firms relying on a mix of alternative mechanisms, including Board composition, to control agency conflicts.

Bathala and Rao (1995) note that alternative mechanisms may control different aspects of agency conflicts and that each mechanism may have other, non-agency-related benefits, associated with its use. Empirical work appears to confirm the presence of substitutability amongst various mechanisms including dividends, leverage, managerial ownership and incentive schemes, the presence of a large shareholder, growth, and outside directors on the Board. In the face of these many alternatives, the agency related value of dividends is still unclear.

2.3.4.4 Conclusions from the empirical studies on the agency theory of dividend

The agency theory of asserts that dividends reduce agency costs by either forcing the firm to the capital market thus solving the collective monitoring problem, or by reducing the free cash at the discretion of management. The cost minimisation model as designed by Rozeff (1982) encapsulates this idea and shows that there is an optimal payout level that minimises the transactions-agency costs structure. Table 2.8 summarises the key points from Rozeff (1982) and subsequent studies of the cost minimisation model. The results appear to support Easterbrook's (1984) proposition that dividends have agency related value.

However, even if dividends may contribute to reducing agency costs, rather than merely signalling internal information, which will be revealed in the longer-term whether or not dividends are paid, the value of the dividend contribution is still unclear. The reason for the ambiguity is the availability of a wide range of alternative non-dividend mechanisms to reduce agency costs. Some researchers have sought to shed light on the degree substitutability amongst the various agency controlling devices, and some of the relevant studies that are reviewed in this chapter are summarised in Table 2.9. Indeed, all of the studies in Table 2.9 support the partiality of the agency-costs controlling rationale for dividends. Thus the agency theory of dividends, like the signalling and tax hypotheses, does not provide a conclusive explanation for the dividend puzzle.

2.4 Conclusions and promising research ideas

The empirical literature has recorded systematic variations in dividend behaviour across firms, countries and time, as well as in the type of dividend paid. Such systematic variations are inconsistent with Miller and Modigliani's (1961) irrelevancy theory, but can be expected in imperfect markets. Indeed, once the assumptions underling the irrelevancy theory are relaxed, it may be unreasonable to expect that dividends will have no effect on expected earnings, investment decisions or on the firm's risk. If dividend policy influences any of these factors, then it is also likely to affect value. Precisely how dividend policy affects value, in the presence of market imperfections, is the subject of various dividend theories, which together form the dividend controversy.

The aim of this chapter was to take stock of the generic theories that have evolved under market imperfections such as transaction costs, taxes, information asymmetries and agency conflicts. It was also intended to review the main empirical methodologies and evidence collected so far, in an endeavour of clarifying where the dividend controversy stands today, after four decades of debate.

The generic dividend theories introduced in Section 2.2 include the transaction costs theory, the tax hypothesis, the bird in the hand argument, and the signalling and agency theories. The transaction cost theory of dividends is based on transaction costs and control considerations that are associated with paying dividends and then resorting to external finance to fund investments. Also incorporated under this theory are pecking order considerations, which are based on information asymmetries and which become relevant if dividends are paid and external finance raised. Thus, the transaction cost theory of dividends basically suggests that firms should utilise retained earnings to the extent possible before paying out dividends.

The tax hypothesis proposes that government distortions by way of taxes have important implications for dividend policy and firm value. Thus the tax hypothesis generally states that due to differences between taxes on dividends and on capital gains, generous dividends reduce wealth. Accordingly, the share prices of firms that adopt high payout policies will reflect this tax disadvantage. The underlying assumption here is that all investors are taxed the same and that dividend income is taxed more heavily than capital gains. Alternatively, if there exist tax-based clienteles for low and high dividend policies, or if transaction costs are not too high as to prohibit active trading, then tax effects on prices should disappear.

The bird in the hand argument is the traditional rationale for generous dividends, and is based on the idea that dividends reduce risk because they bring shareholders' cash inflows forward. This argument, however, is commonly repudiated by the assertion that the risk of the firm comes from the investments in which it is involved, not from how the proceeds from these investments are distributed. A more credible argument in favour of dividends is the signalling theory, which is based on information asymmetries between managers and outside shareholders. Thus according to the signalling theory, unexpected dividend changes convey valuable information to market participants that relate to managers' expectations regarding the prospects of the firm.

The last dividend theory discussed in Section 2.2 is the agency theory of dividends which, like the signalling theory, proposes that dividends are value enhancing. However, while the signalling theory is based on the assumption that managers always act in the interests of existing shareholders, the agency theory relaxes this assumption and allows for agency conflicts. The agency theory of dividends is different from the signalling theory in another crucial respect. Particularly, according to the signalling theory dividends have no value in themselves, but their value is derived from the information they contain about the firm's fundamentals. In contrast, the agency theory of dividends states that the payment of dividends is in itself valuable because it controls agency costs in two ways. First, the payment of dividends reduces the free cash flows under managers' discretion. Second, the payment of dividends forces the firm to the capital market inducing external monitoring of the firm and its management, which is valuable due the free rider problem of collective monitoring.

The discussion on the theoretical themes that have developed to explain the dividend puzzle was followed by a review in Section 2.3 of some of the relevant empirical methodologies and evidence. Event studies around ex-dividend days are typically used to investigate tax clientele effects. Similarly, the market reaction to the dividend signal is often investigated by event studies around dividend announcement dates, while other methodologies include comparison and regression analyses. However, one unique approach to understanding dividend policy, whose findings have been central to the dividend debate is the Lintner's (1956) survey of US managers. The main conclusions from this study are that managers concern themselves primarily with the stability of dividends, believing that the market reacts favourably to dividend increases and unfavourably to decreases. Furthermore, the level of earnings is the most important determinant of the dividend level, and the dividend decision is taken before other decisions such as investment decisions, which are then adjusted.

Lintner's (1956) study is consistent with the signalling rationale for dividends. However, evidence from empirical studies of the signalling hypothesis is mixed. In general it appears that the market reacts strongly to unexpected dividend changes, and that the reaction is typically in the same direction as the dividend change. However, evidence is weaker on actual changes in performance that follow the dividend change announcement. Similarly no consensus has been achieved on the effects of taxes, particularly on whether taxes have permanent or only temporary impact on prices, although the general conclusion is that taxes enter the dividend decision. The transaction/agency costs structure faced by the firm appears important in determining its dividend policy. However, there is also evidence of substitutability amongst dividends and other agency cost control devices such as leverage, managerial ownership, incentive schemes, investment opportunities and others. Thus the general conclusion is that after four decades of debate, the jury is still out on the dividend puzzle.

For this matter, further research is required to sustain the spotlight on the dividend puzzle. In particular, there are four promising research ideas (PRIs), which derive directly from the theoretical and empirical literature surveyed in this chapter. The first PRI relates to the role of agency theory in explaining dividend policy for firms operating in emerging markets, where imperfections are the norm rather than the exception. In these markets agency conflicts and information problems can be expected to loom strong and the finance gap to be particularly wide. Thus models that incorporate these factors, such as the cost minimisation model reviewed in Section 2.3.4.2, should describe well the target payout process of firms in emerging markets.

The second PRI is inspired by developments in areas of corporate governance, and therefore seeks to attain a synergy between corporate governance and the dividend policy puzzle. It may be that the failure to unravel the dividend puzzle has been amplified by failure to recognise interaction of the dividend policy practice with other business features. One idea is to bring together the literature on business groups and firm ownership in order to understand dividend policy, especially in the case of emerging markets.

The third PRI recognises that different theories may have the same practical implications thus making difficult the task of distinguishing amongst them. For instance, both agency theory and signalling theories predict a positive reaction to dividend increases and negative reaction to decreases. One possible method of distinguishing between these theories is by exploiting institutional differences across countries, as in Dewenter, and Warther (1998) with respect to the US and Japan. Furthermore, cross-country comparisons can also assist in establishing fine distinctions between various under-themes within major theories. For example, La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000) use cross-country comparisons to distinguish between two competing agency models of dividends, namely the outcome and substitute models.

Finally, the forth PRI is to use a system of equations instead of the single equation model of dividends. This idea is discussed in Prasad Green and Murinde (2001), and acknowledges the possibility that policy choices may be simultaneously determined. An example is Jensen, Solberg and Zorn (1992), where insider ownership, debt and dividend policies are modelled as a simultaneous equations system.

While the current study attempts to implement the first two PRIs, the latter two are left for future studies. Specifically, the cost minimisation model is applied to emerging market's firms in chapter 3, while business group theory is incorporated into a dividend model in chapter 5. However, cross-country comparisons and multi-equation models are beyond the scope of this study.

Appendix 2A: Survey tables

Table 2.1 Selected empirical studies of the Partial Adjustment Model

Study	Aim	Methodology (Data and model) and results	Conclusions
Lintner (1956)	To assess the process by which dividends are determined through interviews with managers of US firms	**Data:** US, 28 industrial firms selected to ensure a wide range of circumstances under which managers operate, 1947-1953 **Methodology**: ▪ Survey – interviews with managers to learn of the dividend policy of their firms over the previous seven years ▪ Constructing a model that describes the dividend change behaviour. ▪ Testing the model in predicting post-war dividend of all American corporations **Model:** Change in dividend = α + (speed of adjustment coefficient) (target dividend – actual lagged dividend) Where target dividend is the target payout ratio applied to the current year's profits after taxes.	▪ Firms are primarily concerned with the stability of dividends. Managers prefer a gradual upward trend in dividends ▪ Earnings are the most important determinants of any change in dividends ▪ Dividend policy is set first and other policies are then adjusted ▪ The market reacts positively to dividend increase announcements and negatively to announcements of dividend decreases
Fama and Babiak (1968)	Testing the Lintner dividend model	**Data:** US, 392 major industrial firms over the period 1946 to 1964 **Methodology**: 1. Ordinary Least Squares time series of a number of specifications of the Lintner model for individual firms, assessing the statistical characteristics of the distribution of the estimated coefficients (using part of the sample to estimate the models and the other part to validate it) 2. Monte Carlo experiments – generating series for earnings, dividends and the error terms based on assumptions regarding the data generating process. Then using artificial samples to estimate the coefficients. The estimated coefficients are compared with the coefficients of the model actually used to generate the data. **Model:** The Lintner model	▪ Net income appears to explain the dividend change decision better than a cash flow measure. ▪ The Lintner model performs well relative to other models. However, deleting the constant and adding the lagged earnings variable leads to a slight improvement in the predictive power of the model.
Mookerjee (1992)	Apply the Lintner partial adjustment model and modifications of this model, to a developing country, India	**Data:** Annual data for the aggregate Indian corporate sector, 1950-1981 (all variables expressed in real termed by deflating by the consumer price index). **Methodology**: Ordinary Least Squares **Model:** *Δ(dividend) = $\alpha 0$ + $\alpha 1$ (Profit after tax) – $\alpha 2$ (Lagged profit after tax) – $\alpha 3$ (Lagged dividend) + $\alpha 4$ (Lagged external finance)* **Results:** ▪ *Δ(dividend) = -0.33 + 0.62 (Profit after tax) – 0.73 (Lagged dividend)* ▪ *Δ(dividend) = -1.04 + 0.28 (Profit after tax) – 0.79 (Lagged dividend) + 0.37 (Lagged external finance)* ▪ *Δ(dividend) = -0.99 + 0.32 (Profit after tax) – 0.09 (Lagged profit after tax) – 0.72 (Lagged dividend) + 0.36 (Lagged external finance)*	▪ The basic Lintner model is good in explaining the dividend behaviour in India. All variables are significant at conventional levels and the model explains 61% of variation. ▪ Adding external finance in previous period as explanatory variable improves the model. This is explained by access to subsidised borrowing which encourage firms to use borrowings to finance dividends. ▪ The constant is significant but enter with a negative sign, reflecting dividend tax disadvantage in India.

Source: Compiled by author from a selective review of the literature

Table 2.1 (concluded) Selected empirical studies of the Partial Adjustment Model

Study	Aim	Methodology (Data and model) and results	Conclusions
Lee (1996)	Test the hypothesis that dividend changes are determined by changes in permanent earnings. Show that the Lintner model performs better when the target dividend is a function of permanent as opposed to current earnings.	**Data:** US, annually, aggregated (real) data on the S&P Composite Index, 1871-1992 **Methodology**: ▪ Testing for cointegration between various definitions of earnings and dividends. ▪ Constructing a Bivariate Vector Autoregression (BVAR) of change in dividends and the spread between earnings, and dividends ▪ Testing nested models in the BVAR to assess whether permanent earnings, transitory earnings or current earnings, influence dividends. **Model:** ▪ Permanent earnings hypothesis: *Change in dividend =* $\alpha 1$ *(change in the permanent component of earnings)* ▪ Partial adjustment model: *Change in dividend = (speed of adjustment) X (target dividend – lagged dividend)* **Results:** ▪ Earnings and dividends are non-stationary but are cointegrated. ▪ Hence the Bivariate Moving Average Representation of the first difference in dividends and the spread between earnings and dividends in invertible and can be specified as a BVAR.	▪ Changes in dividends are influenced by permanent earnings, but not by transitory earnings. Therefore, the spread between dividends and earnings is influenced by transitory earnings but not by permanent earnings. ▪ The hypothesis that the target dividend in the partial adjustment model is a function of permanent earnings is not rejected while the hypothesis that the target dividend is a function of current earnings is rejected.
Shirvani and Wilbratte (1997)	Use cointegration analysis to check for existence of a long-term stable payout ratio. Use the error correction equations to assess the ratchet effect.	**Data:** US, quarterly, aggregated (real terms) data on the S&P500, 1948:1 to 1994:4 **Methodology**: Multivariate cointegration tests **Model:** Long-run model: *Error term =* $\theta 1$ *log of dividend –* $\theta 2$ *log of earnings +* $\theta 3$ *log of price level +* $\theta 4$ **Results:** Long-run model*: Error term = log of dividend – 1.045 log of earnings + 0.097 log of price level + 0.185* LR test of H0: $\theta 1 + \theta 2 = \theta 3 = 0$: $\chi^2_1 = 0.75$ with probability value of 0.30.	▪ Current earnings is the strongest proxy for ability to pay dividends ▪ The cointegration results suggest that firms pursue a long run payout ratio, consistent with the Lintner model. ▪ Short run ratchet effect – firms apply different adjustment methods to raising and lowering payout ratios. This is due to signalling effects.
Dewenter and Warther (1998)	Compare the responsiveness of the dividends of US and Japanese firms to earnings changes	**Data:** 313 US firms and 180 Japanese companies with at least 5 years of nonzero dividend and earnings data. 1982-1993 **Methodology**: Run the Lintner model without the intercept term for each firm and obtain the median speed of adjustment coefficient for the samples of US firms and Japanese firms. Also split the Japanese sample according to keiretsu membership and compare the median speed of adjustment across these sub-samples. **Model:** Lintner model without the constant **Results:** The median speed of adjustment estimates are 0.055 for all US firms, 0.094 for all Japanese firms, and 0.117, 0.082, and 0.021 for keiretsu, hybrid, and independent firms, respectively.	▪ The dividends of Japanese keiretsu firms are more responsive to earnings changes than those of both US firms and Japanese independent firms. ▪ Thus US dividends are smoother than Japanese dividends and this is due to the observation that Japanese firms and keiretsu firms in particular, face less information asymmetry and fewer agency conflicts than US firms
Hines (1996)	Look at possible determinants of payout rates by exploring the connection between payout ratios and the share of firms' profits from overseas sources	**Data:** US, 505 firms for the period 1984-1989 and aggregate US data covering the time period 1950 to 1986 **Methodology**: ▪ Ordinary least squares regression using cross sectional firm-level data for each of the years 1984 to 1989 ▪ Ordinary least squares regression using time series on aggregate data **Model:** *Dividend payout = [after tax domestic profits +* η *(after tax foreign profits)]* α **Results:** Firm-level for year 1986: *Dividend payout = 0.2353 after tax domestic profits + 0.7290 after tax foreign profits*	▪ Different payout ratios are applied to domestic and foreign profits - US corporations pay dividends out of their foreign profits at about three times the rate that they do out of their domestic profits. ▪ This may be due to the signalling function of dividends if foreign profits are particularly difficult for investors to verify.

Source: Compiled by author from a selective review of the literature

Table 2.2 Selected empirical studies of the tax hypothesis of dividends

Study	Aim	Methodology (Data and model) and results	Conclusions
Gentry (1994)	Testing the tax hypothesis by comparing the dividend policies of Publicly Traded Partnerships that are not subject to the US double taxation system with the dividend policies of corporations.	**Data:** US, 65 Publicly Traded Partnerships (PTP) and corporations in the oil and gas exploration industry, for the years 1987 and 1988 **Methodology**: Cross sectional IV regression technique where the PTP dummy variable is replaced by the fitted probabilities from a Probit model. **Model:** *Payout =* α *-* β*1 debt ratio +* β*2 PTP dummy -* β*3 growth rate +* β*4 profit* **Results:** ▪ 1987: *Payout = 0.0179 – 0.215 debt ratio + 0.747* PTP dummy + 0.261 growth rate + 0.495 profit* ▪ 1988: *Payout = 0.133 – 0.210 debt ratio + 0.425* PTP dummy + 0.181 growth rate + 0.262 profit*	▪ Controlling for other factors, PTP tend to pay more dividends compared with similar corporations – For both the years 1987 and 1988, the PTP dummy enters the dividend model with a positive estimated coefficient that is significant at the 5 percent level. ▪ The results are consistent with the tax hypothesis because PTP face lower tax costs on dividend payments
Lasfer (1996)	Testing the tax hypothesis by assessing the sensitivity of firms' dividend decisions to tax costs at both the corporate and personal levels.	**Data:** UK, 108 non-financial firms quoted on the LSE for the period 1973-1983 **Methodology**: Panel data, generalised least squares method **Model:** *Desired payout = (target payout) EPS -* β*1 dummy indicating ACT irrecoverable +* β*2 inverse for personal income tax rate* **Results:** Dividend level = -0.011 + 0.034 EPS + 0.831 lagged dividend – 0.002 ACT irrecoverable + 0.015 *inverse for personal income tax rate*	▪ Results show that both the personal tax proxy and the corporate tax exhaustion variable exert significant impact on the level of dividend payment. ▪ Both the personal and corporate tax variables enter the model with signs that are consistent with tax hypothesis
Papaioannou and Savarese (1994)	Testing the importance of taxes by studying the effect of the Tax Reform Act 1986 (TRA) on firms' dividend policies	**Data:** US, 236 industrial firms and 40 utility firms with quarterly data, 3^{rd} quarter of 1983 to 1^{st} quarter of 1991 **Methodology**: Regression analysis of a modified Lintner model to test for structural shifts in target payout ratio. The model is applied to: aggregate data (for industrial firms only); industry-specific data (including the utility industry); and individual firm data **Model:** *Current quarter dividend =* α *+* β*1 lagged dividend +*β*2 current quarter earnings +*β*3 (post TRA dummy X current quarter earnings)* ▪ Where β1=1-the adjustment factor; β2=the adjustment factor X the target payout ratio; β3=the adjustment factor X the incremental change in the target payout ratio as a result of the TRA.	Some support for the prediction that the lowering of the ordinary income tax rates and the elimination of the preferential tax treatment of capital gains were associated with increases in the corporate dividend payout ratios. For instance, β3 for 21.2% of the specific regressions (50 out of 236 industrial firms) is positive and significant at the 10% level
Hubbard, and Michaely (1997)	Testing the impact of the tax disadvantage of dividend on share valuation by looking at changes in relative prices following the TRA 1986	**Data:** US, Citizen Utilities Company (CU). Using average daily prices and dividend for the period 1973-1993. **Methodology**: ▪ Tracing the behaviour of the average Dividend –Adjusted-Relative-Price (DARP) of CU's stock dividend shares (class A) and cash dividend shares (class B). DARP = $(P_A/P_B) / (D_A/D_B)$ ▪ In particular the DARP is compared over the three sub-periods around the TRA: pre-TRA (1982-1984), TRA implementation period (1985-1986)and post-TRA (1987-1989). **Results for the sub-period analysis:** ▪ Dividend-Adjusted Relative Price for pre-TRA period (1982-1984) = 1.01 ▪ Dividend-Adjusted Relative Price for implementation period (1985-1986) = 0.91 ▪ Dividend-Adjusted Relative Price for post implementation period (1987-1989) = 1.01	Inconsistent with the tax hypothesis: ▪ Although the relative price of class B increases during the TRA implementation period, this effect is only temporary. ▪ The prices of the two classes of shares are on average equal while there are tax disadvantages associated with the cash-dividend shares (class B).

Source: Compiled by author from a selective review of the literature

Table 2.3 Selected empirical studies of tax clientele effects around ex-dividend dates

Study	Aim	Methodology (Data and model) and results	Conclusions
Elton and Gruber (1970)	Testing for tax clientele by identifying the relationship between marginal tax rates and dividend yield using an ex-dividend date price date.	**Data:** US, 4148 stock traded on the NYSE, which paid dividend between 1966-1967. **Methodology**: Event study around the ex-dividend date: ▪ Calculate the ratio of the change in price over the ex-dividend date to the nominal dividend amount (ΔP/D). ▪ Arrange the data observations by decile according to the value of the dividend yield. ▪ Compare the tax rates implied by the means of the ratios of the change in price to dividend across the dividend yield categories ▪ If a tax clientele effect is present than there should be a negative relationship between investors' tax brackets and the dividend yields of the stock they hold **Results:** Spearman's rank correlation coefficient between D/P and ΔP/D is 0.9152 which is significant at the 1% level	▪ Strong evidence of a clientele effect - Find an inverse relationship between dividend yields and tax brackets. This implies that investors at high income tax brackets select low dividend yield stock. ▪ Changes to the dividend policy rather than the policy itself could affect value. This is due to trading costs which investors will incur in moving from one stock to another when firms change their policies
Frank and Jagannathan (1998)	Offer an alternative to the tax clientele effect for why prices drop by less than the value of the dividend on the ex-dividend day	**Data**: Hong Kong, 1980-1993, 1,896 payments 351firms. **Methodology**: Event study. Cross sectional regression based on a model developed theoretically **Model:** *ΔP/ P = - (ratio of rational to total traders) X (average bid-ask spread) + β (dividend yield)* **Results:** ▪ Full sample: *ΔP/ P* = - 0.944 + 0.77 dividend yield ▪ Low yield stock: *ΔP/ P* = - 0.51 + 0.46 dividend yield ▪ High yield stock: *ΔP/ P* = - 1.17 + 0.98 dividend yield	Ex-dividend day premiums are not caused by tax clientele effects, because they are observed in markets where neither dividends nor capital gains are taxed. Instead they are caused by market microstructure: Market makers are in a better position to collect and reinvest the dividends. The resultant trading pressure around the ex-dividend day causes return premiums to be observed.
Koski & Scruggs (1998)	Test for dynamic tax clientele by analysing abnormal trading around ex div day	**Data:** US, 70 ex-dividend day observations 63 trading days between November 1990 to January 1991 **Methodology:** Event study with an event window of 11 days centred on the ex-dividend date. Cross sectional ordinary least squares regression of the standardised abnormal trading volume (SAV) on the last cum-dividend day on dividend yield and transaction costs **Model:** *SAV = α + β1 YIELD – β2 SPREAD* Where SAVi is the standardised abnormal trading volume on the last cum-dividend day and is obtained as actual volume less the average volume during normal trading period, standardised by the standard deviation of the normal trading volume; YIELD is the dividend yield where the price is the mean of closing prices for stock i over days –10 to -6 relative to ex-dividend day 0; SPREAD is proxy for transaction costs and is measured as the average of spreads (expressed in percentage terms) for all bid and ask quotes for stock i on the cum-dividend day. **Results:** ▪ SAV (purchases) = 1.281 + 75.955** YIELD – 66.523** SPREAD ▪ SAV (sales) = 1.296 + 70.596* YIELD – 64.504** SPREAD	▪ Supportive of a dynamic clientele effect where securities dealers who are tax-neutral are motivated to engage in trading around the ex-dividend day. ▪ This abnormal activity is motivated by potential trading profit which is due to tax-driven abnormal ex dividend returns ▪ The higher the dividend yield, the greater the potential profit from trading ▪ The higher the transaction costs, the lower the potential profit from trading
Green, Rydqvist (1999) Swedish Lottery Bonds	Test for tax clientele effect on ex-distributions returns of Swedish lottery bond. These are taxed like equities but enjoy the relative price stability of bonds.	**Data:** Sweden, 46 lottery bonds trading on the Stockholm Stock Exchange in the period 1986-1997. The sample is sub divided according to tax-regime at time of issue: Pre-1981, 1981-1990, Post-1990. **Methodology**: WLS 1. Cumulative abnormal trading volume for 10-day and 20-day windows around ex-coupon payment dates. 2. Obtaining estimates of implied tax rates and of ex-coupon dates price drop using the Cross sectional Weighted Least Squares regression. **Model:** *Pre-tax return over the trading period = γ0 (trading period) + γ1 (distribution yield)* **Results:** Mixed bonds: R = 0.00021 k – 0.288 C/Pt Sequenced bonds: R = 0.00024 k – 0.511 C/Pt	Taxes impact lottery bonds consistent with tax clientele effect: ▪ Abnormal trading volume around distribution period is high for bonds issued under all tax regimes but highest for pre-1981 when capital losses can be set against all taxable income. ▪ The tax system favours distributions to capital gains, therefore the ex-day price fall is greater than the coupon

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Table 2.4 Selected empirical studies of the signalling hypothesis – Are dividend change announcements interpreted as valuable signals by the market?

Study	Aim	Methodology (Data and model) and results	Conclusions
Laux, Starks and Yoon (1998)	Study stock price reaction of industry rivals to dividend change announcements by firms. Assess direction of the reaction to determine if contagion or competitive effects dominate or cancel out each other.	**Data:** US, 1,243 rivals of 217 firms announcing dividend increases and 667 rivals of 105 firms announcing dividend decreases. Period 1969-1988 **Methodology**: Event study ▪ Event window is the day of the announcement and the previous day. ▪ Abnormal return is measured using the market model which is estimated post event ▪ Comparing average cumulative abnormal return of announcers of dividend increases and decreases ▪ Comparing abnormal returns of rivals of firms announcing dividend changes ▪ Splitting the samples of rival firms according to relative market power and relative growth opportunities and comparing abnormal reaction across the sub-samples. **Results:** ▪ Announcing firms experience significant abnormal reaction to dividend change announcements. Dividend decreases are met with stronger reaction. ▪ The most competitive rivals display significant positive reaction to increase announcements. ▪ The least competitive rivals display significant negative reaction to decrease announcements.	▪ Dividend changes are interpreted as signals as price reaction to both increases and decreases is strong. ▪ Dividend increases signal positive changes for the announcing firm, while dividend decreases signal bad changes. ▪ Managers' reluctance to decrease dividends is justified by the stronger reaction associated with dividend decreases compared with increases. ▪ The dividend change announcement contains information about changes in industry-wide factors as well as shifts in the competitive position of the announcing firm.
Howe and Shen (1998)	Investigate what information is contained in dividend initiation announcements by studying rivals' reaction in terms of both price and analysts' revisions of earnings forecasts.	**Data:** US, 3540 rivals of firms announcing dividend initiations for the price reaction study, and 345 rivals of firms announcing dividend initiations for the earnings forecast revisions study. Period 1968-1992 **Methodology**: Event study ▪ Event window is the day of the announcement and the previous day. ▪ Abnormal return is measured using the market model which is estimated post event Announcement month forecast revisions of the earnings of rivals ▪ Test significance of analysts' EPS forecast revisions from month before to month of the dividend event **Results:** The mean cumulative abnormal return is –0.07 percent while the mean abnormal forecast revision is 0.1671	▪ Stock prices of industry rivals do not significantly react to initiation announcements of firms in same industry. Nor do analysts significantly revise their EPS forecasts for these rival firms. ▪ This indicates that the information contained in initiation is firm-specific rather than industry wide. It also implies lack of both contagion and competitive intra-industry effects

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Table 2.5 Selected empirical studies of the signalling hypothesis – Is the dividend signal justified by subsequent changes in firms' characteristics?

Study	Aim	Methodology (Data and model) and results	Conclusions
DeAngelo , DeAngelo and Skinner (1996)	Do firms use dividend to signal future earnings prospects? Focus on firms with greater need for signalling by selecting those experiencing a decline after a long period of earnings growth	**Data:** US, 145 firms experiencing earnings decline after at least nine consecutive years of growth. Period 1980-1987 **Methodology**: ▪ Comparison analysis of annual average abnormal future earnings over three years following surprise earnings decline. The comparison is between the sub-sample of firms announcing dividend increases in the year of the earnings decline and the sub-samples of similar firms that did not change their dividend or that announced dividend cuts. ▪ Cross sectional regression of abnormal future earnings on dividend signal and control variables. **Model:** *Abnormal future earnings* = $\alpha0$ + $\alpha1$ *historical earnings growth rate* + $\alpha2$ *lagged earnings* + $\alpha3$ *current earnings* + $\alpha4$ *extraordinary items* + $\alpha5$ *discounted operations* + $\alpha6$ *special items* + $\alpha7$ *dividend signal*	▪ No support for the notion that dividend change announcements signal reliable information about future earnings. ▪ Support for two prime reasons for the unreliability of the dividend signal: 1. Mangers tend to send over-optimistic signals naively or deliberately. 2. The cash commitment associated with the dividend increase is relatively small. Thus weaker firms can afford to send misleading signals
Lipson, Maquieira and Megginson (1998)	Do dividend initiations signal increases in unexpected earnings which weaker firms find too costly to send? Focus on the experiences of newly-listed firms	**Data:** US, 99 newly listed firms initiating dividend and matched samples of non-initiating firms. Period 1980-1986 **Methodology**: ▪ Comparison analysis of earning surprises across samples dividend-initiating and non-initiating firms. ▪ Comparing the dividend commitment of initiating firms with the commitment that non-initiating firms would make if they were to imitate similar commitment. Similar commitment is defined as a commitment that generates the same dividend yield, the same dividend-to-sales ratio, or the same dividend-to-assets ratio. **Results:** The difference in the means of the dividend-to-sales ratios between initiating and non-initiating firms (in the initiation year) is 20.04, which is significant at the 1 percent level.	Firms initiate dividend to signal quality relative to otherwise similar firms: ▪ Unexpected earnings following dividend initiations are significantly higher for initiating relative to similar but non-initiating firms. ▪ The dividend commitment for initiating firms is significantly lower than that of non-initiating firms if the latter paid the same level of dividend
Jensen and Johnson (1995)	Examining changes in some financial characteristics of firms before and after a dividend reduction announcement. Assess the reasons for the dividend reduction and the information contained in the announcement.	**Data:** US, 268 observations of dividend reduction/omissions of at least 20% by 242 different firms. Period 1974-1989. **Methodology:** Examining 21 firm characteristics in the three years before and in the three years after the dividend reduction: ▪ Financial variables are grouped into six categories: Performance; Sales & costs; Financial position; Long term financing; Restructuring variables; and Discretionary expenses. ▪ The median values for each variable in each year from three years before to two years after the dividend reduction announcement is calculated. This is the unadjusted data. ▪ The industry-adjusted data is obtained by subtracting the associated industry median from the value obtained for each firm. The sample median is then used. ▪ The unadjusted results are used to assess changes over time and the adjusted results are used to assess the position of reducing firms relative to their industry ▪ The Wilcoxon signed ranks test is used to assess the significance of the differences in the value of the variables at various times. **Results:** ▪ Performance: Earnings and stock prices decline before the dividend reduction but this trend is then reversed ▪ Financial: Cash decreases while debt increases before the dividend reduction but this trend is then reversed ▪ Long term financing: debt issuance declines after the dividend reduction while equity issuance declines in the pre-reduction period ▪ Restructuring variables: Sales of fixed assets increases after the dividend reduction while purchases decline ▪ Discretionary expenses: Spending on R&D increase before the dividend reduction and decline afterwards.	Dividend reduction announcements mark the end of a firm's financial decline and the beginning of a restructuring period, rather than an action of last resort: ▪ Earnings level two years after the reduction are still lower than their level three years prior to the dividend reduction. Other variables also indicate continuation of financial problems. ▪ After the reduction, firms tend to reduce asset purchases, increase asset sales and reduce spending on R&D. This restructuring activity together with the dividend savings could be the reason for the observed improvements in liquidity and debt positions.

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Table 2.6 Selected empirical studies of signalling theories – The permanent earnings, permanent cash flow and risk-information hypotheses

Study	Aim	Methodology (Data and model) and results	Conclusions
Benartzi, Michaely and Thaler (1997)	Test the hypothesis that dividend changes signal changes in permanent earnings	**Data:** US, 1025 firms and 7186 firm-year observations in the period 1979 to 1991 **Methodology**: Categorical analyses: comparing unexpected changes in earnings of firms that decrease, increase or maintain their dividends. Unexpected earnings changes are measured in four alternative ways for up to two years from the year of the dividend change announcement.	Support for the permanent earnings hypothesis: Dividend-increasing firms do not necessarily experience subsequent earnings increases, but they are less likely to experience subsequent earnings declines compared with other firms.
Brook, Charlton and Hendershott (1998)	Test the hypothesis that dividend changes signal future increases in permanent cash flows	**Data:** US, 180 non-regulated firms with 4 consecutive years of steady cash flows. Period 1989-1996 **Methodology**: Comparison analysis: ▪ Classifying the sample into groups based on future increases in cash flows: 101 firms experiencing permanent increases, 45 firms experiencing temporary-increase, and 34 firms experiencing no increase in cash flows. ▪ Compare the following variables across the three groups: dividend changes prior to the cash flow increases, and market-adjusted stock returns in the year before the cash flow increases	Support for the permanent cash flow hypothesis: Firms expecting large permanent cash flow increases tend to increase their dividend to signal this information. Investors understand the signal as the stock price increases significantly in the year of the dividend change and before the jump in cash flow.
Dyl and Weigand (1998)	Do dividend initiations announcements signal future increases in earnings or a reduction in earnings volatility and hence in either market and/or systematic risk of stock return?	**Data:** US, 240 NYSE/AMEX firms initiating dividend payments in the period between 1972 and 1993 **Methodology**: Comparing the mean and median values of the following variables in the period before and after the dividend initiation announcement: ▪ Systematic risk – obtained by regressing daily stock returns on 15 lagged, contemporaneous and 5 leading market returns. The CRSP equally weighted index is used as the market proxy. The pre-event period is defined as days –252 to –6, and the post-event period is defined as days 6 to 252, relative to the event. ▪ Total risk – measured as the sample mean variance of daily returns. The pre and post event studies are defined as for the systematic risk. A conditional total risk measure is also calculated using a GARCH(1,1) model. ▪ Earnings – Average EPS for the sample in the 12 quarters preceding and following the dividend initiation. ▪ Earnings volatility - The variance of mean EPS in the 12 quarters preceding and following the announcement.	Support for the risk-information hypothesis: ▪ The initiation of cash dividends signals a decrease in firm total and market risk and this change in risk occurs immediately following the dividend initiation announcement. ▪ Although earnings do not increase following the dividend initiation, the volatility of earnings in the three years following the announcement is significant.

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Table 2.7 Selected empirical studies of the conditional signalling hypothesis

Study	Aim	Methodology (Data and model) and results	Conclusions
Born and Rimbey (1993)	Investigate the effects of prior activities (in particular, prior financing activity) on the reaction to dividend initiation announcements	**Data:** US, 490 firms announcing dividend initiations between 1962-1989: 102 engaging in financing in the twelve months prior to the dividend initiation announcement and 388 that do not. **Methodology**: Regression analysis of the price reaction to the dividend increase announcement, which is measured as follows: ▪ A single-factor (market) model is estimated for each firm using sixty pre-event trading days of returns ▪ The capital market response to the dividend announcement is defined as the cumulative abnormal returns obtained from the market model over the day of that the dividend announcement is recorded in the Wall Street Journal Index and the previous day. **Model:** *price reaction to the dividend announcement* = $\alpha 0$ + $\alpha 1$ *(dividend yield)* + $\alpha 2$ *(financing per share/ price)* **Results:** ▪ Full sample: price reaction = 0.001 + 2.018 (dividend yield) ▪ Prior-financing group: price reaction = - 0.008 + 2.800 (dividend yield) ▪ Non-financing group: price reaction = 0.015 + 1.745 (dividend yield) ▪ Prior-financing group: price reaction = - 0.015 + 2.512 (dividend yield) + 0.022 (financing yield)	Financing activity prior to dividend increase announcements distinguishes firms that initiate dividend to signal future growth prospects from those that initiate dividend due to disinvesting: ▪ The constant is lower for the prior-financing group because such activity causes anticipation of a dividend-increase signal of growth. ▪ The positive price reaction per unit of dividend yield is higher for the financing sample, because the news under such circumstances is better. ▪ The higher the financing yield, the stronger the price reaction to the dividend initiation announcement
Balachandran Cadle and Theobald, (1999)	Investigate price reaction to Interim Dividend Reductions, and identify factors that impact the price reaction	**Data:** UK, 242 non-financial firms, declaring Interim Dividend Reductions (IDR) in the period 1986-1993. **Methodology**: ▪ Event study – employing five models to generate abnormal returns around the dividend change announcement. The price reaction is measured as the two-day cumulative abnormal return including the day of the announcement and the previous day. ▪ Regression analysis – regressing the price reaction, obtained from the market model, on factors that have the potential to explain the magnitude of the reaction and cross sectional differences in reaction. **Model and Results:** *Price Reaction to IDR = -0.035 - 0.094 (magnitude of the dividend reduction) + 0.0003 (standardised change in interim earnings) + 0.066 (dummy for prior dividend reduction) + 0.107(gearing ratio) - 0.068 (dummy for prior dividend reduction by other firm in the industry) - 0.025 (information leakage control variable) - 0.002(firm size)*	Reaction to dividend reduction depends on the surprise in the announcement. This, in turn, depends on prior dividend behaviour and other factors relating to characteristics of the firm itself, and the environment in which it operates: ▪ IDR lead to negative price reaction. ▪ Reaction is stronger when IDR does not follow a Prior Final Dividend Reduction (PFDR). ▪ When IDR is greater than the PFDR, reaction is stronger compared to when IDR is less or equal the PFDR. ▪ The magnitude of the price reaction to the IDR is influenced by the size of the reduction, the gearing ratio, and to prior dividend reductions by either the firm itself or others in its industry.
Impson (1997)	Analyse cross sectional variation in price reaction to dividend decrease announcements by utilities compared with the reaction by unregulated firms.	**Data:** US, A wide sample of 725 regulated and unregulated firms declaring quarterly dividend decreases/omissions in the period 1974-1993. The sample includes 65 utilities and 660 unregulated firms. A narrow sample of 262 firms. **Methodology**: Weighed Least Squared cross sectional regression of the price reaction to the dividend announcement. The price reaction is obtained using the single index market model estimated pre-event using 250 days. **Model and Results:** *Price reaction = -0.0734 – 0.0504 (regulated-firm dummy) – 0.2528 (average quarterly dividend yield) + 2.0293 (size of the dividend reduction) + 0.0036 (firm size) + 0.0365 (Tobin's Q)*	The circumstances under which the firm operates, and in particular whether it is regulated or unregulated, have an important impact on the price reaction to dividend decrease announcements. Other firm's characteristics, such as Tobin's Q and firm size also have important impact on the price reaction to the dividend announcement.

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Table 2.7 (concluded) Selected empirical studies of the conditional signalling hypothesis

Study	Aim	Methodology (Data and model) and results	Conclusions
Akhigbe and Madura (1996)	Test the extent to which dividend signals are realised by actual changes in long-term stock price performance. Analyse cross sectional variations	**Data:** US, 128 announcement of dividend initiations and 299 announcements of dividend omissions. 1972-1990 **Methodology**: ▪ Assessing the significance of the average monthly abnormal returns following dividend change announcements, where averages are calculated over the first, second, and third years starting one month after the dividend announcement. ▪ Cross Sectional regression of the long-term price performance following the dividend change announcement on the size of the dividend change, firm's size, past profitability and over or under investment as measured by Tobin's Q. **Model and Results:** ▪ Dividend initiations: long-term abnormal performance = *1.0069 + 0.1078 (dividend change) – 0.0872 (size) – 0.1213 (Tobin's Q) – 2.6820 (profitability)* ▪ Dividend omissions: *long-term abnormal performance = -0.0670 - 0.0290 (dividend change) – 0.0355 (size) – 0.0221 (Tobin's Q) – 0.0531 (profitability)*	Long-term price performance following dividend changes varies with firm characteristics: ▪ For initiations the smaller the firm, the higher the degree of over investment and the less efficient is the management team, the stronger the positive long-term performance. ▪ For omissions the larger the dividend change and the larger the firm, the more negative is long-term performance.
Gombola and Liu (1999)	Distinguish between firms with high and low investment opportunities to assess whether the dividend signal is a function of this factor.	**Data:** US, 196 firms announcing Special Designated Dividend in the period 1977-1989 **Methodology**: ▪ Event study - The sample is divided on the basis of Tobin's Q values. The means of the three-day cumulative abnormal return are compared across the two sub-samples. ▪ Cross sectional regression – of abnormal stock return on investment opportunities and control variables. ▪ Distinguish between signalling and agency theories by analysing the abnormal earnings forecast revisions following Special Designated Dividend announcements. **Model and Results:** ▪ *Abnormal stock return = 2.391(investment opportunities dummy) –0.059 (free cash flow) + 0.105 (Special Designated Dividend yield) – 0.475 (firm size)* ▪ *Abnormal stock return* = 0.18715 (abnormal earnings forecast revision) ▪ Abnormal earnings forecast revision = 0.00532 (*abnormal stock return)* –0.0003 (post announcement abnormal return) + 0.00118 (divergence of opinion among analysts)	▪ The price reaction to the Special Designated Dividend announcement is positive and significant for low Tobin's Q firms but not significant for high Tobin's Q firms. This is consistent with the signalling hypothesis: the surprise in the announcement is greater for firms facing poor investment opportunities. ▪ Analysts revise their current year earnings forecast upward significantly following the Special Designated Dividend announcement. This is consistent with signalling but not with agency theory.
Lang and Litzenberger (1989)	Test the validity of the conditional signalling theory and the over-investment hypothesis in explaining price reaction to large dividend changes	**Data:** US, 429 announcements of substantial dividend changes of more than 10 percent in absolute value, 1979-1984 **Methodology**: ▪ Event study - comparison the average daily returns on dividend announcement days for firms with average Tobin's Q less than unity and for firms with average Tobin's Q greater than unity. The sample is further divided into dividend increasing and dividend decreasing announcements. ▪ Analysis of post-announcement revisions in analysts' current earnings forecasts – the sample of dividend increase announcements is split into firms with average Tobin's Q less than one and firms with Tobin's Q greater than one. The sample of dividend decrease announcements is similarly split. **Results:** ▪ Average daily returns on dividend change announcement days for firms with Tobin's Q greater than unity is 0.003, with probability value of 0.021. ▪ Average daily returns on dividend change announcement days for firms with Tobin's Q less than unity is 0.011, with probability value of 0.000. ▪ Average daily returns on dividend decrease announcement days for firms with Tobin's Q greater than unity is -0.003, with probability value of 0.371 ▪ Average daily returns on dividend decrease announcement days for firms with Tobin's Q less than unity is –0.027, with probability value of 0.000. ▪ The difference in the average price reaction to dividend increases by firms with Tobin's Q less than unity and firms with Tobin's Q greater than unity is –0.0024 with probability value of 0.027.	▪ Average reaction to substantial dividend changes is stronger for over-investing firms compared with high firms whose Tobin's Q is greater than unity. This is supportive of both the signalling theory and the over-investment theory. ▪ Average reaction to substantial dividend decreases is insignificant for high Tobin's Q firms but significant for firms with Tobin's Q of less than unity. This evidence is supportive of the over-investment theory but is inconsistent with signalling theory. ▪ Consistent with the over-investment theory but not with signalling theory analysts do not appear to substantially revise their current earning forecasts in response to dividend change announcements.

Source: Compiled by author from a selective review of the literature

Table 2.8 Selected empirical studies of the cost minimisation model

Study	Aim	Methodology (Data and model) and results	Conclusions
Rozeff (1982)	Develop and test the cost minimisation model of dividend	**Data:** US, 1000 firms, 1981 **Methodology**: Cross Sectional Ordinary Least Squares regression of the payout ratio on agency and transaction costs variables. **Model and Results:** Payout ratio = 47.81 – 0.09 (percentage of common stock held by insiders) – 0.321(average growth rate of revenues over past five years) – 0.526 (forecast of average growth rate of revenues over future five years) – 26.543 (beta coefficient) + 2.584 (log of number of common stockholders)	Provide support for a model that describes the optimal payout ratio as that which minimises the sum of transaction costs of external financing on the one hand, and of agency costs that arise from conflicts of interests between managers and outside investors on the other one.
Llyod, Jahera and Page (1985)	Test the importance of size as explanatory variable in the cost minimisation model	**Data:** US, 957 firms, 1984 **Methodology**: Cross Sectional Ordinary Least Squares regression controlling for multicollinearity. **Model and Results:** Payout ratio = 0.52 – 0.093 (residuals from regression of inside holdings on size) – 0.564 (past growth) – 0.216 (forecast growth) – 0.184 (beta coefficient) + 0.025 (residuals from regression of log number of stockholders on size) + 0.016 (log of sales)	The agency variables in the original cost minimisation model may be proxies for size because larger firms are likely to have lower insider holdings and wider dispersion of ownership. After including a size variable and controlling for multicollinearity, provide support for the model and for the importance of size.
Schooley and Barney (1994)	Investigate the relation between the optimal payout ratio and CEO ownership.	**Data:** US, 235 industrial firms, 1980 **Methodology:** Cross Sectional Ordinary Least Squares **Model and Results:** *Dividend yield = 0.10657 – 0.18055 (expected growth) + 0.03302 (past growth) – 0.04843 (beta coefficient) + 0.05519 (log number of shareholders) – 0.00149 (CEO holdings)+ 0.00005 (Squared CEO holdings)*	Support for the cost minimisation model but with parabolic relation between dividend yield and CEO ownership.
Moh'd, Perry and Rimbey (1995)	Testing a dynamic variant of the cost minimisation model.	**Data:** US, 341firms with 18 years of data, 1972-1989 **Methodology:** Panel data, Weighted Least Squares **Model and Results:** ▪ *PAYOUT = 27.058 – 0.136 past growth – 0.593 expected growth + 0.824 size – 5.834 intrinsic business risk -23.277 operating leverage risk – 23.415 financial leverage risk + 0.063 institutional holdings – 0.122 inside holdings + 3.754 log number of shareholders* ▪ *PAYOUT = 13.533 + 0.465 lagged payout ratio + 0.013 past growth – 0.473 expected growth + 0.310 size - 1.868 intrinsic business risk – 16.266 operating leverage risk – 12.492 financial leverage risk + 0.036 institutional holdings – 0.054 inside holdings + 1.140 log number of shareholders*	▪ Results excluding the lagged dependent variable support the cost minimisation model with all coefficients bearing expected signs and being significant. ▪ Adding the lagged dependent variable appears to be important, indicating that managers adjust their payouts through time as well as across firms in response to changes in agency/transaction cost structure.
Holder, Langrehr and Hexter (1998)	Add stakeholder theory variable to a variant of the cost minimisation model.	**Data:** US, 477 firms, 1983-1990 **Methodology:** Panel data regression **Model and Results:** *Payout ratio = 53.849 - 4.361 focus of the firm operations + 1.859 size – 0.081insider ownership + 1.879 number of shareholders + 21.794 free cash flow – 11.743 growth – 349.028 risk*	Provide support for the cost minimisation model but also for the importance of stakeholder theory in determining the firm's payout decision.

Source: Compiled by author from a selective review of the literature

Table 2.8 (concluded) Selected empirical studies of the cost minimisation model

Study	Aim	Methodology (Data and model) and results	Conclusions
Hansen, R.S, R. Kumar and D.K Shome, (1994)	Test a variant of the cost minimisation model on regulated utilities.	**Data:** US, 81 electric utility firms for 1985 and 70 electric utility firms for 1990 **Methodology:** ▪ Comparison analysis of the mean payout ratio of utilities and S&P 400 industrial firms ▪ Panel data regression **Model and Results:** ▪ *For 1985: Payout ratio = 99.95 –1.24 inverse for degree of regulation –0.73 ownership concentration –3.60 flotation costs –0.49 growth* ▪ For 1990: *Payout ratio =104.36 –2.30 inverse for degree of regulation –0.48 ownership concentration –1.05 flotation costs –0.55 growth*	▪ The mean payout ratio of electric utility firms is significantly greater than for S&P400 industrial firms. This is consistent with monitoring rationale as agency problems in regulated firms extend to conflicts with regulator and because for utilities using the dividend device may be relatively less costly. ▪ Growth induced monitoring is an alternative to the dividend device – when growth rate declined in 1990, utilities increased their payouts. ▪ The dividend policy of utilities is determined by the degree of conflicts with managers and regulators as well as flotation costs and growth.
Rao and White (1994)	Assess the applicability of the monitoring rationale for dividend to the case of private firms. The study also innovates by incorporating a tax cost consideration into a variant of the cost minimisation model.	**Data:** US, 66 private firms challenged in court by the Internal Revenue Service for Accumulated Earnings Tax in the period 1928-1988 **Methodology:** Maximum Likelihood Latent Truncation Regression **Model and Results:** *Payout ratio = 44.98 + 0.52 number of common stockholders – 7.16 past growth rate of revenues + 14.20 expected direct costs of Accumulated Earnings Tax – 43.32 percentage of stock held by insiders*	▪ The past growth variable is not significant, but the rest of the explanatory variables are. ▪ Firms expecting high Acumulated Earnings Tax can reduce this cost by increasing their payouts. ▪ The monitoring rationale for dividends is valid even for private firms. It is possible that by paying dividend these firms can induce monitoring by bankers, accountants or the tax authorities.

Source: Compiled by author from a selective review of the literature

Table 2.9 Selected empirical studies on the partiality of the monitoring rationale for dividend

Study	Aim	Methodology (Data and model) and results	Conclusions
Noronha, Shome and Morgan (1996)	Test whether the simultaneity of the dividend and capital structure decisions and a variant of the cost minimisation model are invalidated by alternative non-dividend agency cost controlling devices and/or by growth induced capital market monitoring	**Data:** US, 341 industrial firms: Group A consisting of 131 firms with alternative agency-controlling devices and/or growth-induced capital market monitoring. Group B consisting of 210 firms with no such alternatives. 1986-1988 **Methodology:** Pooling firms over the period after a Chow test confirms the stability of the coefficients. The following regressions are then run separately on group A and on group B: ▪ Cross sectional Ordinary Least Squares regression of a variant of the cost minimisation model ▪ Three Stage Least Squares simultaneous equations model. **Model and Results:** ▪ *Group A: Payout ratio = 0.935 - 0.527 insider holdings - 0.068 log number of shareholders + 0.026 variance of daily returns + 0.065 firm size - 0.005 growth* ▪ *Group B: Payout ratio= 0.292 - 0.312 insider holdings + 0.039 log number of shareholders - 0.331variance of daily returns + 0.016 firm size – 0.003 growth* ▪ System equations for group A *Payout ratio= 0.798 - 0.321equity ratio - 0.315 insider holdings + 0.030 log number of shareholders - 0.342 variance of daily returns - 0.013 firm size - 0.003 growth* *Equity ratio = 0.841 + 0.018 payout ratio + 0.753 advertising and R&D + 0.195 income volatility - 0.301 non debt tax shield* ▪ System equations for group B *Payout raio = 1.300 - 1.497 equity ratio - 0.178 insider holdings + 0.089 log number of shareholders - 0.435 variance of daily returns - 0.021 firm size - 0.002growth* *Equity ratio = 0.989 - 0.231 payout ratio + 0.511 advertising and R&D - 0.799 income volatility - 0.169 non debt tax shield*	Support for the partial explanation of the dividend monitoring rationale: ▪ For Group B (with no alternative agency cost control mechanisms) the modified cost minimisation model is valid. The coefficients on all the variables bear the expected signs and all but the coefficient on the size variable are significant at the 5% level. In contrast for group A, with alternatives to the dividend agency control device, the model gives weak results. ▪ Simultaneity is evident only for Group B. For that group, both the coefficient on payout ratio in the equity ratio equation and the coefficient on equity ratio in the payout equation are significant. However for Group A no simultaneity is observed.
Johnson (1995)	Investigate substitutability between dividend and debt in controlling the agency problem of free cash flow being wasted by management.	**Data:** US, 129 debt offerings by industrial firms over the period 1977-1983. The sample is divided into low and high payout firms and further divided into high and low growth in sales. **Methodology:** ▪ Event study. Using market model, which estimated post event over 150 days from day 21 to 170 relative to the debt issue announcement day. The reaction to the debt issue announcement is calculated as the two-day abnormal return over the day before and the day of the debt issue announcement. ▪ Weighted Least Squares regressions are run on the full sample and separately on low growth and high growth sub-samples. ▪ Comparison analysis across groups of firms categorised on the basis of their payout ratios and growth prospects, of the five-year average number of visits to the capital market. **Model and Results:** ▪ For full sample: *abnormal reaction to debt issue announcement = 0.0093 - 0.0299 (payout ratio)* ▪ For low growth sample: *abnormal reaction to debt issue announcement = 0.0164 – 0.0416 (payout ratio)* ▪ For high growth sample: *abnormal reaction to debt issue announcement = -0.0018 + 0.0145 (payout ratio)*	▪ Price reaction to debt issue announcements is strongest when the free cash flow problem is most severe (low growth firms) and where no alternative mechanisms for reducing the problem are used (low payout firms). ▪ Growth and payout levels increase the frequency of visits to the capital market. ▪ Insignificant relationship is found between the frequency of visits to the capital market and the price reaction to debt issue announcements. This implies that the commitment to pay out cash, which is signalled by the debt issue announcement, is more important than the capital market induced monitoring.

Source: Compiled by author from a selective review of the literature

Table 2.9 (concluded) Selected empirical studies on the partiality of the monitoring rationale for dividend

Study	Aim	Methodology (Data and model) and results	Conclusions
Crutchley and Hansen (1989)	Investigate the agency theory of leverage, dividend and managerial ownership.	**Data:** US, 603 industrial firms, 1981-1985. **Methodology:** Cross sectional, Ordinary Least Squares **Model and Results:** ▪ *OWNERSHIP = - 0.007 + 0.167 Diversification + 0.388 Earnings volatility + 0.456 Standard deviation of returns - 0.058 Advertising and R&D - 0.015 Size* ▪ *LEVERAGE = 0.160 -0.846 Diversification - 1.848 Earnings volatility + 3.151 Standard deviation of returns - 0.875 Advertising and R&D + 0.021 Size* ▪ *DIVIDEND = 0.076 - 0.035 Diversification + 0.034 Earnings volatility - 0.442 Standard deviation of returns - 0.037 Advertising and R&D + 0.004 Size*	▪ Firms adopt alternative policies to control for agency costs. ▪ These policies include managerial ownership, leverage and dividends. ▪ The mix of policies is determined by firm's specific characteristics, which impact the associated costs. ▪ These characteristics include diversification, earnings volatility, flotation costs, spending on R&D and advertising, and firm size.
Agrawal, Jayaraman, (1994)	Investigate the degree of substitutions between dividend, leverage and insider holdings in controlling agency costs.	**Data:** US, 71 industry-size matched pairs of all-equity and levered firms for 1981. **Methodology:** Cross sectional, Ordinary Least Squares **Model and Results:** *Payout ratio = 0.501– 0.300 leverage – 0.004 insider holdings + 0.003 (insider holdings X leverage) - 0.302 free cash flow – 0.072growth*	▪ Find support for the hypothesis that dividends and debt are substitute mechanism for controlling agency costs of free cash flow. ▪ Dividend and managerial ownership are substitute mechanisms for reducing agency costs in all-equity firms.
Bathala and Rao (1995)	To investigate substitutability between Board composition, insider ownership, leverage and dividend policy in controlling agency costs.	**Data:** US, 261 non-regulated firms for 1986. **Methodology:** Cross sectional, Ordinary Least Squares **Model and Results:** *Fraction of outside directors on the Board = 0.8201 - 0.2128 insider holdings - 0.0817 payout ratio - 0.1121 leverage + 0.0874 institutional holdings - 0.0016 growth rate - 0.0007 earnings volatility - 0.0033 length of time that the CEO has held that position - 0.0027 firm size*	▪ Due to their independence and the need to maintain reputation, outside directors on the Board can reduce manager-shareholders conflicts. ▪ This is confirmed by the findings of significant and negative relationships between the fraction of outside directors on the board and other policies to control for agency costs.

Source: Compiled by author from a selective review of the literature

CHAPTER 3: DIVIDEND POLICY AND AGENCY THEORY - EVIDENCE ON INDIAN FIRMS

3.1 Introduction

Agency theory, as articulated by Jensen and Meckling (1976), is a theory of the relationship between the principal and the agent of the principal. Within the context of the firm, agency theory is primarily concerned with owner-manager relationship and with the need for shareholders to monitor management behaviour. This need arises due to the separation of ownership and control and the associated conflicts of interests that arise between shareholders (principals) and managers (agents). Conflicts of interests mean that managers may pursue objectives other than shareholder wealth maximisation in order to fulfil various self-interests. For example, it may be in the interest of managers to divert the firm's resources for the consumption of perquisites. While enjoying the total benefit from the perquisites consumed, the cost to the manager of this consumption is only a fraction of the total cost of the wasted resources. The remaining cost is borne by other owners. However, managers may also suffer as a result of acting as predicted by agency theory. If it is suspected that they are not acting to increase shareholder wealth, then managers may lose their position through, for example, a hostile take-over. Further, if the market suspects managers are inefficient, this has an adverse effect on the share price and hence on managers' holdings and possibly their salary, reputation and career opportunities.

In light of the cost to managers from possible agency problems it becomes important to them that the firm is seen to be free of agency problems. Managers will thus take measures, in addition to those taken by shareholders, to reduce the potential for agency conflicts. Consequently, agency costs are defined as the loss to shareholders of controlling agency behaviour, through measures taken by themselves and by managers as well as the costs from any agency behaviour that has not been controlled. These are the three components of agency costs, which Jensen and Meckling (1976) term monitoring expenditures, bonding expenditures and residual loss, respectively. However, Jensen and Meckling (1976) note that agency costs arise as a result of a co-operative effort between any group of people. Hence, within the context of the firm, agency costs may arise due to conflicts between, or within, any group of stakeholders including employees, customers, regulators etc.

This chapter is concerned with agency theory as applied to dividend policy. This is the agency theory of dividend, which claims that one measure, used by managers to control agency behaviour, is the payment of dividends. Specifically it is proposed that by inducing external monitoring, dividends reduce agency costs, although at the same time increasing the transaction costs associated with raising external funds. The argument is due to Easterbrook (1984) and it goes as follows. Monitoring of the firm and its management is helpful in reducing agency problems and in convincing the market that the managers are not in a position to abuse their position. Some shareholders may be monitoring managers, but the problem of collective action (the free-rider problem) results in too little monitoring taking place. One way of solving this problem is by increasing the payout ratio. When the firm increases its dividend payment, assuming it wishes to proceed with planned investment, it is forced to go to the capital market to raise additional finance. This induces monitoring by potential investors of the firm and its management, thus reducing agency problems.

Rozeff (1982) develops a model that underpins this theory, which is given the name the cost minimisation model. The model combines the transaction costs that may be controlled by limiting the payout ratio, with the agency costs that may be controlled by raising the payout ratio. It thus predicts a negative relation between agency costs and the payout ratio and a positive relation between the transaction costs of raising external finance and the payout ratio. The central idea on which the model rests is that the optimal payout ratio is at the level where the sum of these two types of costs is minimised.

This chapter seeks to contribute to the agency theory of dividend in three ways. First, it applies the cost minimisation model to a developing economy, India. Considering that most similar studies are US-based, this approach could shed a fresh light on the agency rationale for dividend outside the initial testing ground. Second, unlike most other studies that utilise the cost minimisation model, the assumption of a linear relationship between the dependent and explanatory variables is relaxed. For that purpose, the unrestricted model includes polynomial terms of the second degree of all non-dummy explanatory variables as well as interaction terms between all possible pairs. A simplification procedure is then carried out to arrive at the parsimonious specification.

The third contribution of this study is that a broader definition of what constitutes agency costs is considered. Particularly it is assumed that agency costs extend beyond owner-managers conflicts, to include conflicts within owner groups and between owners and other stakeholders. One implication of this assumption is that agency costs are higher in an interventionist business environment due to administrator-owner conflicts. The dividend device can help to solve such conflicts in a manner similar to the Easterbrook (1984) explanation. Specifically, the payment of dividends can reduce the costs associated with administrator-owner conflicts because it forces the firm to go to the capital market to raise funds for investment. When the firm is forced to the capital market, management actions are monitored by potential investors and by analysts. There is therefore increased pressure on managers to become more efficient, and to challenge the decisions imposed upon the firm by regulators. Consequently, the agency rationale for dividend should describe particularly well the situation in a highly administered environment such as the Indian business environment, and this is tested in the study.

However, two possible qualifications can be advanced against this proposition. First is the observation that the Indian financial system is bank-oriented. This implies less severe agency problems in India, and hence less need for the dividend-controlling device, compared with stock market-oriented systems such as in the US. Second, in spite of the traditional tendency towards central planning and intervention, India has been moving towards a more liberalised economy[1]. Progress, however, is slow and the government continues to play an important role in the Indian business environment. Bearing these two qualifications in mind, the proposition remains that agency costs are relatively high in the Indian environment. Therefore the agency costs variables included in the model are expected to be significant and important in explaining the dividend policies of Indian firms.

The remainder of this paper is structured as follows. Section 3.2 reviews some previous studies of the cost minimisation model. Section 3.3 states the empirical model and explains the predictions. Empirical procedures and results are presented in Section 3.4 while Section 3.5 concludes.

3.2 A selective review of the literature

The original cost minimisation model is due to Rozeff (1982), who specifies it as a regression of the firms' target payout ratios on five variables that proxy for agency and transactions costs. Transaction costs in the model are represented by three variables that proxy for the firm's growth rates and risk. High growth and high risk imply greater dependency on external finance either due to investment needs, or in order to honour financial obligations. This, in turn, means, that the firm raises external finance more frequently, hence bears higher transactions costs that are associated with raising external

[1] Liberalisation of the Indian economy began in the latter half of the 1980s, and more formally in the 1990s through a policy of reform programmes, which was initiated in July 1991. (Joshi and Little, 1997)

finance. Rozeff (1982) measures the firm's growth by the five-year average growth rate of revenues. An historic growth rate, that is based on the previous five years, as well as a predicted future growth rate that is based on the next five years, are calculated. The firm's risk is measured by its beta coefficient.

The model captures agency costs with two proxies. First, the fraction of the firm owned by insiders, α, is a proxy for insider ownership and is expected to be negatively related to the payout ratio. As insiders hold more of a firm's equity, the need to monitor their actions is reduced because the incentive for managers to misuse corporate resources falls. Second, the natural logarithm of the number of outside shareholders is a proxy for ownership dispersion. It is expected to be positively related to the payout ratio because the greater the dispersion, the more severe is the collective action problem of monitoring. Rozeff (1982) applies an Ordinary Least Squares (OLS) cross sectional regression to 1981 data on 1000 US firms, to give the results presented in Table 3.1, Study (1).

The results in Rozeff (1982) support the theory put forward, as all the estimated coefficients are highly significant and bear the hypothesised signs. The three transactions costs variables, past growth, future growth and risk, have negatively-signed estimated coefficients, as does the estimated coefficient of the variable measuring insider ownership. Similarly, the variable measuring ownership dispersion is shown to be significantly and positively related to the payout ratio. Thus the model provides good fit and consequently has attracted the attention of subsequent studies.

Table 3.1 Summary of results from selected studies of the cost minimisation model

	Rozeff (1982)	Lloyd et al (1985)	Schooley & Barney (1994)	Moh'd et al (1995)	Holder et al (1998)	Hansen et al (1994)	Rao & White (1994)
Study	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Method	OLS, CS	OLS, CS	OLS, CS	WLS, panel	OLS, panel	OLS, CS	ML, CS
No. firms	1000	957	235	341	477	81	66
Period	1981	1984	1980	1972-1989	1983-1990	1985	1928-88
Dependent	Payout ratio	Payout ratio	Dividend yield	Payout ratio	Payout ratio	Payout ratio	Payout ratio
Constant	47.81 (12.83)***	0.52 (16.52)***	0.10657 (19.255)***	13.533 (3.690)***	53.849 (23.716)***	99.95 (13.41)***	44.98 (3.35)***
Insider ownership	-0.09 (-4.10)***	–0.093 (-3.14)***	–0.00149 (-2.793)***	–0.054 (-2.751)***	–0.081 (-2.939)***		-43.32 (-3.37)***
Insider ownership squared			0.00005 (2.216)**				
Stakeholder theory					-4.361 (-3.595)***		
Regulation rank						–1.24 (-1.97)**	
Tax cost of not paying div							14.20 (2.00)**
Past growth	–0.321 (-6.38)***	–0.564 (-9.37)***	0.03302 (2.476)**	0.013 (0.371)	–11.743 (-4.516)***	–0.49 (-2.09)**	–7.16 (-0.98)
Future growth	–0.526 (-6.43)***	–0.216 (-2.15)**	–0.18055 (-7.502)***	–0.473 (-7.216)***			
Risk	–26.543 (-17.05)***	–0.184 (-8.65)***	–0.04843 (-9.676)***		–349.028 (-33.696)***		
Intrinsic business risk				-1.868 (-2.427)***			
Operating leverage risk				–16.266 (-9.209)***			
Financial leverage risk				–12.492 (-9.034)***			
Ownership dispersion	2.584 (7.73)***	0.025 (3.69)***	0.05519 (3.775)***	1.140 (2.639)***	1.879 (5.190)***		0.52 (2.47)**
Ownership concentration						–0.73 (-2.64)***	
Institutional ownership				0.036 (2.090)**			
Firm size		0.016 (4.53)***		0.310 (0.767)	1.859 (9.478)***		
Lagged dependent				0.465 (39.781)***			
Free cash flow					21.794 (6.629)***		
Flotation costs						–3.60 (-2.27)***	
R-2	0.48 (Adjusted)	0.31 (Adjusted)	0.498 (Adjusted)	0.338	0.36 (Adjusted)	0.25 (Adjusted)	0.33
F-statistic	185.47		39.654	83.032	299.69	7.58	7.44

Key: CS = Cross Sectional; OLS = Ordinary Least Squares; WLS = Weighted Least Squares; ML= Maximum Likelihood; T-statistic in parentheses; Significance levels: ** = 5%; *** = 1%; Variable definitions are given in Appendix 3A.
Source: Complied by author from a selective review of the literature

The study by Llyod, Jahera and Page (1985) is one of the first studies to modify Rozeff's (1982) model. The argument advanced is that the agency variables in the original model could be proxies for size in the sense that a large firm is likely to have a lower fraction of insider ownership and a higher number of shareholders. A size variable is therefore added to the model. To eliminate multicollinearity between the two agency variables and firm's size each of the agency variables is regressed on the size variable. The residuals then replace the original agency variables. Llyod, Jahera and Page (1985) apply an OLS cross sectional regression to 1984 data on 957 US firms, to give the results shown in Table 3.1, Study (2). These results indicate that after multicollinearity is properly controlled for, the cost minimisation model is still valid, with the estimates of all coefficients being significant and bearing the expected signs. Further, the study concludes that firm size is also an important explanatory variable and shows it to be positively related to the payout ratio.

Another study that questions some of the agency variables in Rozeff's (1982) model is by Schooley and Barney (1994). In particular, the relationship between insider ownership and the payout ratio is explored. According to Rozeff (1982) dividends decline monotonically with rises in the fraction of insider ownership. Schooley and Barney (1994) suggest that the relationship between dividend and insider ownership may be non-monotonic. At low levels of ownership the relationship between dividends and insider ownership is negative as predicted by the original cost minimisation model. However, when the fraction of insider ownership reaches a certain point, further increases cause agency costs to start rising and the need for the dividend control tool becomes necessary. Two explanations are put forward of why, at high levels of insider ownership, further rises in α increase agency costs.

First, when high proportion of their wealth is invested in the firm, insiders become less diversified. They then tend to evaluate projects based on total risk and may reject projects even when these are justified based on systematic risk. Second, when insiders hold a substantial percentage of voting rights, they achieve sufficient level of control that diminishes their risk of being replaced. If these explanations are valid, then a parabolic relation should be observed between insider ownership and dividends. Schooley and Barney (1994) empirically test this hypothesis using a variant of the cost minimisation model. However, unlike in the original model, the dependent variable is defined as the dividend yield and not the payout ratio. This ensures that the denominator of the dependent variable is a market measure (share price) rather than an accounting measure (net income). Further, replacing the payout ratio with the dividend yield avoids the problems of negative or very high dependent variable when the firm's net income is negative or close to zero. The broad definition of insiders in the original cost minimisation model is also modified and is replaced by a narrower definition of the chief executive officers (CEO).

The results of the OLS cross sectional regression analysis, using 1980 data on 235 industrial US firms are reported in Table 3.1, Study (3). The findings of a significant and negative estimated coefficient for CEO ownership, and a significant and positive estimated coefficient for the squared CEO ownership, support the hypothesis. CEO ownership is negatively related to the dividend yield over low levels of ownership, while the relation becomes positive when CEO ownership is high. Schooley and Barney (1994) estimate that the minimum dividend yield is when CEO ownership is at around 14.9 percent. The study provides further support for Rozeff's (1982) model and its main contribution to the debate, is by questioning the assumption of linearity in the relationship between α and the firm's dividend policy.

More support and further contribution to the agency theory of dividend debate, is provided by Moh'd, Perry and Rimbey (1995). They introduce a number of modifications to the cost minimisation model and in particular address the dynamic nature of the model. The idea is that if the model is dynamic, variation in the payout ratios across time can be explained by changes in the agency cost/transaction cost structure. To assess the dynamics in the dividend process, variables are not aggregated and the previous period's dividend payout ratio, (the lagged dependent variable), is added to the RHS of the model. Another modification is the inclusion of 26 industry dummies, following an analysis of variance (ANOVA) test that rejects the assumption of a common intercept across different industries[2]. Other innovations include breaking up beta, the

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[2] Glen, Karmokolias, Miller and Shah (1995) note that some industries are subject to significant volatility in their prices, and thus earnings, while other may be growing at different rates compared to the economy as a whole. It is hypothesised that such differences should have an impact on the dividend policy decision. Indeed, when the payout ratios of a number of Indian industries in 1990 and 1994 are compared, significant differences are recorded across industries as well as within the same industry over time.

systematic risk, into its three components to assess more directly the separate effects of financial leverage, operating leverage and the intrinsic business risk. Further, institutional ownership is added as an explanatory variable.

According to agency theory, the presence of institutional investors should have an adverse effect on the firm's payout ratio due to their role in monitoring managers' activities[3]. However, the prediction in Moh'd, Perry and Rimbey (1995) is of a positive relation between the payout ratio and the percentage of common stock held by institutions. This is justified by legal restrictions imposed on institutions against owning non-dividend-paying shares and also by the preference for dividends by institutions due to tax considerations[4]. The results of a Weighted Least Squares (WLS) regression, employing panel data on 341 US firms over 18 years from 1972 to 1989 are given in

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[3] The value of large shareholders, including institutions, in monitoring the firm, is the subject of Shleifer and Vishny (1986). It is proposed that large shareholders are in the best position to monitor the firm's management and implement improvements.

[4] A positive relation between institutional shareholders and dividends, due to tax preferences, is also implied by the hypothesis put forward in Redding (1995). The study explores the connection between firm size and its dividend policy and it is hypothesised that large firms pay dividends to satisfy the tax preferences of their institutional-dominated clientele. Empirical results support this hypothesis when the dividend policy decision is whether or not to pay dividends, but not when the decision is the amount of dividend to be paid. A more complex relationship, between institutional ownership and dividend-policy, that takes into account taxes as well as agency costs and the monitoring value of large shareholders, is described in Shleifer and Vishny (1986). They suggest that the payment of dividends is a type of compensation paid to large shareholders, with tax-related preference for high dividends, in return for their monitoring. This is why most firms pay dividends, in spite of being predominantly owned by small

Table 3.1, Study (4). These results support the view that the dividend process is of a dynamic nature as the estimated coefficient on the lagged dependent variable is found to be highly significant. The estimated coefficient on the institutional ownership variable is positive and significant, which is in line with tax explanations but contradicts the idea about the monitoring function of institutions.

Holder, Langrehr and Hexter (1998) expand the discussion by considering conflicts between the firm and its non-equity stakeholders. Stakeholder theory proposes that non-investor stakeholders in the firm, such as suppliers or customers, also influence the firm's decisions, including its dividend decisions. Specifically, stakeholders have implicit contracts with the firm and face the risk of the firm being unable to honour these contracts. The firm can reduce this risk by showing it has the ability to meet implicit obligations, and the net value it can create this way, is termed Net Organisational Capital (NOC). Firm whose activities are concentrated in a core business will find it more difficult to create NOC value. This is because problems in one business line are likely to pass on to related lines and increase the risk of the firm being unable to meet implicit obligations. However, the crucial point is that firms can use dividend policy to create NOC, because by reducing its payout ratio, the firm signals to implicit claimants an increase in its ability to meet implicit claims. Thus, in order to create NOC value, highly focused firms adjust their dividend policies downward, and business focus is expected to

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investors with tax-related preference for low dividends. It is also the reason that firms are co-owned by large and small shareholders in spite of different tax preferences.

be negatively-related to the payout ratio.

OLS regression results, utilising panel data on 477 US firms each with 8 years of observations, from 1983 to 1990, are presented in Table 3.1, Study (5). Free cash flow is an additional agency variable, which measures the free cash flow available to the managers of firm i in year t after investment in positive Net Present Value projects. In line with Jensen (1986), the higher free cash flow, the higher the potential for managers to misuse these resources. This means the agency problem is more severe, thus controlling it becomes more important. The positive relation found between the dependent variable and the free cash flow variable is therefore consistent with expectations. The rest of the results also confirm to expectations. The estimated coefficient on the stakeholder theory variable is shown to be significant and negative as predicted. The estimated coefficients on all the other explanatory variables are also shown to be statistically significant and to bear the hypothesised signs. Thus the findings in Holder, Langrehr and Hexter (1998) support both the agency model and stakeholder theory and have particular relevance in the case of India, as will be discussed at the end of this section.

Of similar relevance to the Indian case is the study by Hansen, Kumar and Shome (1994). The study also takes a broader view of what constitutes agency costs, and applies a variant of the cost minimisation model to the regulated electric utility industry. The prediction is that the agency rationale for dividend should be particularly applicable in the case of regulated firms because agency costs in these firms extend to conflicts of interests between shareholders and regulators.

Results of cross sectional OLS regression for a sample of 81 utilities and for the period ending 1985 are shown in Table 3.1, Study (6). All the estimated coefficients in the study are significant and bear the expected signs. The variable measuring ownership concentration has a negative estimated coefficient that is highly significant. This has been predicted because as ownership concentration rises there is greater per-owner benefit from monitoring and therefore there is less need for dividend-induced monitoring.

The two explanatory variables that measure transaction costs are flotation costs and the past growth rate. Flotation cost is measured as utility's u expected cost of raising external equity. A higher expected cost of flotation implies a higher cost of using the dividend mechanism. Hence the negative sign on the estimated coefficient of this variable is consistent with expectations. Similarly, the past growth rate, which represents the increase in demand for external funds when the firm experiences growth, is expected to have a negative coefficient. This is borne by the results.

Lastly, the regulation rank variable is utility's u regulatory commission rank and is based on estimation regarding the rate of return the regulatory commission permits the utility to earn. A high rank implies a lower degree of stockholder-regulator conflicts. As the need for the dividend monitoring device declines with reductions in agency conflicts, the coefficient on the regulation rank is expected to be negative. Indeed, results as reported in Study (6) of Table 3.1, show the estimated coefficient on this variable to be negative and significant. This indicates that the degree of regulations influences firms' target payout ratios in a direction that is consistent with agency theory.

While Hansen, Kumar and Shome (1994) apply the cost minimisation model to regulated firms, Rao and White (1994) apply it to private firms. In the case of private firms, the agency-related motivation to pay dividends may be less important, compared with publicly traded firms, for two main reasons. First, as agency problems that arise from the separation of ownership and control, are less applicable in the case of private firms, agency costs can be expected to be lower in the case of these firms. Second, as private firms do not participate in the capital market, the rationale for dividends as a mechanism for capital market monitoring is also weaker. In light of this, Rao and White (1994) empirically test whether agency-costs considerations still enter the dividend decisions of private firms.

The sample in Rao and White (1994) includes 66 private US firms that had been challenged in court by the Internal Revenue Service (IRS) for tax evasion between 1928 and 1988. It is noted that tax saving considerations may influence private firms towards preference for low payout policies. However, if the IRS suspects that a firm is retaining its earnings for the purpose of avoiding taxes, it may take steps to impose Accumulated Earnings Tax (AET) on that firm. As the IRS is unlikely to challenge firms with high payout ratios, the dependent variable of the firms included in the sample is not normally distributed. OLS methods are therefore inappropriate and a limited dependent variable, maximum likelihood technique is used to correct for this bias. Results are presented in Table 3.1, Study (7).

The results in Rao and White (1994) show the estimated coefficient on the variable measuring the expected tax cost of not paying dividends, the retained earnings to assets ratio, to be positive and significant as expected. When the firm expects a high AET cost, it can reduce this by paying higher dividends. Further, the results in Rao and White (1994) show insider ownership and shareholder dispersion, to be significant, with negative and positive estimated coefficients respectively. This implies that agency costs are an important consideration even for private firms. It appears that an agency rationale for dividends applies even to private firms that do not participate in the capital market. The authors note that perhaps by paying dividends, private firms can still induce monitoring by bankers, accountants and tax authorities.

To summarise, the agency theory of dividend in general, and the cost minimisation model in particular, appear to offer a good description of how dividend policies are determined. The variables in the original Rozeff's (1982) model remain significant with consistently signed estimated coefficients, across the other six models reviewed above. Specifically, the constant is, without exception, positively related to the dividend policy decision, while the agency costs variable, the fraction of insider ownership, is consistently negatively related to the firms' dividend policy. The latter is with exception of the study by Schooley and Barney (1994) were the relationship is found to be of a parabolic nature. Similarly, the agency costs variable, ownership dispersion, is consistently positively related to the firm's dividend policy, while the transaction cost variable, risk, is consistently negatively related to the firm's dividend policy regardless of the precise proxy used. The other transaction cost proxies, the growth variables, are also mainly significant and negatively related to the firm's dividend policy, although past growth appears to be a less stable measure than future growth[5].

However, in spite of the apparent goodness of fit of the cost minimisation model, its applicability to the Indian case may be challenged. Samuel (1996) hypothesises that agency problems are less severe in India compared with the US. This is due to the financial system in India being bank-oriented while that in the US is stock market-oriented[6]. Empirical testing in Samuel (1996) supports this hypothesis. In particular, consistent with the assumption that the Indian financial system is debt-oriented, Samuel (1996) finds that Indian firms rely more heavily on external debt (particularly from Development Financial Institutions[7]) than on external equity. Furthermore, consistent with the hypothesis that agency problems are less severe in India compared with the US, Samuel (1996) finds less dependency on internal finance as a source of funding by Indian

[5] Glen, Karmokolias, Miller and Shah (1995) find only a weak link between growth and dividend policy in a group of developing countries. These empirical results are also supported by their field-work, where it is found that some firms in high growth industries paid high dividends due to shareholders' demands.

[6] As pointed by Jensen and Meckling (1976), the lower the amount of outside equity, the less motivated are managers to exploit outside shareholders. Similarly, Easterbrook (1984) notes that increases in the debt to equity ratio can reduce the agency cost of equity.

[7] In the late 1960s the Indian government created Public Sector Development Financial Institutions (DFI) to provide medium and long term finance for investment. The three most important DFI include the Industrial Development Bank of India (IDBI), the Industrial Credit and Investment Corporation of India (ICICI) and the Industrial Finance Corporation of India (IFCI).

managers compared with US managers[8].

However, in contrast to the view expressed in Samuel (1996), other aspects of the Indian economy imply a particular suitability of the agency theory, and of the cost minimisation model, to this economy. Notably, as explained in Haque (1999), many developing countries, including India, established state-centred regimes following their independence[9]. These regimes drew their ideology from socialist and Soviet ideas and were accompanied by highly centralised economic policies.[10] It is this feature of the Indian economy that is hypothesised to lead to increasing agency problems and agency

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[8] Preference by managers, for internal over external finance, is consistent with agency behaviour and with managers' tendency to over-invest. It is easier for managers to over-invest out of internal rather than external finance because the latter subjects them to the discipline of the external capital market.

[9] Haque (1999) observes that since the late 1970s most of these countries have adopted more liberal regimes based on market-oriented ideologies. Joshi and Little (1997) note that liberalisation of the Indian economy began in the 1980s but more formally in the 1990s. However, it is also noted that in spite of these reforms, during the 1990s government intervention has remained relatively high.

[10] Joshi and Little (1997) list some of the economic controls established in India and the theoretical reasons behind them. These include the following: *Capacity controls* aimed at ensuring supply and demand met, and requiring licences for routine business decisions such as setting up or expanding plants.; *Monopoly controls* aimed at preventing monopolies and requiring firms of certain sizes to receive clearances prior to expansion.; *Concessions to small-scale industry,* such as tax concessions, aimed at promoting employment on the assumption that small businesses are labour intensive.; *Foreign trade controls* for the purpose of achieving self-reliance and including controls over imports, and restrictions on foreign ownership.; *Financial markets controls* including nationalisation of the banks in 1969 and high intervention in the banking and financial sectors.; *Price and distribution controls* aimed at ensuring access by the poor to certain basic necessities.; *Labour market controls* including wage regulations and heavy regulations on hiring and firing.

costs. This, in turn, means that the agency rationale for dividends should become more important.

Explicitly, these policies are hypothesised to increase agency costs on three accounts. First, they increase managers' agency behaviour per se. Indeed Joshi and Little (1997) note that when domestic firms enjoy subsidies or a policy of protectionism, the pressure on managers to become more efficient is relaxed. Second, high state intervention means an extension of agency problems to shareholder-administrator conflicts. Indeed, Hansen, Kumar and Shome (1994) show that the degree of industry regulation enters the dividend policy decision. Third, when management of the economy is based on social philosophies of protecting the weaker sectors such as employees or poorer customers, this influences managers to consider the interests of non-equity stakeholders. This implies that stakeholder theory should be particularly relevant to the Indian case, and, as shown by Holder, Langrehr and Hexter (1998) this may lead to a downward pressure on dividend levels. The relevance of stakeholder theory to the Indian case also implies extension of agency problems to conflicts of interests between equity holders and other stakeholders, increasing the need for shareholders to monitor management behaviour.

It is thus the case that on the one hand stands the prediction by Samuel (1996) that agency costs should be lower in the Indian business environment. This implies that the agency rationale for dividends should be less applicable in the case of India. To contrast this, the agency rationale for dividends is predicted to become particularly applicable to

India, due to the extension of agency problems on three accounts as explained above. An empirical procedure is the natural way to settle these differences and in this study the empirical approach draws from the study by Schooley and Barney (1994). There the assumption of a linear relationship is relaxed with respect to insider ownership, while in this study the assumption of linearity is relaxed with respect to all the explanatory variables.

Finally, Rao and White (1994) show that the agency theory of dividends is applicable even in the case of private firms. This also has particular important implications when the agency theory is investigated in the Indian context, because unlisted firms form a large part of that economy. It is to this investigation, of the agency theory of dividends in the Indian context, that attention is now turned.

3.3 The model

The model used in this study is a variant of the cost minimisation model where an attempt is made to capture the factors that are likely to be important in influencing the dividend policy of firms operating in the Indian environment. The general model, which captures the main variables identified in the selective literature review, is of the following form:

$$PAYOUT_i = \alpha_0 + \alpha_1\, AGENCY\ COSTS_i + \alpha_2\, TRANSACTION\ COSTS_i + \alpha_3\, FIRM\ SIZE_i + \alpha_4\, INDUSTRY\ DUMMY_i + \varepsilon_i \qquad (3.1)$$

Where the subscript, i, denotes the sample observation, i = 1,2,…n; PAYOUT is a proxy for the firm's target payout ratio; AGENCY COSTS represents agency costs; TRANSACTION COSTS captures transaction costs; FIRM SIZE measures firm size; INDUSTRY DUMMY captures the effect of the industry type on the intercept, α_0; and ε_i is the disturbance.

The model in Equation (3.1) can be expanded by exploring the key variables that represent agency and transaction costs. To measure agency costs, the AGENCY COSTS variable in Equation (3.1) is broken down into five variables. These include: GOV, measuring government ownership; INST, measuring institutional ownership; DIRS, measuring insider ownership; PUBLIC, measuring ownership dispersion; and FOREIGN, measuring foreign ownership. The TRANSACTION COSTS variable is broken down into two risk variables and a growth variable. The two risk variables include RISK1, measuring business risk, and DEBT1, which is a measure of financial risk. The growth variable, GROW1, represents growth opportunities. Equation (3.1) can thus be more specifically expressed in the form:

$$\begin{aligned} PAYOUT1_i = {} & \beta_0 + \beta_1 GOV_i + \beta_2 INST_i + \beta_3 DIRS_i + \beta_4 PUBLIC_i \\ & + \beta_5 FOREIGN_i + \beta_6 RISK1_i + \beta_7 DEBT1_i + \beta_8 GROW1_i \\ & + \beta_9 SIZE1_i + \Sigma \lambda_j (INDS_j)_i + \varepsilon_i \end{aligned} \tag{3.2}$$

Variable definitions are given in Appendix 3B, and the subscript *j* denotes the industry dummy as listed in that appendix. There are nineteen industry dummies, j = 0,1,3…19.

However, the nature of the relationship between the dependent and explanatory variables may not necessarily be linear. Therefore, to allow for a parabolic relation, a quadratic formulation is introduced. Further, the marginal effect of one explanatory variable may depend on another variable. To capture this, interaction terms are also added. The extended model, including the nine non-dummy explanatory variables, their quadratic and interaction terms, as well as the industry dummies and a constant, form the general model. For ease of notation, the non-dummy explanatory variables associated with the coefficients β_1 to β_9 in Equation (3.2) are marked as X_1 to X_9 respectively. The general model is hence:

$$PAYOUT_i = \beta_0 + \Sigma \beta_k (X_k)_i + \Sigma \gamma_k (X^2{}_k)_i + \Sigma \Sigma \delta_k (X_k X_m)_i$$

$$+ \Sigma \lambda_j (INDS_j)_i + \varepsilon_i \qquad (3.3)$$

Where the subscripts k and m, denote the explanatory variable X. k = 1,2…9, m = 2,3….9, and $m > k$. The Xs are the non-dummy variables that appear on the RHS of Equation (3.2) and are defined in Appendix 3B. The subscript j denotes the industry dummy and the subscript i denotes the sample observation, i =1,2,…n. The hypothesised relationships between each of the explanatory variables and the dependent variable are now discussed.

The linear relationship between the percentage held by the state and central governments, GOV, and the payout ratio is expected to be negative. The government is in a position to monitor the extent to which the firm is acting in its interests through parliamentary questions and audits. The need for the dividend mechanism to induce capital market monitoring is hence reduced[11]. In contrast, it could be argued that the larger the percentage held by the government, the higher the incentive of other shareholders to induce capital market monitoring. This is due to conflicts of interests between the state, whose objectives may not necessarily be that of wealth maximisation, and other shareholders. Hence as the percentage of government holding in the firm increases, other shareholders will demand higher dividends. This ensures that the firm is forced to go to the capital market and is thus monitored by the market, reducing the ability of government ownership to influence managers' behaviour. The expectation is thus of a linear negative relationship between GOV and the dependent variable but a positive relationship between the dependent variable and interaction terms that include GOV and other shareholders. The overall marginal effect of GOV on the target payout ratio is thus undetermined.

Next is INST, the fraction of institutional ownership. Relative to other investors, institutions have more incentive to spend resources on monitoring the firm and its management. This is due to their expertise and better ability to monitor management actions at relatively low cost. They also stand to benefit more from monitoring, because their percentage holding is normally relatively large. Furthermore, institutions are in a better position, compared with individuals, to take over inefficient firms and this threat is

[11] It could, however, be argued that there is a possibility of a positive linear relationship between the percentage of government holding and the payout ratio. This may be the case when political governance breaks down, and ministers engage in asset stripping.

another aspect forcing managers to become more efficient. Consequently, institutional ownership has traditionally been viewed as an answer to the free rider problem. This implies that the larger the percentage held by institutions, the less is the need for dividend induced monitoring. This, in turn, suggests an inverse relationship between INST and the dependent variable. However, Joshi and Little (1996) note that although Development Financial Institutions (DFI) and investment institutions have acquired dominant equity holdings in Indian firms, they have been unable to freely trade in shares and to challenge insiders[12]. This particular aspect of the Indian system may prevent institutions from carrying out their traditional monitoring role, and thus weakens the argument in favour of a negative marginal effect of INST on the target payout ratio[13]. Furthermore, conflicts of

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[12] Joshi and Little (1996) explain the inability of institutions to freely trade in shares and to challenge insiders, by the observation that most Indian firms are still controlled by a small group of shareholders referred to as the 'promoters'. The 'promoters' are often from the same family with relatively small percentage holding. However their controlling position has been protected by government legislation, court practice, and also by regulations introduced by the Securities and Exchange Board of India (SEBI). For example, the government can refuse the transfer of shares if this would change the control structure in the firm. Similarly SEBI introduced a new take over code in November 1994 aimed at discouraging this practice, which is vital to the ability of institutions to discipline management.

[13] Another aspect with implications on the ability of Indian financial institutions to carry out the traditional monitoring role is inefficiency. Joshi and Little (1997) note the low internal and organisational efficiency of Indian banks. Wogart (1999) notes the difficulties and greater exposure to risk faced by DFIs, which were brought about by the introduction of the 1991 reforms. In particular, the source of weakness of the DFIs was due to the abandonment of industrial licencing leading to increase in demand for long term finance at the same time when previously subsidised funds became less available. This, together with their concentration in stressed (sick) industries led to fears that the balance sheets of the main DFIs contain many non-performing assets. This, in turn, led to market valuation problems for these institutions.

interests, other than those between shareholders and managers, could mean a positive rather than a negative marginal effect of INST on the dependent variable, as is now explained.

First, as mentioned in the discussion on the government variable, GOV, conflicts of interests between the government group of shareholders and other shareholders become more severe with increases in the percentage of government holdings. As the percentage of institutional ownership increases, so does the ability of this group of shareholders to influence management to increase the payout ratio in order to reduce conflicts. This implies a positive sign on the estimated coefficient of the interaction term of GOV and INST[14]. Second, in a highly interventionist environment such as India, conflicts with regulators mean that a higher level of monitoring is required to control agency problems. In this case the level of monitoring carried out by the large shareholders may still be below the optimal level and shareholders will push for higher payouts to induce capital market monitoring. The higher is INST, the greater their ability to influence management actions, implying a positive direct relationship between INST and the dependent variable. Third, when management of the economy is based on socialist ideology, non-equity stakeholders can be expected to have more power. In line

[14] This argument is wakened by the extent to which the institution involved is controlled by the government. All banks in India were nationalised in 1969 and heavy regulations were imposed on the banking and financial sectors. However, this policy has been reversed by the economic reforms of the 1990s. For example, in the process of reforms, the government has allowed new Private Sector banks to enter and also encouraged some of the Public Sector banks to partially privatise.

with stakeholder theory, these stakeholders will push for lower payouts to ensure the firm can meet its implicit obligations. This may be against the interest of shareholders, thus creating pressure by, in particular influential shareholders, for higher payouts. Again, this implies a positive relation between INST and the payout ratio within the Indian context. Faced with these contradicting predictions, the overall marginal effect of INST on the target payout ratio is undetermined.

The higher is the percentage held by directors and their families, DIRS, the more aligned are their interests with those of outside shareholders. This is because as their level of holding in the firm rises, insiders bear more of the costs associated with their consumption of perquisites and stand to gain more if the firm does well and its stock price rises. Thus as the percentage of insider holdings rises, there is less potential for agency problems and less need for the dividend control mechanism. The prediction is therefore of an inverse relationship between DIRS and the dependent variable.

The percentage held by the public at large, PUBLIC, is a measure of ownership dispersion, assuming that the average holding per individual is relatively small. A better measure of dispersion (and the one that have been used by all the studies reviewed in Section 3.2) is based on the number of shareholders. However, this data is not available on the database, PROWESS, used in this study. The more widely spread is the ownership structure, the more acute the free rider problem and the greater the need for outside monitoring. The marginal effect of PUBLIC, on the dependent variable, is therefore expected to be positive.

FOREIGN is a measure of the percentage of foreign ownership. Glen, Karmokolias, Miller and Shah (1995) note that investors in developed countries often hold stock of developing countries for its long-run growth potential. If developing countries' stock is held for growth rather than for income, this suggests a negative relation between FOREIGN and the payout ratio. Furthermore, foreign holding increases foreign analysts' interest in the firm, resulting in more monitoring and hence with less need for the dividend induced monitoring device. Again, implying a negative relation between the percentage of foreign holdings and the payout ratio. On the other hand, if it is assumed that the task of monitoring management is more difficult and costly for overseas investors, than the need to pay dividends is increased with increases in the percentage of foreign holdings. In light of these contradicting predictions, the nature of the relationship between FOREIGN and the dependent variable is undetermined[15].

The three transaction costs variables are GROW1, RISK1 and DEBT1. When the firm is expected to need to raise external finance more often, its transaction costs are expected to be higher. Dependency on external finance rises with growth opportunities and with the volatility of earnings. Hence both GROW1 and RISK1 are expected to have negative marginal effects on the dependent variable.

Similarly DEBT1 represents both an increase in dependency on external finance

[15] A possible limitation to the use of FOREIGN as an agency variable, is foreign ownership restrictions in India. These restrictions imply that foreign investors are not totally free in their investment decisions and this could have implications on the interpretation of the observed relationship between FOREIGN and the

and an increase in the total risk of the stock. It represents dependency on external finance to the extent that it represents the fixed costs, which the firm is committed to, and because debt has to be repaid, leading to the need for re-financing. Further, DEBT1 represents risk, in the sense that it is a proxy for the financial risk associated with the stock. As a risk variable, a higher level of debt implies a higher level of fees when external finance is raised. Thus, DEBT1, like the other risk variable, RISK1, is also predicted to be negatively related to the payout ratio. Moreover, debt and dividends are sometimes viewed as alternative mechanisms to control agency costs. Jensen (1986), Johnson (1995), Crutchley and Hansen (1989) and Agrawal and Jayaraman (1994) among others, note that the free cash flow problem can be controlled by either issuing debt or by paying dividends. This is for two reasons. First, both debt and dividends lead to more frequent visits to the capital market thus both induce capital market monitoring of the firm. Second, both, having debt in the capital structure and paying dividends, are forms of a commitment to pay out cash. If debt and dividends are alternative ways to achieve the same goal, than there should be an inverse relationship between them.

The nature of the relationship between firm size and the payout ratio is not predicted but is to be determined by the data. This is because both a negative and a positive relationship between the size of the firm and its dividend policy can be justified by agency theory. On the one hand large firms face relatively lower cost per dollar raised externally. This is because a large part of issuance costs are fixed so larger firms benefit

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dependent variable.

from economies of scale when raising (larger amounts of) external finance. At the same time, larger firms are likely to have more dispersed ownership structure and in that sense face higher potential for agency problems. The lower transaction costs and the higher potential for agency problems, imply a positive correlation between firm's size and the use of the dividend control mechanism. However, large and influential firms usually attract more attention and are likely to be tensely monitored by the media, and the general public. These firms also tend to have highly traded stock and are thus likely to be continuously monitored by participants in the secondary market. Further, large firms tend to have easier access to the alternative agency cost control mechanism, namely debt. There is therefore less need for managers of large firms to induce monitoring through the payment of dividends. This implies a negative correlation between firm size and the dependent variable. The expected marginal effect of SIZE1 on the dependent variable is hence not specified.

The hypothesised signs on the estimated coefficients of the explanatory variables are summarised in Table 3.2. Not included in Table 3.2, however, are the predictions regarding the nature of the relationship between dividends, and the industry dummies, $INDS_j$. Firms in different industries operate under different set of regulations and often face different levels of risk and growth potential. The industry dummies, $INDS_j$, are included to test for a difference in the intercept when the firm belongs to specific industries. The prediction is that firms that operate under a higher degree of regulation face higher agency costs due to conflicts between owners and regulators. Such firms are expected to have significantly higher payout ratios. Similarly, firms facing opportunities for growth or higher risk are expected to have significantly lower payout ratio compared with the controlled group[16].

Table 3.2 Predicted signs on the estimated coefficients of the explanatory variables when regressed on a measure of dividend payout

Variable	**Predicted sign of the linear association between payout and the explanatory variable**	**Overall marginal effect**
GOV	(-)	Undetermined
INST	(-/+)	Undetermined
DIRS	(-)	Negative
PUBLIC	(+)	Positive
FOREIGN	(-/+)	Undetermined
RISK1	(-)	Negative
DEBT1	(-)	Negative
GROW1	(-)	Negative
SIZE1	(-/+)	Undetermined

Variable definitions are given in Appendix 3B.

Empirical procedures are applied to test the above predictions, which can be summarised as follows. Of the nine non-dummy explanatory variables, PUBLIC is the only variable predicted to be positively related to the target payout ratio while DIRS, RISK1, DEBT1 and GROW1 are all predicted to be negatively related to the target payout ratio. The remaining non-dummy explanatory variables include GOV, INST, FOREIGN and SIZE1. Although the nature of the relationship between these variables and the dependent variable have been considered, no definite predictions are made regarding their marginal effects on the target payout ratio. The testing procedures and testing results are discussed in the next section, starting with description of the data.

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[16] See footnote (5).

3.4 Empirical procedures and results

3.4.1 The data

The data are retrieved from the PROWESS database updated to 8 March 2000[17]. All input/raw values that are based on numbers reported in audited accounts are stated in crore (ten million) Indian rupees. Utilising the annualised mode in PROWESS, all profit and loss and associated figures are annualised to correct for values reported in respect of periods other than 12 months.

At the time the data were collected, the PROWESS database contained nearly 8000 firms of which about 4800 were listed on the Bombay Stock Exchange (BSE). This paper initially took the universe of 4829 BSE-quoted companies and screened them on the basis of the following criteria: none of the raw data requested from PROWESS are missing; profit after tax in each of the years 1994 to 1998 is positive. This process resulted in a sample of 952 firms. However, as Public Sector firms are assumed to behave fundamentally different to Private Sector firms, 42 firms associated with the former were excluded, to give a sample of 910 firms. This sample was further reduced in the process of constructing the variables and the weighting series and due to the removal of outliers. The sample construction procedure is described in Appendix 3C and resulted in a sample size of 880 observations, the descriptive statistics of the non-dummy

[17] PROWESS is a database developed and maintained by the Centre for Monitoring Indian Economy (CMIE).

variables of which are presented in Table 3.3.

Table 3.3 Descriptive statistics for Model 1: Indian Private Sector firms 1994-1998
(Number of observations: 880)

	Mean	**Std Dev**	**Minimum**	**Maximum**	**Sum**	**Variance**	**Skewness**	**Kurtosis**
PAYOUT1	0.2948	0.1523	0.0000	0.8621	259.4325	0.0232	0.6620	0.7875
GOV	0.0051	0.0329	0.0000	0.4177	4.4774	0.0011	8.1871	73.2186
INST	0.0997	0.1098	0.0000	0.5151	87.6965	0.0121	1.0401	0.0934
DIRS	0.1381	0.1786	0.0000	0.8828	121.4813	0.0319	1.4542	1.4864
PUBLIC	0.2670	0.1584	-0.2576	0.9508	234.9698	0.0251	0.9433	1.2370
FOREIGN	0.1312	0.1859	0.0000	0.8028	115.4829	0.0346	1.5763	1.4685
RISK1	0.0788	0.0539	0.0054	0.3153	69.3512	0.0029	1.5228	2.7659
DEBT1	0.3323	0.1563	0.0000	0.9038	292.3900	0.0244	0.1374	-0.0237
GROW1	0.2374	0.2211	-0.6093	2.9989	208.8684	0.0489	3.4821	30.8976
SIZE1	4.5534	1.4243	0.2531	9.6629	4007.0155	2.0286	0.3468	0.2282

Correlation Matrix

	PAYOUT1	**GOV**	**INST**	**DIRS**	**PUBLIC**	**FOREIGN**	**RISK1**	**DEBT1**	**GROW1**
PAYOUT1	1.0000								
GOV	0.0097	1.0000							
INST	-0.0326	0.0741	1.0000						
DIRS	-0.0683	-0.0975	-0.3170	1.0000					
PUBLIC	0.0531	-0.0203	-0.2105	-0.1420	1.0000				
FOREIGN	0.0816	-0.0290	0.0397	-0.2877	-0.2501	1.0000			
RISK1	-0.1866	-0.0155	-0.1558	0.1446	-0.0709	0.0411	1.0000		
DEBT1	-0.0565	-0.0265	0.0906	0.0210	0.0551	-0.2919	-0.2411	1.0000	
GROW1	-0.0802	-0.0370	-0.1687	0.0681	0.1514	-0.1071	0.0507	0.1777	1.0000
SIZE1	-0.0319	0.0408	0.4627	-0.3772	-0.1216	0.1591	-0.1731	0.1775	-0.0003

Variable definitions are given in Appendix 3B.

Table 3.3 also presents the correlation matrix for the non-dummy variables. There does not appear to be high correlation between any two of the explanatory variables (With exception, perhaps, of INST and SIZE1 with correlation value of 0.46). However, to assess more directly whether multicollinearity is present, the Variance Inflation Factor (VIF) procedure is undertaken. VIF(β_k) can be interpreted as the ratio of the actual variance of the estimated coefficient, VAR(β_k), to what it would have been in the absence of multicollinearity. (In the latter case, the coefficient of multiple determination, R^2_k, in a regression of the explanatory variable, X_k, on all other explanatory variables is zero). VIF values for all the non-dummy explanatory variables of Equation (3.2) are reported in Table 3.4. As can be observed from Table 3.4, all the VIF values are close to unity and none exceeds two, confirming that the sample data do not suffer from multicollinearity.

The specification of the model of Equation (3.2) includes 19 industry dummies and the relevance of including these dummies is assessed in a manner similar to the approach in Moh'd, Perry and Rimbey (1995). Specifically, the hypothesis that there is no difference in the means of the dependent and independent variables, across the different industries, is tested using an ANOVA procedure. For this purpose, each of the non-dummy variables of Equation (3.2) is regressed on a constant and on the 19 industry dummies, (INDS0-INDS1, INDS3-INDS19). The F-statistics, testing the hypothesis that none of the explanatory variables influences the dependent variable, are presented in the last column of Table 3.4.

As can be seen from Table 3.4, the hypothesis that there is no difference between the means is rejected at the 1 percent significance level in all but two cases. In the first of these two cases, where GOV is the dependent variable, the null hypothesis is rejected at the 10 percent significance level. In the second case, where DIRS is the dependent variable, the null hypothesis is rejected at the 5 percent significance level.

Table 3.4 Results of: Variance Inflation Factor (VIF) Procedure and of Analysis Of Variance (ANOVA) Procedure for the dependent variable and all the non-dummy independent variables

	VIF Procedure		ANOVA procedure
Variable	**R^2_k**	**VIF**	**F-STAT**
PAYOUT1			4.8094
GOV	0.3623	1.0529	1.5813
INST	0.3623	1.5682	4.7554
DIRS	0.3369	1.5080	1.8557
PUBLIC	0.2385	1.3132	3.0403
FOREIGN	0.3017	1.4321	4.6246
RISK1	0.1294	1.1486	2.4420
DEBT1	0.3118	1.4531	10.5647
GROW1	0.1390	1.1614	3.2462
SIZE1	0.3743	1.5981	4.3445

R^2_k is the R-squared in a regression of X_k (the variable on the left most column) on a constant and the rest of the explanatory variables.
$VIF(\beta_k) = 1/(1 - R^2_k)$ where β_k is the estimated coefficient on the explanatory variable, X_k.
Sample size, n = 880; Variable definitions are given in Appendix 3B.
Critical values for F(19,860) are as follows:
Upper tail area 0.01 = 1.9274, Upper tail area 0.05 = 1.5982, Upper tail area 0.10 = 1.4396

3.4.2 Empirical procedures

The approach taken to model formulation is the general to specific, starting by applying Feasible Generalised Least Squares (FGLS) procedure to the general model of Equation (3.3)[18]. This unrestricted model is based on theory but allows for possible non-linear effects and for interactions among variables. A simplification procedure is then carried out and involves putting the general model through Wald and t-tests, to arrive at the parsimonious specification.

In order to construct the weights for the FGLS procedure, the variances of the disturbances are assumed to be proportional to the expected values of the dependent variable. That is, the variance function is assumed to be of the form:

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[18] The FGLS procedure has been applied to correct for possible heteroskedasticity, which is a common problem in cross sectional data. As the structure of the heteroskedasticity is unknown, an auxiliary

$$Var(\varepsilon_i) = \alpha Z_i \tag{3.4}$$

$$Z_i = E(PAYOUT1_i)$$

The fitted values from the OLS regression, which constitutes the auxiliary regression, are used as estimates of Z_i. The weights are the inverses of the fitted values unless these are non-positive, in which case they are replaced by the actual value of the dependent variable, $PAYOUT1_i$.

The weighted data are computed by multiplying the original data by the square roots of the weights. However, the TSP programme normalises the weights by dividing them by a constant, so that they sum to the number of observations. The normalisation procedure ensures that the magnitudes of the weighted data and of the weighted residuals are similar to those of the original data and residuals. Models based on the original data and on an alternative weighting-scheme, that uses the squared OLS residuals, were also experimented with to give similar results[19].

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regression is used to obtain estimates of the factor to which the variances of the disturbances are assumed to be proportional.

[19] In the alternative weighting scheme it is assumed that all the explanatory variables are the source of the heteroskedasticity in the disturbances. However, as the variances of the disturbances are unknown, they are replaced by the squared residuals. Therefore, the squared residuals, obtained from the original OLS regression, are regressed on a constant, the nineteen industry dummies and the nine non-dummy explanatory variables, their squares and cross products. The fitted values from this auxiliary regression are used to compute the weights. Nonetheless, where these fitted values are non-positive they are replaced by the actual squared residuals.

Table 3.5 Results for the specified weighted regression

	MODEL1		MODEL2		MODEL3		MODEL4		MODEL5		MODEL6		MODEL7	
Dependent	PAYOUT1		PAYOUT1		PAYOUT1		PAYOUT1		PAYOUT1		PAYOUT1		PAYOUT2	
observations	880		893		847		870		893		881		867	
Adj. R-squared	0.526		0.237		0.218		0.732		0.531		0.641		0.298	
F-statistic	41.717	[.000]	13.029	[.000]	9.436	[.000]	95.836	[.000]	38.336	[.000]	61.334	[.000]	15.172	[.000]
Variable	**Estimate**		**Estimate**		**Estimate**		**Estimate**		**Estimate**		**Estimate**		**Estimate**	
C	0.462	[.000]	0.368	[.000]	0.598	[.000]	0.479	[.000]	0.495	[.000]	0.435	[.000]	0.678	[.000]
GOV	-0.654	[.000]	-0.619	[.002]	-2.097	[.001]							-0.768	[.000]
INST											-0.221	[.162]		
DIRS													-0.393	[.001]
PUBLIC			0.389	[.000]										
FOREIGN					-0.236	[.053]							-0.270	[.045]
RISK1	-1.491	[.000]	n/a		n/a		-1.559	[.000]	-1.533	[.000]	-1.450	[.000]	-1.190	[.001]
RISK2	n/a				n/a		n/a		n/a		n/a		n/a	
RISK3	n/a		n/a		-0.132	[.004]	n/a		n/a		n/a		n/a	
DEBT1	-0.293	[.079]	-0.608	[.000]	-0.171	[.012]	n/a		-0.300	[.066]			-0.487	[.012]
DEBT2	n/a		n/a		n/a				n/a		n/a		n/a	
GROW1					-0.292	[.000]			n/a					
GROW2	n/a		n/a		n/a		n/a		-0.291	[.000]	n/a		n/a	
SIZE1					-0.057	[.000]	-0.028	[.000]			n/a		-0.055	[.000]
SIZE2	n/a		n/a		n/a		n/a		n/a				n/a	
SQR(INST)									-0.179	[.152]				
SQR(DIRS)	0.166	[.088]	0.163	[.080]			0.205	[.023]	0.154	[.100]	0.182	[.079]	0.317	[.015]
SQR(PUBLIC)	-0.322	[.001]	-0.462	[.000]	-0.370	[.001]	-0.402	[.000]	-0.505	[.000]	-0.353	[.000]	-0.506	[.000]
SQR(RISK1)	3.022	[.001]	n/a		n/a		2.908	[.003]	3.371	[.000]	2.914	[.002]	2.735	[.015]
SQR(DEBT1)	-0.311	[.016]					n/a		-0.271	[.020]	-0.288	[.000]	-0.354	[.014]
SQR(GROW1)	0.053	[.050]					0.076	[.001]	n/a		0.075	[.028]	0.059	[.004]
SQR(GROW2)	n/a		n/a		n/a		n/a		0.040	[.001]	n/a		n/a	
SQR(SIZE1)	-0.003	[.001]	-0.002	[.016]					-0.003	[.002]	n/a			
SQR(SIZE2)	n/a		n/a		n/a		n/a		n/a		-0.002	[.005]	n/a	
GOV INST	4.277	[.000]	4.292	[.001]			5.584	[.000]	4.307	[.000]	4.358	[.000]	4.574	[.000]
GOV DIRS					8.949	[.000]								
GOV RISK1			n/a		n/a		-8.325	[.000]	-6.663	[.000]	-6.508	[.001]		
GOV SIZE1					0.435	[.001]					n/a			
INST PUBLIC			0.452	[.016]										
INST FOREIGN									0.652	[.000]				
INST RISK2	n/a		-1.425	[.001]	n/a		n/a		n/a		n/a		n/a	
INST RISK3	n/a		n/a		-0.199	[.024]	n/a		n/a		n/a		n/a	
INST DEBT1					0.473	[.008]	n/a							
INST GROW1							-0.237	[.081]	n/a					
INST SIZE2	n/a		n/a		n/a		n/a		n/a		0.044	[.150]	n/a	
DIRS DEBT1	0.278	[.081]	0.372	[.030]	0.295	[.093]	n/a		0.343	[.031]			0.467	[.028]
DIRS SIZE1	-0.049	[.001]	-0.062	[.000]	-0.044	[.003]	-0.041	[.001]	-0.057	[.000]	n/a			
DIRS SIZE2	n/a		n/a		n/a		n/a		n/a		-0.031	[.025]	n/a	
PUBLIC RISK1	1.058	[.022]	n/a		n/a		1.409	[.003]	1.222	[.018]	0.961	[.039]	0.806	[.142]
PUBLIC RISK2	n/a		-0.708	[.000]	n/a		n/a		n/a		n/a		n/a	
PUBLIC GROW1	-0.312	[.001]			-0.261	[.035]	-0.249	[.002]	n/a		-0.247	[.012]	-0.214	[.031]
PUBLIC SIZE1	0.052	[.000]			0.082	[.000]	0.056	[.000]	0.054	[.000]	n/a		0.071	[.000]
PUBLIC SIZE2	n/a		n/a		n/a		n/a		n/a		0.058	[.000]	n/a	
FOREIGN GROW1							-0.557	[.002]	n/a		-0.332	[.097]		
FOREIGN SIZE1	0.021	[.001]	0.017	[.007]	0.068	[.008]	0.045	[.000]			n/a		0.071	[.011]
FOREIGN SIZE2	n/a		n/a		n/a		n/a		n/a		0.035	[.000]	n/a	
RISK2 DEBT1	n/a		0.800	[.006]	n/a		n/a		n/a		n/a		n/a	
RISK3 GROW1	n/a		n/a		0.097	[.000]	n/a		n/a		n/a		n/a	
RISK3 SIZE1	n/a		n/a		0.024	[.013]	n/a		n/a		n/a		n/a	
DEBT1 GROW1	0.502	[.001]	0.474	[.001]	0.498	[.005]	n/a		n/a		0.429	[.003]	0.554	[.001]
DEBT1 GROW2	n/a		n/a		n/a		n/a		0.592	[.000]	n/a		n/a	
DEBT1 SIZE1	0.055	[.030]	0.076	[.000]			n/a		0.039	[.133]	n/a		0.101	[.001]
GROW1 SIZE1	-0.043	[.000]	-0.050	[.000]					n/a		n/a		-0.067	[.000]
GROW1 SIZE2	n/a		n/a		n/a		n/a		n/a		-0.043	[.001]	n/a	
INDS1									0.035	[.086]				
INDS3							-0.034	[.105]						
INDS4			-0.034	[.052]	-0.038	[.023]	-0.037	[.036]			-0.036	[.037]	-0.033	[.078]
INDS5	-0.091	[.000]	-0.090	[.000]	-0.110	[.000]	-0.098	[.000]	-0.081	[.000]	-0.086	[.000]	-0.108	[.000]
INDS7	-0.041	[.014]	-0.050	[.004]	-0.045	[.010]	-0.041	[.021]	-0.030	[.064]	-0.047	[.006]	-0.044	[.040]
INDS9					-0.037	[.035]	-0.034	[.034]			-0.029	[.077]		
INDS10	-0.083	[.000]	-0.080	[.000]	-0.079	[.000]	-0.089	[.000]	-0.069	[.000]	-0.087	[.000]	-0.062	[.005]
INDS11					-0.057	[.082]								
INDS12	0.143	[.000]	0.116	[.000]	0.112	[.000]	0.109	[.000]	0.149	[.000]	0.112	[.000]	0.147	[.000]
INDS13									0.050	[.017]				
INDS14	0.126	[.008]	0.125	[.006]	0.112	[.006]	0.119	[.014]	0.128	[.004]	0.133	[.018]	0.091	[.043]
INDS17							-0.064	[.061]						
INDS19					0.031	[.068]	0.028	[.115]	0.028	[.127]				

Standard Errors are heteroskedastic-consistent (HCTYPE=2); Method of estimation is weighted least squares; Statistics are based on transformed data; [probability values]

Table 3.5, Model 1, presents the results of the specified model. However, to assess the sensitivity of the results to the selection of proxies, each of the transaction costs and size proxies as well as the dependent variable have been substituted by alternative measures, to form six additional models, Model 2 to Model 7. The use of different variable definitions resulted in different sample sizes for each model as indicated in Table 3.5. Changes from Model 1, in each of the additional models, are discussed below while definitions for the alternative variables are given in Appendix 3B.

Models 2 and 3 use alternative risk variables, while Model 4 uses an alternative financial risk variable. In Model 2, RISK1, which measures the volatility of the return on capital employed, is replaced by RISK2, which is the standard deviation of the daily stock returns. In Model 3 RISK1 is replaced by RISK3, which measures the volatility in the first difference of annual profits. Model 4 replaces DEBT1, which is the average ratio of total borrowings to total assets, with DEBT2, the average ratio of profit before interest to profit after interest.

The growth variable in Model 1, GROW1, is measured as growth in income, which is consistent with most of the studies reviewed in Section 3.2. In Model 5 this is replaced by GROW2, which measure the growth in total assets, consistent with Hansen, Kumar and Shome (1994). Similarly, Model 6 use SIZE2 in place of SIZE1 of Model 1, which measures firm size in terms of total assets. SIZE2, is also a firm size variable but is based on income as in Lloyd, Jahera and Page (1985), Moh'd, Perry and Rimbey (1995), and Holder, Langrehr and Hexter (1998).

Finally, in Model 1 the dependent variable, PAYOUT1, is measured as the ratio of the sum of common dividend paid during a five-year period to the sum of profits in the same period. This is consistent with Hansen, Kumar and Shome (1994), but differs from the approach taken by most other studies reviewed in Section 3.2. This more common approach to measuring the target payout ratio is taken in Model 7, where PAYOUT1 is replaced by PAYOUT2, which is the five-year average annual payout ratio.

Table 3.6 Marginal Effects (based on the unweighted means)

	MODEL1	MODEL2	MODEL3	MODEL4	MODEL5	MODEL6	MODEL7
Dependent	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT2
GOV	-0.2274	-0.1915	1.1181	-0.10499	-0.0983	-0.0788	-0.3107
INST	0.0218	0.0256	0.0126	-0.02717	0.0712	-0.0031	0.0236
DIRS	-0.0829	-0.1132	-0.0578	-0.12877	-0.1008	-0.0869	-0.1502
PUBLIC	0.0757	0.1303	0.1168	0.092468	0.0724	0.0839	0.0675
FOREIGN	0.0963	0.0773	0.0731	0.073817	0.0649	0.0776	0.0556
RISK1	-0.7319	-	-	-0.76634	-0.7056	-0.7667	-0.5458
RISK2	-	-0.0653	-	-	-	-	-
RISK3	-	-	-0.0208	-	-	-	-
DEBT1	-0.0929	-0.0351	0.0330	-	-0.0899	-0.0888	-0.0661
DEBT2	-	-	-		-	-	-
GROW1	-0.0854	-0.0700	-0.1291	-0.1273	-	-0.1217	-0.1499
GROW2	-	-	-	-	-0.0714	-	-
SIZE1	-0.0090	-0.0103	-0.0130	-0.012779	-0.0078	-	-0.0086
SIZE2	-	-	-	-	-	-0.0112	-

The results of Table 3.5 are summarised in Table 3.6, which presents the marginal effects of each of the non dummy explanatory variables on the dependent variable. The marginal effect of the explanatory variable, X_k, on the dependent variable, Y, represents the expected change in Y for a unit change in X_k. Marginal effects are obtained by partially differentiating the dependent variable with respect to each of the nine non-dummy explanatory variables, using mean values of the original (non-weighted) variables where necessary. The results in Table 3.6 and Table 3.5 can be used to assess whether the relationships between the dependent and independent variables confirm to expectations. This assessment is carried out in the next section.

3.4.3. Estimation and testing results

As shown in Table 3.5 and Table 3.6, the model appears to be relatively robust to alternative specifications. In most cases, the marginal effects of all the non-dummy explanatory variables, on the dependent variable, bear the expected signs as predicted by the agency theory of dividends. Furthermore, excluding the size variable, the results are consistent with findings in the studies reviewed in Section 3.2. These results are, in general, supportive of the hypothesis that the agency theory of dividends and the cost minimisation model describe well the Indian data[20].

The first agency variable, GOV, measures the percentage of common equity held by the government. A negative linear relationship was predicted between GOV and the dependent variable, because government is in a relatively good position to monitor. (Hence the need for dividend-induced capital market monitoring is reduced). Indeed, in

[20] Appendix 3D presents the results for the unweighted procedure while Appendix 3E contains the results for the alternative weighting scheme regressions. These results are similar to those reported in Tables 3.5 and 3.6.

the four models (Model 1, Model 2, Model 3 and Model 7) where a simple linear relation is retained, the estimated coefficient is consistently negatively signed and significant at the 1 percent significance level. This negative relation between GOV and the payout ratio can also be interpreted in the context of by Hansen, Kumar and Shome (1994). The hypothesis is that a policy of state intervention increases the potential for agency conflicts by extending the problem to owner-regulator conflicts. As higher percentage of shares are held by the government, investors' goals shift from wealth maximisation to social and political issues and consequently owner-regulator conflicts are smoothed out. However, the interaction term of GOV and INST, appears with a positive coefficient that is significant at the 1 percent level in all models but Model 3. This is also consistent with the prediction made in Section 3.3 and is indicative of conflicts of interests between government and other (mainly influential) shareholders such as institutions[21]. While the prediction of the overall marginal effect of GOV was inconclusive, the actual effect is found to be negative in all but Model 3.

The overall marginal effect of INST, the percentage of common equity held by institutions, was also not decisively predicted. In five of the seven models (Model 1, Model 2, Model 3, Model 5 and Model 7) the marginal effect of INST on the dependent variable is found to be positive. This is inconsistent with the view that the ability of institutional shareholders, to more effectively monitor the firm, reduces the need for the dividend mechanism. However, evidence of a positive relation between INST and the

[21] But see footnote (14)

payout ratio is consistent with the preference-for-dividends-related prediction and results in Moh'd, Perry and Rimbey (1995). It is also consistent with the notion that due to greater agency conflicts, the level of institutional monitoring is insufficient. Hence this influential group of shareholders pushes for higher payouts to induce capital market monitoring.

The marginal effect of the percentage of insider ownership, DIRS, on the dependent variable is negative under all specifications in line with the prediction made. In six models (Model 1, Model 2, Model 4, Model 5, Model 6 and Model 7) the estimated coefficient on the squared DIRS is positive and significant at the 10 percent significance level at least. This is consistent with the results in Schooley & Barney (1994) and indicates positive impact, which becomes stronger at high levels of insider ownership. It implies that although the overall impact of insider ownership is to reduce agency costs, high levels of insider ownership give rise to additional agency problems[22].

The marginal effect of PUBLIC, the variable measuring ownership dispersion, on the target payout ratio is positive. As predicted it appears that increases in the dispersion of ownership increases the collective action problem of monitoring and thus the need for the dividend induced capital market monitoring. However, under all models the

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[22] See the review of the study by Schooley & Barney (1994) in Section 3.2, where it is suggested that at high levels of insiders ownership, agency problems become more severe for two reasons:

1. At high levels of inside ownership, insiders become more risk averse as they are less well diversified.
2. When insiders have sufficient voting powers, they become immune to the threat of being replaced.

estimated coefficient of the squared PUBLIC variable is negative and significant at the 1 percent level. This indicates that high dispersion of ownership, particularly at high levels, can contribute to reducing agency costs. Perhaps as more people hold the shares, activity in the secondary market increases, as does the public attention directed towards the firm, thus inducing monitoring and reducing the need for the artificial dividend mechanism.

The prediction regarding the marginal effect of the percentage of foreign ownership, FOREIGN, on the payout ratio was inconclusive. However, the actual marginal effect is found to be positive in all models. This indicates that the greater the percentage held by foreign institutions, the greater the need to induce capital market monitoring. It is consistent with the view that, relative to other shareholders, it may be more difficult for overseas investors to monitor the firm and its management.

The transaction costs variables, measuring growth opportunities, business and financial risks, generally confirm to the prediction of a negative impact on the payout ratio. The marginal effect of the variable entered as a proxy for business risk, (RISK1/RISK2/RISK3) is found to be negative in all models. The variables RISK1 and RISK3 enter the models in which they are included with negative estimated coefficients, which are significant at the 1 percent significance level. The variable RISK2 (replacing RISK1 in Model 2) does not enter the specified model on its own, but appears only in two interaction terms (with INST and with PUBLIC). It should be noted, however, that RISK2 represents the total risk associated with holding the firm's shares rather than its business risk alone. (RISK2 is the standard deviation of daily stock returns).

Evidence regarding the nature of the relationship between debt and the target payout ratio is not very strong. The financial risk variable is shown to have the predicted negative marginal effect on the payout ratio in five models (Model 1, Model 2, Model 5, Model 6 and Model 7). However, in Model 3, the level of debt in the firm's capital structure, appears to have a positive effect on the target payout ratio. In Model 4, where DEBT2 measures the effect of interest payments on profits, this debt variable completely drops out of the specified model.

The marginal effect of the growth variable on the payout ratio appears to be negative in all models. It is interesting to note, however, that the estimated coefficient on the interaction term between the growth variable and DEBT1 is positive and significant at the 1 percent significance level. Indeed this apparently important interaction term enters all the specified models where DEBT1 is included regardless of how growth is measured (that is, in all models apart of Model 4 where DEBT2 replaces DEBT1). This may suggest that in line with agency behaviour growing firms, that finance their growth by borrowings, are under greater pressure to increase their payout ratios. This may be explained by the risk that the uncertain cash flows to be generated from growth opportunities will be insufficient to meet owners' needs after all creditors have been paid.

Consistent with Lloyd, Jahera and Page (1985) firm size appears to be an important factor in determining target payout ratios. The variable measuring firm size enters each model, in one form or another, with a significant estimated coefficient. No definite prediction was made in this study regarding the nature of the relationship between the firm's size and its dividend policy. However, the marginal effect of size on the payout ratio is repeatedly negative and this is opposite to the findings by all the studies reviewed in Section 3.2, which introduce a size variable. These include Lloyd, Jahera and Page (1985), Moh'd, Perry and Rimbey (1995), and Holder, Langrehr and Hexter (1998). The negative impact of size on the payout ratio may be due to better access by large firms to debt finance, which substitutes for dividends in controlling agency costs. Alternatively, large firms may be able to create reputation for responsible behaviour by managers, hence the need for the dividend commitment is reduced.

Finally, before moving to Section 3.5, where conclusions are presented, the results are reviewed with respect to the industry dummies. INDS12 and INDS14 appear with significant and positive estimated coefficients in all models. The financial services sector (INDS12) is positively related to the target payout ratio in all models at the 1 percent significance level. Similarly, the transport and communication services sector (INDS14) is positively related to the payout ratio in all models at the 5 percent significance level at least. The financial services sector, due to high level of regulations, can be expected to suffer from higher degree of owner-regulator conflicts and thus the use of the dividend mechanism to control for agency costs is justified[23]. An agency cost rationale can also explain the significant and positive relation recorded between the

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[23] Firms in the financial services sector may also be operating under codes and regulations that restrict their flexibility in determining payout ratios.

transport and communication services and the dependent variable[24].

The industries appearing with significant and negative estimated coefficients in all models include INDS5, INDS7 and INDS10. The non-metallic mineral products (INDS5) and wood, paper and paper products (INDS10), are both shown to be significantly negatively related to the firm's payout ratio at the 1 percent significance level across all models. The non-electrical machinery manufacturers sector (INDS7) is negatively related to the target payout ratio across all models at the 10 percent significance level at least. Such relationship may be due, for example, to growth opportunities or high risk.

3.5. Conclusions and promising research ideas

The agency rationale for dividends as articulated by Easterbrook (1984) and modelled in Rozeff (1982) appears to be borne by the results of this study, although the relationships between variables are shown to be more complex than has previously been assumed. The results are consistent with the idea that Private Sector firms in India set their target

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[24] Within the transport and communication services is the telecommunications industry, which had been under public sector monopoly until 1994. However, as noted in Ahluwalia (1998), unlike other public sector industries, telecommunications has generated substantial internal surplus. The surplus was the result of the industry exploiting its monopoly position by highly charging for long distance calls, which was politically possible because the target consumers were considered to be high-earners. It could be argued that this surplus has increased the potential for agency problems by increasing the opportunities for managers to misuse internal funds, thus increasing the need for the dividend mechanism to control these problems.

payout ratios so as to minimise the sum of agency costs and the costs associated with raising external finance. Thus while foreign ownership and the dispersion of ownership have positive impact on the payout ratio, business risk, growth and insider ownership negatively influence dividend levels.

Moreover, it is suggested that agency costs, that enter the cost minimisation model, include additional conflicts faced by owners besides those with managers. Specifically, it is proposed that costs also arise due to conflicts between owners and regulators, conflicts between owners and other stakeholders and conflicts amongst the different owner groups. An important implication of this is that the level of intervention in the economy, which has an adverse effect on conflicts of interests within the firm, also influences the dividend policy decision. Indeed, it is shown that the percentage of shares held by central and state governments is an important determinant of the firm's target payout ratio. This is due to the implications of such holdings on agency costs within the firm.

Inconclusive results are obtained with respect to the variables measuring institutional ownership and financial risk, while the results on the size proxy are contentious. These clearly require further investigation, perhaps allowing the dividend decision, the capital structure decision, and ownership structure patterns to be simultaneously determined. Indeed, it is reasonable to assume that these decisions are interdependent and therefore a system of equations, as in Jensen, Solberg and Zorn (1992) and in Noronha, Shome and Morgan (1996), may be the better testing approach.

Another future research idea is to incorporate agency costs of debt into the model. In particular, conflicts between owners and debt holders and the latter's attitudes towards dividend policy were also not addressed in this chapter, but are likely to prove important. Other extensions could include adopting empirical methodologies that account for dividend trends over time, such as the panel procedure that allows for time effects. This procedure, however, calls for relatively long time periods, which is often problematic with data from emerging markets due to the recent origin of available databases. Additional promising research idea is to investigate the impact of group affiliation on agency costs and on the dividend decision. This last idea may be particularly relevant in the Indian corporate context due to the importance of Business Houses in that environment, and is taken up in Chapter 5.

APPENDIX 3A: Definitions of variables in studies of the cost minimisation model

1 - DEPENDENT VARIABLE

Study	Name	Definition
Rozeff (1982)	PAY	The average payout ratio, 1974-1980
Lloyd, Jahera and Page, (1985)	PAYOUT	The average payout ratio in the last seven years from Value Line (1984 issue)
Schooley and Barney (1994)	DIVYD80	The dividend yield in 1980
Moh'd, Perry and Rimbey (1995)	PAYOUT	The common dividend to net income for year t.
Holder, Langrehr and Hexter (1998)	DP	The mathematically smoothed payout ratio in year t.
Hansen, Kumar and Shome (1994)	POR	The sum of all dividends paid during the 5 years prior to and including 1985 over the sum of all shareholders' earnings in the same period
Rao and White (1994)	PAY	The average of the most recent payout ratios from the time of the court case and as far back as seven years using all available information

2 - INSIDER OWNERSHIP

Study	Name	Definition
Rozeff (1982)	INS (-)	The percentage of common stock held by insiders, 1981
Lloyd, Jahera and Page, (1985)	RSINS (-)	The residual from a regression of the percentage of common stock held by insiders on the size variable.
Schooley and Barney (1994)	CEOOWN (-) CEOOWNSQ (+)	The percentage of the firm's stock held by chief executive officers, year ending 1980 The squared CEOOWN
Moh'd, Perry and Rimbey (1995)	INSD (-)	The percentage of common shares held by insiders in year t.
Holder, Langrehr and Hexter (1998)	INS (-)	The residual from a regression of insider ownership in year t on the size variable.
Rao and White (1994)	INS (-)	The percentage of stock held by insiders on year of the court case.

The hypothesised signs of the coefficients are included in brackets following the variable name.

3 - STAKEHOLDER THEORY

Study	Name	Definition
Holder, Langrehr and Hexter (1998)	FS (-)	The focus of firm i in year t. It is the maximum proportion of a firm's sales attributed to a distinct business line. FS = [Max (S_j)] / S, where Max (S_j) is the sales for the business line j with the maximum sales of all firm i's lines, and S is total sales for firm i for year t

4 - REGULATION RANK

Study	Name	Definition
Hansen, Kumar and Shome (1994)	COMMRANK (-)	Utility's u regulatory commission rank as of year-ending 1985. It is based on estimation regarding the rate of return the regulatory commission permits the utility to earn

5 - TAX COST OF NOT PAYING DIVIDENDS

Study	Name	Definition
Rao and White (1994)	COST (+)	The ratio of retained earnings to total assets in the year of the court case. It is a proxy for the expected direct costs of Accumulated Earnings Tax, associated with not paying dividends.

The hypothesised signs of the coefficients are included in brackets following the variable name.

6 - PAST GROWTH

Study	**Name**	**Definition**
Rozeff (1982)	GROW1 (-)	Average growth rate of revenues, 1974-1979
Lloyd, Jahera and Page, (1985)	GROW1 (-)	The five-year average historic growth rate of revenues relative to 1984
Schooley and Barney (1994)	PASTSALE (-)	The annual sales' growth from 1975 to 1979
Moh'd, Perry and Rimbey (1995)	GROW1 (-)	The average rate of revenue growth over the previous 5 years, relative to year t, as reported in Value Line
Holder, Langrehr and Hexter (1998)	GROW (-)	It is measured as the beta coefficient in a regression of the natural logarithm of sales in year t, LSALES, on time. $LSALES_n = \alpha + \beta\, TIME_n$ (for n = t, t-1…t-4) and GROW = β = [Cov ($LSALES_n$, $TIME_n$) / Var ($TIME_n$)].
Hansen, Kumar and Shome (1994)	TAGROW (-)	Growth rate in total assets measured over the five-year period ending in 1985.
Rao and White (1994)	GROW (-)	Average annual percentage change in revenues. The number of years over which the average is calculated varies across firms from 2 to 10 from the year of the court case, depending on data availability. The mean number of years of data availability is 4.5

The hypothesised signs of the coefficients are included in brackets following the variable name.

7 - FUTURE GROWTH

Study	Name	Definition
Rozeff (1982)	GROW2 (-)	Value Line's forecast of average growth rate of revenues, 1979-1984
Lloyd, Jahera and Page, (1985)	GROW2 (-)	The 5 year average growth rate of revenues as forecasted by the 1984 edition of Value Line
Schooley and Barney (1994)	EXPSALE (-)	Value Line's forecasted annual sales growth from 1980 to 1985
Moh'd, Perry and Rimbey (1995)	GROW2 (-)	Value Line's forecast of average growth in revenues over the next five years relative to year t.

8 - RISK

Study	Name	Definition
Rozeff (1982)	BETA (-)	The beta coefficient of returns obtained from Value Line Investment Survey (1981 issue). It is measured as the covariance of the firm's stock return with the market return divided by the variance of the market return. This is estimated using 5 years of weekly data on the firm's stock returns and Value Line's Index
Lloyd, Jahera and Page, (1985)	BETA (-)	The beta coefficient as reported in the 1984 edition of Value Line

The hypothesised signs of the coefficients are included in brackets following the variable name.

8 – RISK (continued)

Study	Name	Definition
Schooley and Barney (1994)	BETA (-)	The beta coefficient as reported in the 1980 edition of Value Line
Moh'd, Perry and Rimbey (1995)	$\beta 0$ (-) OLRISK (-) FLRISK (-)	$\beta 0$ (intrinsic business risk) = $\beta / [(1\text{-}t) (C/S + D/S) +1]$ OLRISK (operating leverage risk) = $(1\text{-}t)\beta 0\ C/S$ FLRISK (financial leverage risk) = $(1\text{-}t)\beta 0\ D/S$ Where: β is the firm's systematic risk calculated using the market model and daily returns for each full year. The equally-weighted CRSP index serves as a proxy for the market return. t is corporate income tax rate. C is risk-adjusted present value of total fixed costs. D represents market value of risky debt but is measured using book value of debt and S is market value of common equity.
Holder, Langrehr and Hexter (1998)	STD (-)	The standard deviation of monthly returns in calendar year t.

The hypothesised signs of the coefficients are included in brackets following the variable name.

9 - OWNERSHIP DISPERSION

Study	Name	Definition
Rozeff (1982)	STOCK (+)	The natural logarithm of the number of common stockholders, 1981
Lloyd, Jahera and Page, (1985)	RSTOCK (+)	The residual from a regression of the natural logarithm of the number of common stockholders on the size variable.
Schooley and Barney (1994)	LNUMSHRS (+)	The log of (1 + number of common shareholders year ending 1980, in thousands)
Moh'd, Perry and Rimbey (1995)	STKHLDR (+)	The natural log of the number of shareholders in year t.
Holder, Langrehr and Hexter (1998)	LCSHR (+)	The residual from a regression of the natural logarithm of the number of common shareholders in year t on the size variable.
Rao and White (1994)	STOCK (+)	The number of common stockholders in year of the court case

The hypothesised signs of the coefficients are included in brackets following the variable name.

10 – OWNERSHIP CONCENTRATION

Study	Name	Definition
Hansen, Kumar and Shome (1994)	OWNSHIP (-)	Relates to year-end 1985. OWNSHIP = $N_m S_m^2 + N_i S_i^2 + N_o S_o^2$. Where N_m, N_i and N_o are the numbers of stockholders in the managers' group of investors, institutional group of investors and the group of remaining stockholders respectively. S_m, S_i and S_o are the average percentages of stock held by each shareholder in the respective groups.

11 - INSTITUTIONAL OWNERSHIP

Study	Name	Definition
Moh'd, Perry and Rimbey (1995)	INSTINV (+)	The percentage of common stock held by institutions in year t.

12 - FIRM SIZE

Study	Name	Definition
Lloyd, Jahera and Page, (1985)	SIZE (+)	The natural logarithm of sales for 1983
Moh'd, Perry and Rimbey (1995)	SIZE (+)	The natural logarithm of sales for year t.
Holder, Langrehr and Hexter (1998)	LSALES (+)	The natural logarithm of sales in year t.

The hypothesised signs of the coefficients are included in brackets following the variable name.

13 - LAGGED DEPENDENT

Study	Name	Definition
Moh'd, Perry and Rimbey (1995)	LAGPAY	The one-year lag of PAYOUT, the dependent variable

14 - FREE CASH FLOW

Study	Name	Definition
Holder, Langrehr and Hexter (1998)	FCF (+)	[net income + depreciation + interest expenses - capital expenditure] / total assets

15 - FLOTATION COSTS

Study	Name	Definition
Hansen, Kumar and Shome (1994)	FLOTCOST (-)	The firm's historical average flotation cost incurred in selling common stock, expressed as a percentage of the gross proceeds. Each firm's historical average FLOTCOST is estimated from equity offerings during the period 1971 to 1986

The hypothesised signs of the coefficients are included in brackets following the variable name.

APPENDIX 3B: Variable definitions

1 - Dependent variable

(Alternative proxies for the target payout ratio)

PAYOUT1 - The sum of common dividends paid during the five years from 1994 to 1998, over the sum of the profit after tax (PAT) in the same period. This variable is the dependent variable in Model 1 to Model 6.

PAYOUT2 - The five-year average (1994-1998) of the ratio of common dividends to PAT. This is the dependent variable in Model 7.

2 - Agency variables

(The information is for the latest available date as reported in the PROWESS database, updated to 8/3/00)

GOV - The number of equity shares held by central and state governments as a ratio of total equity shares.

INST - The number of equity shares held by financial institutions, insurance companies, mutual funds and commercial banks, as a ratio of total equity shares.

DIRS - The number of equity shares held by directors of the firm and their relatives as a ratio of total equity shares.

PUBLIC - The number of equity shares held by the Indian public at large, as a ratio of total equity shares.

FOREIGN - The number of equity shares held by foreign entities as a ratio of total equity shares. Foreign entities include foreign collaborators, foreign financial institutions, foreign nationals and non-residential Indians.

3 - Alternative Risk variables

RISK1 - The standard deviation of the annual adjusted returns on capital employed (ROCE) over the period 1994 – 1998. The ROCE, for year t, is calculated by PROWESS as:

ROCE = 100 X PBIT (nnrt) / average capital employed

PBIT (nnrt) is the profit before interest and tax excluding extra ordinary items. Average capital employed is the average funds used by the firm during year t including equity and preference capital, reserves and long term borrowings. As ROCE in PROWESS is expressed in percentage terms, RISK1 is obtained by dividing the standard deviation of ROCE by 100. RISK1 is used in all models excluding Model 2 and Model 3.

RISK2 - The standard deviation of daily stock returns over the 365 calendar days ending on 31 December 1998. The variances of daily returns, expressed in percentage terms, are obtained from PROWESS. RISK2 is calculated by taking the square root of the variance and dividing by 100. RISK2 is thus a measure of total risk of holding the firm’s equity. It is included as the measure of risk in Model 2.

RISK3 - The standard deviation of the first difference of annual earnings over the period 1994 to 1998. The first difference of annual earnings for year t is calculated as:

$$FDIFF_t = LOG(PAT_t) - LOG(PAT_{t-1}).$$

Where PAT is profit after tax and LOG is the natural logarithm. RISK3 is the risk variable in Model 3.

4 - Alternative Financial Risk variables

DEBT1 - A measure of the financial risk to which the firm is exposed. It is the five-year average (1994 to 1998) of the ratio of total borrowings to total assets. Total borrowings include all forms of secured and unsecured, short-term and long-term debt. Total assets include fixed assets, investments and current assets. DEBT1 is the proxy for financial risk in all but Model 4.

DEBT2 - The five-year average financial leverage risk in the period 1994-1998. The financial leverage risk in year t, $FLRISK_t$ is obtained from PROWESS and is defined as:

$$FLRISK_t = PBIT\ (nnrt)_t \,/\, PBT\ (nnrt)_t.$$

The nominator is profit before interest and tax excluding extra ordinary items, and the dominator is profit before tax excluding extra ordinary items. $FLRISK_t$ measures by how much profit before interest is greater than profit after interest, hence the higher the value, the greater the degree of financial leverage. DEBT2 replaces DEBT1 in Model 4.

5 - Alternative Growth variables

GROW1 - The average annual growth in total income during the period 1994 to 1998, calculated as:

$$GROW1 = (\text{total income 1998}/ \text{ total income 1993})^{(1/5)} - 1$$

Total income is defined as the sum of sales plus change in stock plus other income, where the latter is defined as recurring income from sources other than the firm's main business activities. GROW1 is the growth variable in all but Model 5.

GROW2 - The average annual growth in total assets during the period 1994 to 1998, calculated as:

$$GROW2 = (\text{total assets 1998}/ \text{ total assets 1993})^{(1/5)} - 1$$

Total assets include fixed assets, investments and current assets. GROW2 replaces GROW1 in Model 5.

6 - Alternative size variables

(Expressed in logs to correct for scale effects)

SIZE1 - The natural logarithm of the average total assets in the five years 1994 to 1998. Total assets include fixed assets, investments and current assets. SIZE1 is the firm size proxy in all but Model 6.

SIZE2 - The natural logarithm of the average total income in the five years 1994 to 1998. Total income is the sum of sales plus change in stock plus other income. Other income is defined as recurring income from sources other than the firm's main business activities. SIZE2 replaces SIZE1 in

Model 6.

7 - Industry dummies

$INDS_j$ - A dummy representing industry j where j = 0, 1, 3, 4,…. 19. Nineteen industry dummies are included to measure the change in the intercept from the control group, which is the textiles industry (INDS2). These are listed below.

A description of the industry dummies (Based on PROWESS industry classification listing)

NAME	**DESCRIPTION**
INDS0	Chemicals: paints & varnishes, dyes & pigments, drugs & pharmaceuticals, soaps & detergents, cosmetics & toiletries
INDS1	Food & beverages
INDS2	Textiles
INDS3	Chemicals: polymers, plastic products, petroleum products, tyres & tubes, rubber & rubber products
INDS4	Chemicals: Inorganic chemicals, alkalies (including: caustic soda, soda ash), fertilisers, pesticides, organic chemicals, others chemicals
INDS5	Non-metallic mineral products
INDS6	Metals & metal products
INDS7	Machinery: non-electrical machinery
INDS8	Machinery: electronics
INDS9	Transport equipment
INDS10	Wood, paper & paper products
INDS11	Leathers products, clocks & watches, miscellaneous manufactured articles
INDS12	Financial services
INDS13	Trading
INDS14	Transport services, communication services
INDS15	Construction & offshore drilling
INDS16	Hotel & tourism, health services, recreational services, miscellaneous services
INDS17	Infrastructure services: mining & quarrying, electricity
INDS18	Diversified
INDS19	Machinery: electrical machinery

APPENDIX 3C: Construction of the sample

Collecting the initial sample

Firms listed on the Bombay Stock Exchange	4829
Less: Firms with missing data or with non-positive profit after tax[1]	-3877
Less: Firms classified by the database as under public ownership.	-42
Initial sample	910

Observations lost in construction of the variables:

GROW1 (The denominator, income in 1993 is 0)	12
RISK3 (non positive profit after tax in 1993, thus log is undefined)	62
Weights are set to missing values	2
Outliers (RISK1>=0.32)	16

[1] PROWESS classifies each company into a unique ownership group with which it is deemed to be most closely associated. The classification is based on a continuous monitoring of company announcements and a qualitative understanding of the company concerned. This study generated a dummy variable, OWNCODE, which equals 1 when a firm is classified by PROWESS as controlled by either the central or state governments, and 0 if the firm is associated with any other private group. All firms with OWNCODE of 1 were excluded

Appendix 3D: Results of the unweighted regressions

Table 3D.1 Results for the specified unweighted regressions

	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	MODEL 7
Dependent	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT2
observations	882	895	848	871	894	882	869
Adj. R-squared	0.201	0.179	0.198	0.217	0.220	0.217	0.181
F-statistic	13.285 [.000]	9.854 [.000]	8.760 [.000]	11.067 [.000]	9.668 [.000]	12.634 [.000]	7.612 [.000]
Variable	**Estimate**	**Estimate**	**Estimate**	**Estimate**	**Estimate**	**Estimate**	**Estimate**
C	0.401 [.000]	0.313 [.000]	0.390 [.000]	0.481 [.000]	0.560 [.000]	0.372 [.000]	0.504 [.000]
GOV	-0.606 [.003]		-0.454 [.042]		-0.881 [.001]		-0.427 [.080]
INST		0.148 [.010]					0.197 [.025]
DIRS							-0.280 [.034]
PUBLIC	0.370 [.001]	0.496 [.000]	0.547 [.000]			0.353 [.001]	0.260 [.106]
FOREIGN					-0.240 [.072]		
RISK1	-1.502 [.000]	n/a	n/a	-1.583 [.000]	-1.612 [.000]	-1.497 [.000]	
RISK2	n/a		n/a	n/a	n/a	n/a	n/a
RISK3	n/a	n/a	-0.159 [.000]	n/a	n/a	n/a	n/a
DEBT1	-0.200 [.000]	-0.435 [.000]	-0.120 [.071]	n/a	-0.495 [.001]		-0.597 [.000]
DEBT2	n/a	n/a	n/a		n/a	n/a	n/a
GROW1					n/a		
GROW2	n/a	n/a	n/a	n/a	-0.339 [.000]	n/a	n/a
SIZE1			-0.022 [.015]	-0.032 [.000]		n/a	-0.026 [.083]
SIZE2	n/a	n/a	n/a	n/a	n/a		n/a
SQR(GOV)		-1.664 [.014]					
SQR(DIRS)	0.270 [.013]	0.222 [.032]	0.229 [.018]	0.242 [.016]	0.183 [.109]	0.252 [.027]	0.322 [.031]
SQR(PUBLIC)	-0.648 [.000]	-0.530 [.000]	-0.561 [.000]	-0.396 [.001]	-0.511 [.000]	-0.622 [.000]	-0.640 [.000]
SQR(RISK1)	2.894 [.004]	n/a	n/a	2.816 [.008]	3.437 [.001]	3.151 [.002]	2.355 [.032]
SQR(DEBT1)				n/a		-0.254 [.000]	
SQR(GROW1)				0.067 [.033]	n/a		
SQR(GROW2)	n/a	n/a	n/a	n/a	0.049 [.001]	n/a	n/a
SQR(SIZE1)		-0.002 [.016]			-0.004 [.001]	n/a	
GOV INST	3.906 [.000]	3.346 [.007]	3.164 [.002]	5.390 [.000]	5.133 [.001]	4.159 [.000]	5.468 [.000]
GOV DIRS			4.550 [.012]				
GOV FOREIGN					1.114 [.064]		
GOV RISK1		n/a	n/a	-8.211 [.000]	-4.086 [.075]	-6.005 [.001]	-5.826 [.025]
GOV DEBT1				n/a	1.359 [.041]		
INST RISK2	n/a	-1.826 [.001]	n/a	n/a	n/a	n/a	n/a
INST RISK3	n/a	n/a	-0.225 [.019]	n/a	n/a	n/a	n/a
INST DEBT1			0.437 [.017]	n/a			
INST GROW1					n/a		-0.614 [.041]
DIRS RISK1		n/a	n/a				-0.896 [.104]
DIRS DEBT1				n/a	0.305 [.119]		0.412 [.079]
DIRS SIZE1	-0.042 [.004]	-0.038 [.007]	-0.048 [.001]	-0.044 [.001]	-0.059 [.002]	n/a	
DIRS SIZE2	n/a	n/a	n/a	n/a	n/a	-0.040 [.010]	n/a
PUBLIC RISK1	1.153 [.063]	n/a	n/a	1.475 [.007]	1.365 [.014]	1.131 [.063]	
PUBLIC RISK2	n/a	-0.696 [.000]	n/a	n/a	n/a	n/a	n/a
PUBLIC GROW1			-0.342 [.008]	-0.298 [.007]	n/a		
PUBLIC SIZE1				0.059 [.000]	0.056 [.000]	n/a	0.040 [.121]
FOREIGN GROW1			-0.359 [.056]	-0.591 [.002]	n/a		
FOREIGN SIZE1	0.018 [.003]	0.020 [.002]	0.033 [.001]	0.047 [.000]	0.064 [.020]	n/a	0.017 [.024]
FOREIGN SIZE2	n/a	n/a	n/a	n/a	n/a	0.020 [.001]	n/a
RISK3 GROW1	n/a	n/a	0.110 [.000]	n/a	n/a	n/a	n/a
RISK1 SIZE1		n/a	n/a			n/a	-0.161 [.001]
RISK2 SIZE1	n/a	0.088 [.003]	n/a	n/a	n/a	n/a	n/a
RISK3 SIZE1	n/a	n/a	0.028 [.003]	n/a	n/a	n/a	n/a
DEBT1 GROW1	0.474 [.001]	0.542 [.001]	0.394 [.046]	n/a	n/a	0.438 [.001]	0.467 [.010]
DEBT1 GROW2	n/a	n/a	n/a	n/a	0.680 [.000]	n/a	n/a
DEBT2 GROW1	n/a	n/a	n/a	0.008 [.135]	n/a	n/a	n/a
DEBT1 SIZE1		0.056 [.001]		n/a	0.039 [.139]	n/a	0.079 [.009]
GROW1 SIZE1	-0.048 [.000]	-0.057 [.000]	-0.045 [.010]		n/a	n/a	-0.052 [.002]
GROW1 SIZE2	n/a	n/a	n/a	n/a	n/a	-0.051 [.000]	n/a
INDS1				0.040 [.078]	0.031 [.147]	0.041 [.057]	0.044 [.076]
INDS4		-0.038 [.027]	-0.034 [.053]	-0.031 [.067]	-0.026 [.118]	-0.036 [.042]	-0.032 [.116]
INDS5	-0.089 [.000]	-0.092 [.000]	-0.099 [.000]	-0.090 [.000]	-0.093 [.000]	-0.094 [.000]	-0.113 [.000]
INDS7	-0.040 [.030]	-0.046 [.011]	-0.045 [.016]	-0.038 [.042]	-0.042 [.016]	-0.037 [.041]	-0.048 [.036]
INDS10	-0.078 [.000]	-0.085 [.000]	-0.069 [.001]	-0.079 [.000]	-0.079 [.000]	-0.085 [.000]	-0.063 [.010]
INDS12	0.127 [.000]	0.120 [.000]	0.127 [.000]	0.099 [.000]	0.119 [.000]	0.107 [.000]	0.134 [.000]
INDS13							0.048 [.121]
INDS14	0.124 [.008]	0.136 [.005]	0.122 [.007]	0.135 [.008]	0.120 [.007]	0.126 [.013]	0.113 [.021]
INDS17			-0.061 [.086]	-0.068 [.052]	-0.062 [.103]	-0.072 [.040]	-0.084 [.030]
INDS19			0.034 [.043]	0.032 [.072]			

Standard Errors are heteroskedastic-consistent (HCTYPE=2); Method of estimation is ordinary least squares; [probability values]

Table 3D.2 Marginal Effects (for unweighted regressions)

	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	MODEL 7
Dependent	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT2
GOV	-0.2171	0.3153	0.4824	-0.1153	-0.0962	-0.0598	-0.3384
INST	0.0205	0.0145	-0.0179	0.0280	0.0266	0.0218	0.0798
DIRS	-0.1187	-0.1096	-0.1322	-0.1303	-0.1172	-0.1077	-0.1248
PUBLIC	0.1146	0.1558	0.1689	0.1031	0.0897	0.1092	0.0996
FOREIGN	0.0818	0.0886	0.0661	0.0726	0.0578	0.0880	0.0756
RISK1	-0.7369	-	-	-0.7863	-0.7230	-0.7291	-0.5172
RISK2	-	0.0305	-	-	-	-	-
RISK3	-	-	-0.0252	-	-	-	-
DEBT1	-0.0872	-0.0510	0.0152	-	-0.0785	-0.0645	-0.0726
DEBT2	-	-	-	0.0019	-	-	-
GROW1	-0.0615	-0.0801	-0.1357	-0.1031	-	-0.0795	-0.1423
GROW2	-	-	-	-	-0.0856	-	-
SIZE1	-0.0150	-0.0077	-0.0139	-0.0163	-0.0087	-	-0.0122
SIZE2	-	-	-	-	-	-0.0150	-

Appendix 3E: Results of the alternative weighting-scheme regressions

Table 3E.1 Results for the specified alternative weighting-shceme regressions

	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	MODEL 7
Dependent	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT2
observations	882	895	848	871	894	882	869
Adj. R-squared	0.536	0.580	0.599	0.882	0.968	0.563	0.518
F-statistic	45.333 [.000]	66.061 [.000]	58.417 [.000]	271.32 [.000]	1166.44 [.000]	43.030 [.000]	45.475 [.000]
Variable	**Estimate**	**Estimate**	**Estimate**	**Estimate**	**Estimate**	**Estimate**	**Estimate**
C	0.584 [.000]	0.403 [.000]	0.587 [.000]	0.476 [.000]	0.520 [.000]	0.605 [.000]	0.416 [.000]
GOV		-0.690 [.000]	-2.037 [.000]			-0.631 [.000]	-0.628 [.000]
INST						-0.382 [.005]	
DIRS	-0.129 [.005]					-0.038 [.104]	
PUBLIC		0.386 [.003]					0.492 [.000]
FOREIGN		-0.409 [.002]	-0.328 [.002]				
RISK1	-1.260 [.000]	n/a	n/a	-1.371 [.000]		-2.637 [.000]	-1.058 [.000]
RISK2	n/a		n/a	n/a	n/a	n/a	n/a
RISK3	n/a	n/a	-0.110 [.003]	n/a	n/a	n/a	n/a
DEBT1		-0.376 [.000]		n/a			
DEBT2	n/a	n/a	n/a		n/a	n/a	n/a
GROW1	-0.267 [.000]	-0.205 [.000]	-0.251 [.000]		n/a		
GROW2	n/a	n/a	n/a	n/a	-0.378 [.000]	n/a	n/a
SIZE1	-0.050 [.000]		-0.058 [.000]	-0.040 [.000]	-0.039 [.002]	n/a	-0.029 [.000]
SIZE2	n/a	n/a	n/a	n/a	n/a	-0.047 [.000]	n/a
SQR(DIRS)		0.367 [.004]					
SQR(PUBLIC)	-0.573 [.000]	-0.332 [.007]	-0.435 [.000]	-0.291 [.006]	-0.560 [.000]	-0.385 [.000]	-0.681 [.000]
SQR(RISK1)	3.654 [.000]	n/a	n/a	3.533 [.001]	1.395 [.011]	4.219 [.000]	3.784 [.000]
SQR(DEBT1)	-0.378 [.000]			n/a	-0.335 [.000]	-0.222 [.001]	-0.587 [.000]
SQR(GROW1)	0.055 [.045]			0.067 [.020]	n/a	0.098 [.004]	0.059 [.000]
SQR(GROW2)	n/a	n/a	n/a	n/a	0.038 [.044]	n/a	n/a
SQR(SIZE1)		-0.004 [.000]				n/a	
GOV INST	2.909 [.000]	2.018 [.000]		4.107 [.000]	3.173 [.065]	3.398 [.000]	3.520 [.000]
GOV DIRS			9.371 [.000]				
GOV RISK1	-5.065 [.000]	n/a	n/a	-7.505 [.000]			
GOV RISK2	n/a	3.712 [.000]	n/a	n/a	n/a	n/a	n/a
GOV DEBT1				n/a		0.584 [.077]	
GOV SIZE1			0.412 [.000]		-0.108 [.025]	n/a	
INST FOREIGN			0.191 [.181]		0.811 [.020]		
INST RISK2	n/a	-0.634 [.000]	n/a	n/a	n/a	n/a	n/a
INST GROW1				-0.541 [.000]	n/a		
INST GROW2	n/a	n/a	n/a	n/a	-0.194 [.351]	n/a	n/a
INST SIZE1				0.030 [.003]		n/a	
INST SIZE2	n/a	n/a	n/a	n/a	n/a	0.080 [.002]	n/a
DIRS PUBLIC							-0.343 [.026]
DIRS RISK1		n/a	n/a				-0.690 [.007]
DIRS DEBT1				n/a	0.429 [.014]		0.292 [.042]
DIRS SIZE1		-0.075 [.001]	-0.038 [.011]	-0.009 [.196]	-0.047 [.001]	n/a	
PUBLIC RISK1		n/a	n/a			0.860 [.019]	
PUBLIC RISK2	n/a	-0.469 [.008]	n/a	n/a	n/a	n/a	n/a
PUBLIC GROW1				-0.322 [.001]	n/a	-0.240 [.007]	
PUBLIC SIZE1	0.089 [.000]		0.066 [.000]	0.068 [.000]	0.083 [.002]	n/a	
PUBLIC SIZE2	n/a	n/a	n/a	n/a	n/a	0.064 [.000]	n/a
FOREIGN DEBT1				n/a			-0.530 [.000]
FOREIGN GROW1	-0.420 [.003]			-0.472 [.003]	n/a	-0.480 [.006]	
FOREIGN SIZE1	0.040 [.000]	0.090 [.000]	0.075 [.000]	0.042 [.000]		n/a	0.044 [.000]
FOREIGN SIZE2	n/a	n/a	n/a	n/a	n/a	0.042 [.000]	n/a
RISK1 DEBT1		n/a	n/a	n/a	-2.715 [.000]		
RISK1 SIZE2	n/a	n/a	n/a	n/a	n/a	0.186 [.002]	n/a
RISK3 DEBT1	n/a	n/a	-0.160 [.017]	n/a	n/a	n/a	n/a
RISK3 GROW1	n/a	n/a	0.066 [.004]	n/a	n/a	n/a	n/a
RISK3 SIZE1	n/a	n/a	0.029 [.000]	n/a	n/a	n/a	n/a
DEBT1 GROW1	0.461 [.000]	0.360 [.001]	0.315 [.000]	n/a	n/a	0.317 [.011]	
DEBT2 GROW1	n/a	n/a	n/a	0.008 [.051]	n/a	n/a	n/a
DEBT1 GROW2	n/a	n/a	n/a	n/a	0.901 [.000]	n/a	n/a
DEBT1 SIZE1	0.011 [.531]	0.052 [.000]		n/a		n/a	0.085 [.000]
GROW1 SIZE1					n/a	n/a	-0.050 [.000]
GROW1 SIZE2	n/a	n/a	n/a	n/a	n/a	-0.047 [.000]	n/a
INDS0				0.024 [.129]			
INDS1				0.054 [.008]	0.043 [.022]		
INDS4			-0.029 [.000]			-0.027 [.063]	
INDS5	-0.064 [.000]		-0.070 [.000]	-0.063 [.000]	-0.045 [.091]	-0.100 [.000]	-0.120 [.000]
INDS6	0.038 [.002]		0.032 [.103]	0.030 [.110]			
INDS8				0.025 [.123]			
INDS9	-0.033 [.033]					-0.035 [.013]	
INDS10	-0.082 [.000]	-0.094 [.000]	-0.087 [.000]	-0.069 [.000]	-0.057 [.000]	-0.085 [.000]	-0.043 [.001]
INDS11	-0.053 [.142]						
INDS12	0.158 [.000]	0.126 [.000]	0.137 [.000]	0.134 [.000]	0.142 [.000]	0.105 [.000]	0.231 [.000]
INDS13					0.023 [.310]		0.075 [.001]
INDS14	0.067 [.000]	0.062 [.057]	0.057 [.000]	0.101 [.004]	0.095 [.003]	0.065 [.075]	
INDS15					0.028 [.233]		
INDS17						-0.050 [.101]	-0.080 [.000]
INDS18	0.047 [.037]						
INDS19				0.059 [.008]	0.039 [.074]		

Standard Errors are heteroskedastic-consistent (HCTYPE=2); Method of estimation is weighted least squares; Statistics are based on transformed data; [probability values]

Table 3E.2 Marginal Effects (for alternative weighting scheme regressions)

	MODEL1	MODEL2	MODEL3	MODEL4	MODEL5	MODEL6	MODEL7
Dependent	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT1	PAYOUT2
GOV	-0.1102	-0.1821	1.1316	-0.1865	-0.1730	-0.0977	-0.2760
INST	0.0153	-0.0420	0.0250	0.0296	0.0686	-0.0089	0.0188
DIRS	-0.1288	-0.2390	-0.1265	-0.0424	-0.0723	-0.0379	-0.0485
PUBLIC	0.0996	0.1697	0.0687	0.0782	0.0767	0.0876	0.0812
FOREIGN	0.0799	0.0011	0.0144	0.0801	0.0808	0.0722	0.0253
RISK1	-0.7096	-	-	-0.8522	-0.6836	-0.9152	-0.5576
RISK2	-	-0.1690	-	-	-	-	-
RISK3	-	-	-0.0140	-	-	-	-
DEBT1	-0.0934	-0.0550	-0.0404	-	-0.1296	-0.0689	-0.0340
DEBT2	-	-	-	0.0018	-	-	-
GROW1	-0.1426	-0.0847	-0.1009	-0.1486	-	-0.1824	-0.1969
GROW2	-	-	-	-	-0.0757	-	-
SIZE1	-0.0177	-0.0151	-0.0130	-0.0144	-0.0235	-	-0.0067
SIZE2	-	-	-	-	-	-0.0131	-

A note on the alternative weighting scheme:

1. Assuming that the variances of the disturbances are a function of: a constant, the dummy variables, the non-dummy variables their squares and cross products.
2. As the variances are unknown they are replaced by the squared residuals.
3. The auxiliary regression is the squared residuals on the variables listed in point (1) above.
4. The weights are the inverses of the fitted values from the auxiliary regression.
5. It the fitted value from the auxiliary regression is non-positive, it is replaced by the actual squared residuals.

CHAPTER 4: THE DETERMINANTS OF CAPITAL STRUCTURE - EVIDENCE FROM MAURITIUS

4.1 Introduction

The previous two chapters looked at the dividend policy decision, while in this chapter attention is turned to the second financing choice faced by the firm, namely the capital structure decision. More specifically, the aim here is to empirically study the determinants of capital structure of Mauritian firms. The motivation is consistent with Rajan and Zingales (1995), and more recently and with reference to developing countries, with Booth, Aivazian, Demirguc-Kunt, and Maksimovic (2001). Particularly the idea is to assess whether the various capital structure theories that have been formed mainly in relation to developed markets, can stand the test of different markets. If this is the case then firm characteristics that have been found important in determining the capital structure of US firms should be similarly correlated with the leverage ratios of Mauritian firms. However, where the nature of correlation between leverage and other firm characteristics in Mauritius differs from the pattern recorded for US data, this does not necessarily imply a rejection of the underlying theory. Indeed, such deviation could still support theory to the extent that it may be explained by differences in the institutional structure of the Mauritian market.

Capital structure theories are concerned with explaining how the mix of debt and equity in the firm's capital structure influences its market value. Since the seminal paper by Modigliani and Miller (1958) and their proposition that the value of the firm is independent of its debt-equity mix, the two basic theories that have dominated the capital structure debate are the "trade off theory" and the "pecking order theory". The trade off theory proposes that the optimal level of debt is where the marginal benefit of this source of finance is equal to its marginal cost. There is variation, however, among researchers on the view of what constitute the benefits and costs of debt. One benefit of debt, from the point of view of existing shareholders, is that bondholders have no voting rights. This makes external debt more attractive relative to external equity particularly in the case of small or tightly controlled firms, whose owners are reluctant to give up control. Glen and Pinto (1994) note that control considerations may be particularly relevant for the capital structure decisions of firms in emerging markets, due to the long tradition of family ownership. Certainly in Mauritius avoiding dilution of control can be expected to be important, as the dominance of family owned groups is strong.

Apart from control considerations another benefit of debt is the tax deductibility of interest payments at the corporate tax level. Specifically, Modigliani and Miller (1963) note that because interest payments are deducted in arriving at the profit figure on which tax is charged, these payments actually reduce the corporate tax liability. The corporate tax benefit of debt, however, may be offset, at least to some extent or in some cases, by the tax disadvantage of interest payments at the personal level. Indeed, Miller (1977) shows that capital structure may still be irrelevant when the benefit of the interest tax shield is fully offset by the disadvantage of interest income at the personal level.

This may be the case when the effective personal tax rate on equity income, from both dividends and capital gains, is sufficiently lower than that on interest income. Further, as suggested by DeAngelo and Masulis (1980) the value of the corporate tax deductibility of interest also depends on the corporate tax level, whether the firm has generated taxable profits, and the availability of non-debt tax shields. Thus given non-debt tax shields such as capital allowances, tax credits, pension contributions, or tax losses carried forward, the trade off theory typically sets the corporate tax benefit of debt against costs that are associated with debt, such as financial distress.

Financial distress costs include the costs associated with bankruptcy, such as legal and administration fees and the costs incurred in liquidating assets. Liquidation costs are high if the value of the asset in liquidation is substantially less than its value in current use. This partly depends on the type of assets held. For example, the secondary market for specialised machinery is likely to be thin therefore liquidation costs for such assets are likely to be high. Likewise, intangible assets such as brand names, trademarks, or human capital have no value on liquidation hence liquidation costs for such assets will also be high. Brealey and Myers (2000) note that even before the firm is declared bankrupt, it may incur distress costs that are associated with being in a position of financial difficulties. These costs may be associated with lost reputation or manpower migration, which are likely to occur when it becomes known that the firm is financially distressed. In short, financial distress should be an important disadvantage of using debt and its costs should be weighed against the corporate tax advantage of debt. But corporate tax and financial distress are not the only benefit and cost of debt. Agency theory as articulated by Jensen and Meckling (1976) has further implications for the trade off theory of capital structure.

There are at least four agency-related benefits of using debt in the capital structure mix. First, conflicts of interests between managers and outside shareholders may be controlled by debt. Specifically, higher levels of debt in the capital structure of firms imply that managers hold a larger fraction of the firm's equity, which reduces agency problems by aligning the interests of managers with that of outside shareholders. Second, Jensen (1986) argues that higher level of debt implies a commitment to pay out more cash, which may otherwise be wasted by managers. Third, managers' tendency to over invest, in order to advance their self-interests, can be controlled through monitoring by lenders and by debt covenants. Forth, Harris and Raviv (1990) propose that debt in the capital structure generate information valuable in controlling agency behaviour. Particularly it is noted that for self-interest reasons, managers are always reluctant to liquidate the firm or to provide information that could lead to liquidation. This is the case even when liquidation is the best course of action from investors' point of view. However, debt is a disciplining device because default on debt obligations triggers an investigation of the firm. Such investigation, although costly in terms of legal fees and disruption to normal operations, generates information to investors and lead to the implementation of major changes and more efficient operating policies.

To summarise, agency theory predicts that debt should reduce conflicts between managers and outside owners because it increases the fraction of management's ownership, and because interest is a commitment to pay out cash. Further, debt is valuable because debt covenants restrict managers' freedom, and because default on debt triggers information and changes in policies. Bearing these agency-related benefits of debt, there are also agency-related costs to debt, which are due to conflicts of interests between equity and debt holders of levered firms. One such conflict is over risk levels, and is commonly referred to as the problem of risk shifting or asset substitution. Accordingly, debt in the capital structure induces moral hazard problems by encouraging owners to engage in investments riskier than those anticipated by debt holders. By increasing the variance of cash flows, wealth is expropriated from debt holders because the level of interest required by them has been fixed before the shift in risk. This way if the risky projects are successful the extra gains accrue to shareholders while if the risky projects are unsuccessful the costs are shared among all security holders. Risk shifting behaviour has adverse effects on debt in the capital structure as it leads to debt becoming more expensive, more constraining and less available as a future source of finance[1].

However, just as financial distress costs partly depend on the type of assets held,

[1] Risk shifting behaviour causes the cost of debt to increase as debt-holders price such tendencies into their required return. Similarly, risk-shifting behaviour leads to debt becoming a more constraining form of finance as debt covenants incorporate conditions aimed at preventing such behaviour. Furthermore, risk-shifting behaviour can cause loss of reputation, which may lead to difficulties in obtaining further debt finance.

so is the ability of equity holders to expropriate debt holders' wealth through risk-shifting actions, also depends on the firm's asset structure. For instance, when growth prospects constitute a substantial part of the firm's assets, providing it with many alternative investments, this increases the opportunity for risk-shifting actions by equity holders. Similarly, Viswanath and Frierman (1995) argue that the potential for risk-shifting behaviour is directly related to assets' fungibility, or the ease with which the variance of cash flows to be generated from a particular asset may be altered. The similarity between intangibility and fungibility is noted. Thus Viswanath and Frierman (1995) remark that intangible assets such as the skills of lawyers of a law firm are fungible because it is difficult to monitor the type of cases in which these lawyers engage. In contrast a tangible fixed asset such as land is non-fungible. This is because it is relatively easy to monitor the way in which land is used, thus limiting the ease with which the variance of cash flows from the use of this asset may be altered.

From the above discussion it emerges that agency-related costs, that are associated with risk shifting behaviour by equity holders may be higher for firms with many intangible or fungible assets. However, risk shifting or asset substitution is not the only agency cost of debt. Another such cost is the cost associated with under investment. This problem applies particularly to firms in financial distress, when owners may be unwilling to invest even in good projects. Instead equity holders may prefer to receive higher dividends rather than the firm generating cash flows that may be sufficient to pay only those higher up on the payment list. Thus, under investment like asset substitution is an agency cost of debt that may reduce the benefits from the value of debt, in controlling the agency cost of equity. However, whether or not the agency costs and benefits of debt are considered, and whatever other non-agency related factors are assumed to constitute the benefits and costs of debt, central to the trade off theory is the idea of an optimal capital structure. This can be contrasted with the pecking order theory, where the central idea is that firms follow a preference order with respect to the various sources of finance.

The pecking order theory is due to Myers (1984) and is based on two realistic assumptions. The first assumption is the presence of asymmetric information between managers and outside investors. The second assumption is that mangers, acting in the interest of existing security holders, tend to issue securities when these are over valued. The first assumption implies that due to information problems outsiders do not know the true value of the firm but that they should use managers' actions as signals to this value. The second assumption implies that new issues should be interpreted as bad news and should therefore be met with price reductions[2]. The combination of price reductions and issue expenses increases the cost of external funds relative to internal funds, and leads to

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[2] When managers are aware that the current market value of the firm is lower than the fair value based on their superior information about the firm, then they will be reluctant to issue new securities at the depressed price. In contrast, managers may be more willing to issue new securities when they view the firm to be overvalued. If shares are issued under such circumstances, there will be a wealth transfer from new to old shareholders when prices eventually settle at their fair value. The result of this behaviour is that new issues imply bad news and are likely to be met with price reduction.

preference by firms for the latter. It also implies that when internal funds are insufficient to meet the financing needs of the firm, external debt is preferred to external equity because it is less risky and less exposed to mis-pricing.

Thus there is a principle difference between the trade off and pecking order theories. This difference relates to the question of whether firms follow a target capital mix or whether capital structure is determined by the most preferred source that is available to the firm when the need for funds arises. However, while the distinction between these two theories may be clear-cut, the practical implications of pecking order, agency costs, trade off, and control considerations are difficult to disentangle. To distinguish between these theories as possible explanation for the capital structure decision, investigators typically study the relationships between leverage and other firm's characteristics. However, often the direction of correlation between leverage and a particular firm characteristic is consistent with more than one theory. This is a serious limitation to the investigation at hand as distinguishing between these theories, is precisely the aim here.

Bearing this limitation in mind, the study progresses as follows. Section 4.2 presents some of the empirical evidence on the validity of various capital structure theories. Section 4.3 presents the model and the theoretical predictions. Section 4.4 gives a brief description of the Mauritian economy and corporate sector and describes the database. Empirical procedures are described in Section 4.5, estimation and results are given in Section 4.6, and Section 4.7 concludes.

4.2 Review of selective empirical studies

As noted in the previous section, the principle difference between the trade off and pecking order theories is related to the question of whether firms follow a target capital mix[3]. Alternatively, in line with pecking order considerations, capital structure is determined by the most preferred source that is available to the firm when the need for funds arises. Kamath (1997) has attempted to understand which theory dominates the capital structure decision by studying the views and practices of financial managers of 142 US firms that were listed on the NYSE on the last day of 1988. Based on a survey administered in 1990, Kamath (1997) concludes that pecking order considerations appear to be more important to managers than maintaining a target capital structure. Indeed, there is general support in the empirical literature, for the importance of pecking order considerations to the capital structure decision of firms in developed economies.

Similar to Kamath (1997), the capital structure decision is also examined in Singh (1995) but there the investigation is by a different methodology, focusing on different markets and reporting contradicting results. Specifically Singh (1995) carries out a comparison analysis to examine corporate financial patterns of firms in developing countries, and finds that these firms do not follow a pecking order. These findings contradict the prediction that pecking order considerations should be particularly

[3] Reference to the trade off theory here relates not only to the tax advantage versus distress costs, but also to agency costs, control considerations etc.

important in less efficient markets where the finance gap is wider. Such contradicting findings justify the vast amount of related empirical work that have emerged[4].

Certainly, a survey approach as in Kamath (1997), or a comparison analysis as in Singh (1995) are possible methods to investigate the practical validity of competing theories. Another approach is to study firms' financial data. Particularly, whether firms have target capital structure, or they simply follow a preference-order often have different implications for firms with differing characteristics, operating in different environments. The relationships between firms' characteristics and their capital structures can therefore be useful in distinguishing between trade off, agency, control, and pecking order theories. The type of assets held by the firm, non-debt tax shields available to it, profitability, risk, growth, and size, are among the characteristics that are commonly included as explanatory variables in empirical studies of capital structure. Table 4.1 presents the results of a selected number of empirical studies.

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[4] Singh (1995) examines corporate financial patterns of the top 100 listed manufacturing firms in each of ten developing countries for the period 1980 to 1990. The main findings are as follows:

- Compared with firms in developed countries firms in developing countries rely more on external sources to finance growth.
- Equity as a source of external finance is used relatively more by firms in developing countries compared with those in developed economies.
- The notion that firms in developing countries are more highly geared compared with those in developed countries is not supported by the data.

However, the study by Singh (1995) focuses on the largest listed firms and neither addresses the question of size nor the question of unlisted firms.

Table 4.1 Summary results of selected studies of the determinants of capital structure.

Panel A: Predictions

	1	2	3	4
Study	**Bradley, Jarrell, Kim (1984)**	**Alderson & Betker (1995)**	**Titman & Wessels (1988)**	**Rajan & Zingales (1995)**
Liquidation costs		(-) – High debt increases the probability of having to liquidate assets.		
Firm size		(?) – Included in the regression but the nature of relationship with the dependent variable is not predicted.	(+) – Large firms tend to be more diversified and less risky therefore can support more debt. (-) – Small firms bear higher costs when issuing new equity and hence prefer to issue debt.	(+) – Large firms are diversified, thus less likely to face bankruptcy. (-) – A proxy for the availability of information that outsiders have about the firm. This increases the preference for equity relative to debt
Non-debt tax shield	(-) – Non-debt tax shields such as accelerated depreciation and investment tax credits, reduce the firm's tax liabilities and thus the value of interest tax shield.	(-) – Firms with high non-debt tax shield reduce their debt to ensure they can use the alternative tax shield.	(-) – Non-debt tax shields are substitutes for the debt tax shield. Therefore firms with high non-debt tax shields, relative to their expected cash flows, will have less debt in their capital structure.	
Tangibility / Collateral value of assets / The fraction of fixed assets			(+) – Assets with high collateral value can back more debt. (-) – The use of assets with low collateral value (intangible assets), are more difficult to monitor. In such cases, debt can be used as a monitoring device.	(+) – Tangible assets can be used as collateral and diminish the risk to lenders from risk shifting and other agency problems of debt. (+) – Tangible assets retain more value on liquidation
Growth/ Investment opportunity			(-) – There are more opportunities for shareholders to expropriate bondholders' wealth if the firm is facing many investment opportunities. Also, growth opportunities add value but cannot be used as security for lenders and do not generate current cash flows that can be shielded against tax by interest.	(-) – Firms that are highly geared are more likely to pass up profitable investments. Therefore growing firms should use greater amount of equity finance. [But, when growth is measured in terms of market to book value, the negative correlation with the debt ratio may be due to over-pricing. If the stock price is high, equity becomes attractive]
Uniqueness			(-) – When the firm's product is unique, liquidation is likely to impose high costs on suppliers, customers and workers.	
Profitability			(-) – Pecking Order: profitable firms have sufficient retained earnings, which is a preferred source of funds compared with external finance. This preference for internal finance is due to the costs associated with raising external funds including transactions costs and costs that arise due to information asymmetric problems.	(-) – Pecking Order: profitable firms have sufficient retained earnings, which are preferred to debt. (+) – Agency theory: If the market for corporate control is efficient, then debt is a commitment to pay out cash. (-) – Agency theory: If market for corporate control is inefficient, then managers prefer to avoid the disciplinary role of debt. (+) – Supply consideration: Lenders prefer to lend to profitable firms.
Risk	(-) – When the costs of financial distress are significant, then debt ratios are inversely related to the variability of firm value.		(-)	
Investments in R&D and advertising	(-) – Since such investments can be expensed in the year they are incurred, they reduce the firm's tax liability and hence the value of the interest tax shield. (-) - The future value of assets created by such investments, is subject to more managerial discretion. This implies higher agency costs, including the agency problem of under investment, and thus with lower debt levels.			
Industry classification	(-/+) – Because firms' characteristics tend to vary across industries, Industry classification may partly explain variation in debt ratios across firms.		(-) – Manufacturers of specialised equipment face higher liquidation costs because the secondary market for such assets is thin.	

Source: Complied by author from a selective review of the literature

Table 4.1 Summary results of selected studies of the determinants of capital structure.
Panel A: (concluded) Predictions

	5	6	7	8
Study	**Wiwattanakantang (1999)**	**Jordan, Lowe, Taylor (1998)**	**Hussain (1997)**	**Hirota (1999)**
Firm size	(+) – Large firms have higher debt capacity and their risk of bankruptcy is lower due to being well diversified. (-) – Less information problems make equity issuance more appealing to larger firms.	(+) – Larger firms are less prone to bankruptcy, so they tend to use more debt than smaller firms.	(+) – Large firms are less prone to bankruptcy, hence use more debt than small firms.	(+) – Large firms tend to be more diversified and hence less likely to fall into financial distress.
Non-debt tax shield	(-) – Items such as depreciation or pension funds provide alternatives to interest in shielding profits from tax.			(-) – The gain from the tax advantage of interest is larger when the firm does not enjoy other, non-debt, tax shields.
Tax		(+) – Greater use of non-debt tax shields (e.g. depreciation) reduces the *effective* tax rate, and thus the value of the debt tax shield.	(+) – The double taxation of equity at corporate and personal levels implies that high taxes create preference towards debt.	
Tangibility / Collateral value of assets / The fraction of fixed assets	(+) – Tangible assets can be used as collateral (+) – Asset substitution, which is an agency cost of debt, is less likely to occur when the firm has more assets already in place.	(+) – High ratio of fixed to current assets is associated with high barriers to entry, lower earnings risk, and greater ease of raising debt as fixed assets may be used as collateral.		(+) – The cost of financial distress depends partly on the type of assets held by the firm. Tangible and fixed assets tend to have higher resale value compared with non-tangible assets.
Growth/ Investment opportunity	(-) – Growth prospects provide owners with greater opportunities to expropriate wealth from debt holders through sub-optimal investments or risk shifting. Hence, firms with high investment opportunities relative to their tangible assets should have low debt levels.	(+) – Growing firms need funds. Small firms, in particular, prefer debt to equity because the latter involves giving up control. (-) – Shareholders of growing firms have greater opportunities to expropriate bondholders' wealth. Lower debt may reduce the severity of this agency cost.		(-) – Firms with many investment opportunities prefer equity to debt because highly levered firms tend to pass up profitable investments. Also, firms with high investment opportunities face high liquidation costs. (+) – Signalling theory: Prosperous firms use debt to signal their quality
Profitability	(-) – Pecking Order considerations suggest that firms prefer internal to external funds. Higher profits imply less need to rely on debt. (+) – Lenders prefer borrowers with high current cash flows.	(-) – Pecking Order: profitable firms have sufficient retained earnings hence depend less on debt.	(-) – Profitable firms and those expecting high future profitability are likely to rely more on equity.	(-) – Pecking order: profitable firms have sufficient retained earnings hence need to rely less on external debt.
Risk	(-) – High probability of being financially distressed			(-) – Uncertain operating income imply risk of financial distress
Diversification		(-) adds uncertainty for SMEs		
Competitive strategy (Innovation, Differentiation, Cost reduction)		(-) – *Innovation* means investment in firm-specific assets with lower liquidation value. (-/+) – *Differentiation* means investment in intangible assets such as reputation with zero liquidation value but which can be used as security for lenders (+/-) – *Cost reduction* means investment in tangible modern equipment with high liquidation value, or in firm-specific assets with low liquidation value.		
Importance of access to external finance		(+) - Pecking order: when retained earnings are insufficient, debt is preferred to equity		
Access to external finance has been a problem		(+) – Implying that the firm's debt level has approached that high level, which outsiders consider the safe limit.		
No of non-executive directors on Board		(-) – Non-executive directors provide extra equity capital.		
Retained earnings			(+) – Implies strong cash position. This increases the ability to borrow at good terms. It also implies greater need for the disciplinary mechanism of debt.	
Institutional and regulatory characteristics of Japanese market				(+) – Link with main bank. (+) – Group affiliation. (+) – Regulatory constraints on the issues of public equity.
Free cash flow consideration – The spread between the firm's interest rate and dividend yield				(-) – The agency theory of free cash flow: financing choice is based on the free cash flow that is retained in the firm for managers to use.

Source: Complied by author from a selective review of the literature

Table 4.1 Summary results of selected studies of the determinants of capital structure.

Panel B: Definitions

	1	**2**	**3**	**4**
Study	**Bradley, Jarrell, Kim (1984)**	**Alderson & Betker (1995)**	**Titman & Wessels (1988)**	**Rajan & Zingales (1995)**
Method	OLS – Cross sectional	OLS – Cross sectional	Factor analytical technique – Cross sectional	Maximum likelihood and a censored Tobit model – Cross sectional
Sample	US firms	US firms that reorganised under Chapter 11 of the Bankruptcy Reform Act.	US manufacturing firms	Non-financial, listed G-7 firms: US, UK, Japan, Germany, France, Italy, Canada
Period	20 years: 1962 - 1981	1982-1993	9 years: 1974-1982	4 years: 1987-1991
Variables construction	Debt ratio, volatility, and non-debt tax shield are calculated over 20 years. Advertising and R&D expenditure is calculated over 10 years (1971-1982).	Data items, including estimates of going-concern and assets' liquidation values, are obtained from the bankruptcy disclosure statements of the sample firms.	All variables, excluding the risk variable, are averaged over three years. The risk variable is calculated using the full sample period of nine years.	Separate regressions for each country. Variables are averaged over 4 years
Number of observations	821 all firms, 655 non-regulated firms	88	469	2079 for US, 175 for Germany, 117 for France, 522 for UK
Dependent Variable	Sum of annual book value of long term debt / [Sum of (Market value of equity + book value of long term debt)]	1. Long term debt / Total assets 2. Total liabilities / Total assets	1. Long term debt / Market value of equity 2. Short term debt / Market value of equity	Adjusted short-term and long-term debt / (Adjusted short-term and long-term debt + Book value of adjusted equity in 1991)
Liquidation costs		(Going-concern value - Liquidation value) / Going-concern value		
Firm size		Log (total assets)	1. Log (sales) 2. Rate at which employees voluntarily leave their jobs. Large firms offer wider career opportunities and hence have lower quit rate. Thus the voluntarily quit rate is an inverse measure of size.	Log (net sales)
Non debt tax shield	Sum of (Annual depreciation + Investment tax credits) / Sum of annual earnings before interest, depreciation, and taxes	Net operating loss carry forward / Total assets.	1. Investment tax credit / Total assets 2. Depreciation / Total assets 3. Non-debt tax shield (NDT) / Total assets. NDT is obtained from federal income tax payments (T), operating income (OI), interest payments (i), and corporate tax rate during the sample period (48%): T = 0.48 (OI – i – NDT) NDT = OI – i – T/0.48	
Asset structure / Capital intensity / Tangibility of assets			1. Intangible assets / Total assets 2. (Inventory + Gross plant & equipment) / Total assets	Fixed assets / Total assets
Growth opportunities			1. Capital expenditure / Total assets 2. Percentage change in total assets 3. R&D expenditure / Sales	Market to book ratio
Uniqueness			1. R&D expenditure / Sales. 2. Selling expenses / Sales. 3. Rate at which employees voluntarily leave their jobs.	
Profitability			1. Operating income / Total assets. 2. Operating income / Sales	Earnings before interest, taxes and depreciation / Book value of assets
Risk / Firm volatility	Standard deviation of the first difference in annual earnings before interest, depreciation and taxes / Average total assets		Standard deviation of percentage change in operating income.	
Investments in R&D and advertising	Sum of annual R&D and advertising expenses / Sum of annual net sales			
Industry classification	25 two-digit SIC industry classification dummies.		A dummy that equals one if firm produces machines and equipment.	

- OLS = Ordinary Least Squares, FGLS/WLS = Feasible Generalised Least Squares/ Weighted Least Squares
- MV = Market Value, BV = Book Value

Source: Complied by author from a selective review of the literature

Table 4.1 Summary results of selected studies of the determinants of capital structure.

Panel B: (concluded) Definitions

	5	6	7	8
Study	**Wiwattanakantang (1999)**	**Jordan, Lowe, Taylor (1998)**	**Hussain (1997)**	**Hirota (1999)**
Method	OLS – Cross sectional	OLS and FGLS/WLS – Cross sectional	Panel – POOLED	OLS – Cross sectional
Sample	Thai non financial listed firms	UK SMEs	Largest listed manufacturing firms: 93 Korean, 98 Malaysian	Large Japanese firms
Period	1996	1989-1993	Korea: 1980 - 1990 Malaysia: 1983 - 1990	1977, 1982, 1987, 1992
Variables construction	Single year data	Financial data averaged over the whole period. Non-financial data obtained from a questionnaire	Separate regression for each country (panel)	Most variables averaged over three years including current and two previous years.
Number of observations	244	173	847 for Korea, 507 for Malaysia	407 for 1977, 467 for 1982, 466 for 1987, 545 for 1992
Dependent	1. BV of total debt / (BV of total liabilities + MV of total equity) 2. BV of total debt / BV of total assets	Natural log (average debt to equity)	Log (Long term debt / Paid up capital)	Total debt / (Total debt + Book value of equity)
Firm size	Log (sales)	Log (average turnover)	Log (Total assets)	Log (Real sales)
Non debt tax shield	Depreciation costs / Total assets			[Profit before tax – (Tax paid / Tax rate)] / Total assets
Tax		Effective tax rate = Average tax paid / Average Profit before interest & tax	Log (Taxes)	
Asset structure / Capital intensity / Tangibility of assets	(Net property, plant & equipment) / Total assets	Log (Fixed assets / Current assets)		1. Fixed assets / Total assets 2. (R&D + Advertising expenditure) / Sales
Growth opportunities	Market value of total assets / Book value of total assets	Growth rate of turnover		Market value of firm to book value of total assets
Uniqueness		As assessed from questionnaire's results.		
Profitability	(Earnings before interest & tax) / Total assets	1. Profit before interest & tax (PBIT) / Turnover 2. Square (PBIT / Turnover)	1. **Current**: Log (Net profit margin) 2. **Future**: Log (PE ratio)	(Operating income + depreciation) / Total assets
Risk	Standard deviation of first difference in operating income 5 years before 1996 / Average value of total assets over that period.	Variation of profit before interest & tax		Standard deviation of the first difference in operating income over 10 years / Average value of total assets over same period.
Corporate strategy-Diversification		1. Dummy = 1 if SIC code >1 2. Dummy = 1 for firms with new products in new markets		
Competitive strategy		Dummies to represent: Innovation, Differentiation, and Cost Reduction strategies.		
Cash flow		PBIT + Depreciation – Tax		
Importance of access to finance		Dummy = 1 if access to finance is important to firm.		
Difficulty of access to finance		Dummy = 1 if access to finance has been a problem.		
Non-executive directors on Board		Number of non executive directors / Number of executive directors on Board		
Retained earnings			Log (Retained earnings / Paid up capital).	
Relationship with the main bank				Share of borrowings from the main bank in total liabilities.
Group affiliation				A dummy variable that equals one for Keiretsu firms.
Regulation on public equity issues				A dummy that equals one for firms that meet two out of the three conditions that are required in order to issue equity.
Free cash flow based financing decisions				The spread between interest rate and dividend yield for firms that are allowed to issue equity.

- OLS = Ordinary Least Squares, FGLS/WLS = Feasible Generalised Least Squares/ Weighted Least Squares
- MV = Market Value, BV = Book Value

Source: Complied by author from a selective review of the literature

Table 4.1 Summary results of selected studies of the determinants of capital structure.

Panel C: Results

	1		2		3		4			
Study	**Bradley, Jarrell, Kim (1984)**		**Alderson & Betker (1995)**		**Titman & Wessels (1988)**		**Rajan & Zingales (1995)**			
Regression (Dependent variable / Sample)	Sample - All firms	Sample - Non - regulated	Dependent - Long term debt	Dependent - Total liabilities	Dependent - Long term debt to MV of equity	Dependent - Short term debt to MV of equity	Dependent - Book capital Sample - US	Dependent - Book capital Sample - Germany	Dependent - Book capital Sample - France	Dependent - Book capital Sample - UK
R2	0.586	0.337	0.066	0.101			0.21 pseudo	0.12 pseudo	0.12 pseudo	0.18 pseudo
Constant	0.225 [7.30]	0.191 [4.77]	0.718 (0.00)	0.593 (0.00)			Included but not reported	Included but not reported	Included but not reported	Included but not reported
Liquidation costs			-0.505 (0.01)	-0.182 (0.10)						
Firm size			0.002 (0.95)	0.036 (0.03)	-0.033 [-0.6]	-0.183 [-3.2]	0.06 {0.01} ***	-0.07 {0.02} ***	0.02 {0.02}	0.026 {0.01} ***
Non debt tax shield	0.308 [6.51]	0.316 [6.12]	-0.030 (0.33)	-0.031 (0.12)	-0.058 [-0.6]	-0.041 [-0.4]				
Tangibility of assets					0.041 [0.8]	-0.046 [-0.9]	0.50 {0.04} ***	0.42 {0.19} **	0.53 {0.26} **	0.41 {0.07} ***
Growth					-0.068 [-0.7]	-0.112 [-1.2]	-0.17 {0.01} ***	-0.20 {0.07} ***	-0.17 {0.08} **	-0.13 {0.03} ***
Uniqueness					-0.263 [-3.7]	-0.260 [-3.7]				
Profitability					-0.213 [-3.7]	-0.179 [-3.1]	-0.41 {0.1} ***	0.15 {0.52}	-0.02 {0.72}	-0.34 {0.30}
Risk	-0.645 [-4.66]	-0.579 [-3.94]			-0.031 [-0.7]	-0.017 [-0.4]				
R&D and advertising	-0.98 [-4.43]	-0.956 [-4.13]								
Industry dummies	25 industries included but not reported	21 industries included but not reported			-0.106 [-2.1]	-0.063 [-1.2]				
Key findings	• Industry classification is an important determinant of capital structure. • Support for the trade off theory: Firm leverage ratios are related inversely and strongly to earnings volatility and to the intensity of R&D and advertising expenditures. • Firm leverage ratios are significantly and positively related to the proxy of non-debt tax shield measured in terms of depreciation and tax credits. This contradicts the theory that interest payments and depreciation and tax credits are alternative tax shields. A possible explanation is that the proxy used for non-tax shields is an instrumental variable for the type of assets and their collateral value.		Asset structure is an important determinant of capital structure: Firms with assets that are associated with high liquidation costs select capital structures that reduce the likelihood of financial distress		• Firms with unique products have lower debt ratios. This is due to the high costs that will be imposed on customers, suppliers and workers of such firms in the case of liquidation. • Support for the pecking Order theory: Smaller firms use more short-term debt relative to larger firms. This is because small firms face higher transaction costs of raising long-term debt or equity. • No support for importance of non-debt tax shields, volatility, asset structure or growth prospects in determining firms' capital structures. However, this may be due to measurement problems.		• Factors that have been previously identified as important determinants of the debt ratios of US firms have similar influence on the debt ratios of other major industrialised countries. • However, institutional effects and inaccurate proxies make it difficult to identify the theoretical model that explains the determinants of capital structure. • Thus a better understanding of how institutional factors influence debt ratios, can help to identify the valid theoretical model.			

- MV = Market Value, BV = Book Value
- (p-values), [t-ratios], {standard errors}
- Significant levels indicators are added where they are included in the relevant study: *, **, *** indicate significant at 10, 5 and 1 percent levels respectively

Source: Complied by author from a selective review of the literature

Table 4.1 Summary results of selected studies of the determinants of capital structure.

Panel C: (concluded) Results

	5		6		7		8			
Study	**Wiwattanakantang (1999)**		**Jordan, Lowe, Taylor (1998)**		**Hussain (1997)**		**Hirota (1999)**			
Regression / dependent variable	Market leverage	Book leverage	OLS	FGLS/ WLS	Korea	Malaysia	Year = 1977	Year = 1982	Year = 1987	Year = 1992
R2	0.33 Adjusted	0.17 Adjusted	0.4340	0.5351	0.0714	0.2401	0.643 Adjusted	0.690 Adjusted	0.594 Adjusted	0.522 Adjusted
Constant			3.9710 (0.002)	3.8632 (0.005)	-1.545 [-2.663]	-9.737 [-13.775]	Included but not reported	Included but not reported	Included but not reported	Included but not reported
Firm size	0.031 [2.993]***	0.041 [4.089]***	0.1007 (0.493)	0.1472 (0.372)	0.2130 [3.749]	0.4813 [7.189]	2.79 [3.46]***	2.86 [3.55]***	1.85 [2.27]**	3.39 [4.22]***
Non debt tax shield	-1.264 [-2.608]***	-1.604 [-3.424]***					-1.11 [-1.43]*	-0.06 [-0.06]	-0.07 [-0.10]	-1.25 [-1.69]**
Tax rate			-5.2143 (0.000)	-5.5828 (0.000)	-0.1369 [-4.040]	-0.0741 [-1.526]				
Tangibility of assets	0.080 [1.381]	0.060 [1.076]	0.2362 (0.006)	0.2834 (0.004)			0.32 [3.58]***	0.20 [2.35]***	0.13 [1.25]	0.25 [3.02]***
Non tangible assets							-1.73 [-3.85]***	-0.76 [-1.55]*	-1.19 [-3.41]***	-1.19 [-4.27]***
Growth	-0.123 [-7.585]***	-0.038 [-2.414]**	-0.0519 (0.839)	-0.1013 (0.776)			-15.68 [-2.92]***	-10.34 [-1.80]**	-1.80 [-1.95]**	-4.04 [-3.19]***
Current Profitability	-0.649 [-4.118]***	-0.543 [-3.566]***	0.3543 (0.045)	0.0882 (0.613)	0.3859 [5.087]	-0.5236 [-7.919]	-2.32 [-7.17]***	-2.14 [-6.87]***	-1.73 [-6.23]***	-1.78 [-5.74]***
Squared (Profitability)			-0.0085 (0.075)	-0.0013 (0.787)						
Future Profitability – based on PE ratio					0.0781 [2.560]	-0.3476 [-4.194]				
Risk	0.006 [0.089]	0.026 [0.397]	0.3187 (0.000)	0.3137 (0.004)			-0.39 [-0.56]	-0.27 [-0.64]	-1.72 [-2.24]**	-0.23 [-0.31]
Diversification – SIC code > 1			-0.1524 (0.443)							
Diversification – New products in new markets			0.0342 (0.864)							
Innovation			-0.2181 (0.032)	-0.2669 (0.025)						
Differentiation			0.3483 (0.129)	0.2033 (0.405)						
Cost reduction			0.2761 (0.151)	0.4002 (0.065)						
Cash flow			-3.3520 (0.022)	-4.3000 (0.004)						
Importance of access to finance			0.3706 (0.083)	0.4353 (0.066)						
Difficulty of accessing finance			0.5207 (0.020)	0.6339 (0.031)						
Non-executive directors on Board			-0.1873 (0.056)	-0.1910 (0.000)						
Retained earnings					0.0309 [0.5874]	0.0783 [1.126]				
Link of firm with its main bank							0.85 [4.72]***	1.20 [4.94]***	1.01 [4.59]***	1.32 [6.45]***
Group affiliation							0.94 [0.47]	5.24 [2.71]***	5.07 [2.59]***	3.99 [[2.11]**
Regulations allow issue of equity							3.93 [0.53]	-15.72 [-3.60]***	-8.55 [-3.05]***	-5.56 [-2.04]**
Cash flow based financing decisions							-2.36 [-2.08]**	-0.63 [-1.10]	-0.60 [-1.51]*	-0.20 [-0.41]
Key findings	• Support for the trade off theory: In particular size is positively related to debt levels, which is consistent with the trade off theory rather than with information asymmetry models. • Agency conflicts and voting power considerations also play a role in the capital structure decision. It is for that reason that ownership structure influences debt ratios.		• Competitive strategy is an important determinant of debt ratios while there is only weak evidence for the importance of corporate strategy. The latter may be due to measuring problems. • Tax rate and risk are significantly related to debt ratios but in a manner opposite to predictions. • Size does not appear important, perhaps due to focus on SMEs.		• Consistent with expectations, size and retained earnings are positively related to leverage. • Inconsistent with expectations, taxes are negatively related to leverage. • Opposing results in Korea and Malaysia with regards profitability. • Institutional factors such as tax rules and other government policies also influence debt ratios.		• Capital structure theories that have been developed in the US are also applicable in the Japanese context. • Institutional and regulatory factors in the Japanese capital market, such as relationships with the main bank, group affiliation, and regulation on new issues, re important in corporate financing decisions. • The relationships between leverage and its determinants appear to be stable over time.			

- MV = Market Value, BV = Book Value
- (p-values), [t-ratios], {standard errors}
- Significant levels indicators are added where they are included in the relevant study: *, **, *** indicate significant at 10, 5 and 1 percent levels respectively

Source: Complied by author from a selective review of the literature

Table 4.1 is split into three panels. Panel A summarises the predictions in each of the studies reviewed, regarding the relationships between the firm's debt ratio and its determinants. Panel B summarises the empirical procedures and gives variable definitions. Panel C presents the regression results and key findings, which are discussed below.

Using cross sectional, Ordinary Least Squares (OLS) procedure, Bradley, Jarrell and Kim (1984) investigate the validity of the trade off theory with a sample of approximately 800 US firms for the period 1962 to 1981. In particular, the study uses three proxies to measure the importance of tax, agency and financial distress considerations in influencing the debt decision. The tax advantage of debt is inversely measured by the presence of non-debt tax shields, being depreciation and investment tax credits. Further, investments in R&D and advertising also represent non-debt tax shield because these capital investments are expensed immediately thus reduce the tax liability of the firm. However, expenditure on R&D and advertising is also a proxy for the agency costs of debt. This is because managers have relatively high discretion over assets created from such expenditure, increasing the opportunities for under investment and risk shifting[5]. The third explanatory variable is risk as measured by earnings volatility, and which stands for the cost of financial distress. Specifically, because financial distress is

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[5] The duplicity of R&D and advertising expenditure in reflecting both the availability of alternative non-debt tax shields and agency costs of debt is an illustration of the point made earlier. Particularly it shows the limitation of empirical work in distinguishing between the various capital structure theories.

costly, firms with volatile earnings are predicted to have less debt in their capital structure. Lastly, the importance of industrial classification to firms' long-term debt ratios is analysed by including 25 industry dummies.

Table 4.1, Panel C shows that the results in Bradley, Jarrell and Kim (1984) confirm to expectations. Particularly, the extent that the estimated coefficients on the variables measuring earnings volatility and investments on R&D and advertising are negatively signed and significant. Furthermore, the study concludes that target debt ratios are strongly related to industrial classification even when regulated firms are excluded from the sample[6]. Target debt levels are also found to be significantly and positively related to the proxy for the non-debt tax shields, measured in terms of depreciation and tax credits. This is inconsistent with the predicted negative relationship which is based on the idea that depreciation and tax credits are alternatives to interest payments in shielding tax. Bradley, Jarrell and Kim (1984) attempt to reconcile these results by suggesting that the level of depreciation and tax credit may be a proxy for the type of assets held by the firm. Specifically, it is noted that high levels of depreciation and tax credits may be reflecting asset tangibility because it is this type of assets that tend to generate them.

[6] The study by Bradley, Jarrell and Kim (1984) begins by examining the relationship between leverage and industry classification. A standard ANOVA procedure, where leverage is regressed on industry dummies, finds a strong positive relation between regulated firms and leverage. In particular the dummies of highly regulated firms including telephone, electric and gas utilities, and airlines all have positive estimated coefficients with high t-ratios. To isolate the possibility that results are distorted by this strong relationship between leverage and regulations, empirical procedures proceed by running tests that exclude regulated industries along side those for the full sample of firms.

Tangible assets are often assumed to be an inverse proxy for liquidation costs, as they have greater value on liquidation compared with intangible assets such as brand names or reputation. Thus the direct correlation between liquidation value, tangibility, and depreciation may be the reason for the positive sign found on the non-debt tax shield. This means that, consistent with the trade off theory, assets with high liquidation value and lower expected bankruptcy costs can support more debt and should be positively related to debt ratios. This link between liquidation value and debt ratios is also the subject of Alderson and Betker (1995).

Alderson and Betker (1995) use data on 88 US firms that have reorganised under Chapter 11 of the Bankruptcy Code during the period 1982 to 1993[7]. This selection procedure allows liquidation costs to be measured directly as the fraction of going-concern value that would be lost if the firm liquidated. A significant and negative correlation of –0.26 is reported between this direct measure of liquidation costs and the degree of assets' tangibility measured in terms of fixed to total assets. This supports the explanation in Bradley, Jarrell and Kim (1984) that depreciation and thus the degree of assets' tangibility is an inverse proxy for liquidation costs. Further, by way of an OLS, cross sectional regression analysis, Alderson and Betker (1995) show that the level of

[7] Under Chapter 11 of the US Bankruptcy Reform Act, 1978, a firm may apply to the court for protection from its creditors while it carries out reorganisation of its affairs so as to be able to pay off its creditors. Firms that reorganise under the Code must disclose by way of a Bankruptcy Disclosure Statement, their post-bankruptcy financial structure as well as estimates of going-concern and liquidation values of their assets.

debt in firms' capital structures is inversely related to liquidation costs. As can be seen from Panel C of Table 4.1, the estimated coefficient of the liquidation costs variable remains significantly negatively signed whether the dependent variable is measured in terms of long-term debt or total liabilities.

This last point regarding various measurements of the dependent variable is also addressed by other capital structure studies. Rajan and Zingales (1995) look at the issue closely. They note that the ratio of total liabilities to total assets reflects what is left for shareholders in the case of liquidation. Thus this broadest measure of debt ratio is particularly appropriate in the Alderson and Betker's (1995) study which uses a sample of firms that have narrowly escaped liquidation. In contrast, in Titman and Wessels (1988) the debt level is not aggregated but is separately measured as the levels of long-term debt, short-term debt and convertible debt. This separation serves to assess the different theoretical implications on each source of debt finance[8]. For their investigation of the determinants of capital structure, Titman and Wessels (1988) use factor analytic technique and nearly 500 US manufacturing firms in the period 1974 to 1982. The results of this study are also reported in Table 4.1.

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[8] Although not reported in Table 4.1, Alderson and Betker (1995) also run separate regressions for the different types of debt. In particular, private debt to total debt, convertible debt to total debt and secured debt to total debt are regressed on a constant, liquidation costs and firm size. The study reports significant negative relations between liquidation costs and both private to total debt and secured to total debt.

As shown in Table 4.1, Panel C, Titman and Wessels (1988) find most of the estimated coefficients on the explanatory variables in the long-term debt and short-term debt regressions to bear the predicted signs. In general the results appear to support the pecking order theory according to which information asymmetries and transaction costs influence the firm's choice of funds. For example, smaller firms tend to use more short-term debt than larger firms as implied by the significantly negative estimated coefficient on the size variable in the short-term debt regression. This reflects the higher degree of information asymmetries and higher transaction costs, that small firms face when issuing long-term debt or equity. Furthermore, profitable firms, with sufficient internal funds, tend to have less debt relative to the market value of their equity. This is indicated by the significantly negative estimated coefficients on the profitability variable. However, while Titman and Wessels (1988) find the pecking order proxies generally to be significant, their results also show that the proxies for the trade off theory are not. Thus assets' tangibility, non-debt tax shields, volatility of earnings, and growth opportunities appear not to be important in determining firms' capital structures. Titman and Wessels (1988) conclude that their results are not conclusive but that the failure to find support for the trade off theory may be due to measurement problems. Similarly, Rajan and Zingales (1995) also conclude that the puzzle of what determines capital structure is still unresolved but that this may be due to inaccurate proxies or to institutional influences.

With reference to institutional influences, Rajan and Zingales (1995) suggest that the impact of such factors may stand in the way of empirical studies to resolve the capital structure debate. Particularly it is proposed that factors such as tax and bankruptcy rules or the historic role played by banks and the securities markets may obscure the validity of theoretical models. Therefore, in an attempt to assess the impact of institutional structures, Rajan and Zingales (1995) extend their testing ground beyond the US. The idea is that by examining countries with different institutional structures, a better understanding of the fundamental determinants of capital structure may be obtained. Specifically the study addresses the question of whether four factors, that have been consistently identified as important determinants of capital structure in the US, are also important in other industrialised countries. Separate Tobit models are estimated for a sample of non-financial, listed, firms from each G-7 country, for the period 1987 to 1991. The results for the US, Germany, France and the UK are presented in Table 4.1. These indicate that the same factors, which were found to be important in explaining the capital structure of US firms, are also important in other G-7 countries. Specifically, the results indicate that the degree of assets' tangibility is always positively correlated with leverage, while growth opportunities and debt are always negatively correlated. Similarly, in all countries but Germany, size is always positively related to debt while profitability is always negatively related to debt.

Like Rajan and Zingales (1995), Wiwattanakantang (1999) also deviates from the common practice of focusing on US firms. Instead Wiwattanakantang (1999) focuses on an emerging economy, namely, Thailand. The study is an OLS cross sectional regression analysis of approximately 200 non-financial firms, listed on the Thai stock exchange in

1996. Contribution to the capital structure debate is principally by assessing agency-related influences on the trade off theory of debt. Specifically, it is suggested that due to agency-related costs of debt, firms with alternative mechanisms for controlling the equity costs of equity should use less of the debt-controlling device. Further, it is proposed that high managerial ownership, large institutional investors, and high ownership concentration could provide alternative control-mechanisms to debt. Therefore it is hypothesised that these ownership structure features should be negatively related to debt ratios. The empirical results for the agency effects on financing decisions in Wiwattanakantang (1999) are not reported in Table 4.1, as they are not directly relevant to this study. However, a relevant conclusion from this investigation is that control and voting power considerations, as well as agency costs considerations are important in determining firms' debt ratios. Indeed, it is found that in single-family owned firms there is positive and significant relationship between the level of debt and the percentage of shares held by CEOs and directors. This is inconsistent with the notion that high managerial ownership reduces agency problems and the need for the debt-controlling device. Instead the findings could be explained by the role of debt in protecting the voting powers of owners/managers, which may be particularly important in family-owned firms. Wiwattanakantang (1999) however, also suggests an alternative explanation, which is based on agency theory. Accordingly family-owned firms may select high debt ratios not in order to maintain their voting power, but in order to signal their commitment to reducing agency costs associated with conflicts of interest between controlling and minority shareholders[9].

In addition to investigating agency effects, Wiwattanakantang (1999) also investigates tax and information effects on financing decisions, the results of which are presented in Table 4.1. There is an important point to be made about the relationship between size and the level of debt in the capital structure. Results in Wiwattanakantang (1999) as in Rajan and Zingales (1995) show size to be positively and significantly related to the debt ratio. However, as in Titman and Wessels (1988), and Rajan and Zingales (1995), Wiwattanakantang (1999) also does not provide a definite prediction about the nature of the relationship between size and debt. Indeed, all these studies suggest that size could be positively or negatively related to debt, depending on the relative importance of pecking order and trade off considerations. Thus the sign on size could help in distinguishing between these two competing theories. To the extent that size reflects diversification, trade off theory supports a positive relation between size and debt because large and diversified firms are less likely to fall into financial distress. In

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[9] Wiwattanakantang (1999) notes that conflicts between controlling and minority shareholders may arise from wealth expropriation by the former. This may be done through payments of the firm's cash flows to the controlling shareholder or trading with other companies with which the controlling shareholder is associated at terms that are advantageous to those companies. Further, in cases where the controlling shareholder is a family, conflicts may arise if the family ensures the firm provides jobs to its members even when this may not be in the best interests of minority shareholders. Thus an agency-related explanation for the findings of high debt in tightly controlled firms, is that debt can help in reducing conflicts between majority and minority shareholders.

contrast, to the extent that size reflects access to information about the firm, pecking order and asymmetric information considerations should result in a negative sign between size and debt[10]. Thus the significant and positive sign on size in Rajan and Zingales (1995) and in Wiwattanakantang (1999) is supportive of trade off theory.

In an attempt to isolate the impact of size on the firm's debt decision Jordan, Lowe and Taylor (1998) take two actions. First, they focus on approximately 200 small and medium sized (SMEs) UK firms for the period 1989 to 1993. Second, they measure diversification directly. Table 4.1 presents the results of this study from both OLS and Feasible Generalised Least Squares (FGLS) methods.[11] The results lend strong support to the pecking order theory as reflected by proxies such as profitability, cash flow, and a measure of the importance of access to external finance. There is also evidence to support the importance of the firm's assets structure, which is partly influenced by some competitive strategies like innovation. However, there is no evidence that diversification,

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[10] If asymmetric information considerations play an important part in determining firms' debt ratios, then larger firms, with less information problems, should tend to issue more external equity. However, the failure in Wiwattanakantang (1999) to find support for this theory may be due to information effects being obscured by the aggregation of the debt ratio to include both short and long-term debt. This is because for smaller firms with many information problems, long-term debt, like external equity, is also subject to possible significant mis-pricing. Indeed, as reported earlier, Titman and Wessels (1988) find that smaller firms tend to use significantly more short-term debt but insignificantly more long-term debt.

[11] In the FGLS case the predicted values from the non-weighted regression are used to construct the weights.

firm size, or growth influence the debt ratios of SMEs[12]. In addition, inconsistent with expectations, risk is found to be strongly and positively related to debt while the effective tax rate is found to be strongly but negatively related to the level of debt. This puzzling result of a strong and negative relation between taxes and debt is repeated in Hussain (1997).

Hussain (1997) studies two emerging economies, namely the Republic of Korea and Malaysia in the period directly following their financial liberalisation between 1980 and 1990. The panel procedure is applied to two samples of just under 100 of the largest listed manufacturing firms from each country. This results in approximately 800 observations in the case of Korea and approximately 500 in the case of Malaysia[13]. The

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[12] Jordan, Lowe and Taylor (1998) note that their failure, to find strong support for the importance of diversification in determining capital structures, may be due to the difficulty in finding accurate proxies for this corporate strategy. With relation to the apparent insignificance of size, the claim is that this may be due to the concentration of the study on SMEs, or to the fact that the sample firms may not have crossed the size threshold, which is seen as important in reducing the risk of bankruptcy. With regard growth, the study does not predict the sign on the estimated coefficient of this variable although it is expected to be an important explanatory variable. On the one hand the study predicts a positive relation between growth and debt due the need of growing firms for funds combined with control considerations. This is suggested to be particularly the case for small firms whose owners/managers prefer to finance growth by debt rather than by external equity in order to maintain their control. On the other hand, the agency theory of debt predicts a negative relationship between growth and debt due to greater opportunities for growing firms to expropriate bondholders' wealth. To minimise this agency problem, growing firms have lower debt ratios in their capital structure.

[13] The reason for the smaller number of observations in the case of Malaysia is because while the period for Korea spans the years 1980 to 1990, that for Malaysia starts from 1983 to 1990. It is also worth noting that the panel procedure is the Pooled/Total regression. In other words, Hussain (1997) assumes common

explanatory variables include the familiar size, profitability, taxes and industry dummies. In addition to these variables Hussain (1997) also includes future profitability as measured by the PE ratio, and dependency on retained earnings. The idea is that optimistic firms that expect high future profitability tend to rely more heavily on equity. Therefore the expectation is of a negative relationship between leverage and future profitability. In contrast, firms that have accumulated high levels of retained earnings tend to use more debt because the high cash position gives them better access to debt finance and also increases the need for debt as a disciplinary mechanism. Thus Hussain (1997) predicts a positive estimated coefficient on the retained earnings variable. Some of the results in Hussain (1997) are reproduced in Table 4.1.

Consistent with the prediction made in the study and with the general results in Rajan and Zingales (1995) and in Wiwattanakantang (1999), Hussain (1997) finds size and leverage to be strongly and positively related. Further, the results with regards current and future profitability are also strong but of opposing signs for Korea and Malaysia. Another important contribution of Hussain (1997), is the conclusion regarding the importance of institutional factors such as tax structure and other government policies to firms' capital structure decision. For example, after comparing stock market development and capital structures of Korea and Malaysia, Hussain (1997) suggests that

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coefficients for each whole sample. It is explained that if this assumption is relaxed, to allow for the Fixed effects model then this requires the exclusion of the industry dummies. Hussain (1997) also notes that the Random effect/ Error-components procedure gives similar results.

the predominance of the debt sector in Korea, despite the rapid growth of the Korean equity sector could be due to tax rules. Specifically tax rules resulted in the after-tax cost of debt remaining lower relative to the cost of equity, thus maintaining preference for debt[14]. Hussain (1997) further reports strongly positive estimated coefficients on the Korean manufacturing firms' dummies, when the dependent variable is measured in terms of bank-debt. This apparent importance of bank loans to some sectors could be due to government policy, which made priority loans from the government available to selected industries.

It can therefore be concluded that the approach in Hussain (1997) is in line with the suggestion in Rajan and Zingales (1995), that better understanding of institutional effects may help to identify the theoretical determinants of capital structure. Another study that takes the same approach is Hirota (1999) with respect to Japan. Specifically, Hirota (1999) runs cross sectional OLS regressions of total debt to capital for each of the years 1977, 1982, 1987 and 1992 as well as a pooled regression for all years. The study

[14] Hussain (1997) suggests that the rapid growth of the equity sector in Korea during the 1980s could be partly due to government policy. For example, during this period the government has encouraged interest in the stock markets by the selling of its equity holdings in nationalised firms. Further, a number of measures were introduced in 1987 to reduce the fraction of bank-loans in the capital structures of the 30 largest business groups. These groups were forced to repay their debts by raising new capital in the stock market. However, Hussain (1997) also notes that during the same period the after-tax cost of debt remained lower relative to the cost of equity. This was due mainly to a low tax on interest income of 18%, while dividend income for high-income individuals was taxed at 70% (although no tax was charged on capital gains). Thus the dominance of the debt sector in Korea, in spite of the rapid growth of the equity sector was driven by tax rules.

uses between 400 to 500 manufacturing and non-manufacturing Japanese firms for each of the four years, resulting in just over 1,800 observations for the pooled regression. Explanatory variables in Hirota (1999) include the traditional variables as well as specific institutional and regulatory proxies. The traditional variables include non-debt tax shields, type of assets, growth opportunities, risk, profitability and firm size. The institutional and regulatory variables include proxies for factors appropriate to the Japanese business environment such as relationship with the main bank. Other institutional variables include group affiliation dummy, and a dummy that represents whether regulations in the Japanese environment allow the firm to issue external equity.

Another explanatory variable that is included in Hirota (1999) is the spread between interest rate and dividend yield for firms that are allowed to issue equity. The aim is to measure the importance of agency conflicts and in particular the agency problem of free cash flow and how this influences financing decisions. The idea is that managers' financing decisions may be based on how much cash the firm has to pay in the form of interest rates relative to dividends because this influences the free cash flow available to themselves. Therefore the greater the difference between the rate of interest and the dividend yield, the more motivated is the manager to issue equity rather than debt. This implies a negative relationship between debt and the spread between the interest rate faced by the firm and its dividend yield. Indeed as shown in Table 4.1, Hirota (1999) finds the estimated coefficient on the spread between the interest rate and the dividend yield to be negative in all regressions and significant in half of the years.

These results support the idea that managers in Japan tend to behave as predicted by agency theory. Other results in Hirota (1999) lead to the conclusions that, consistent with Rajan and Zingales (1995), capital structure in Japan can be partly explained by theoretical factors developed in the US. The importance of institutional and regulatory characteristics of the Japanese environment in influencing financial decisions of Japanese firms is also established.

The key findings, in Hirota (1999) and the rest of the studies reviewed above, are summarised in Panel C of Table 4.1. Clearly, there is wide support for the notion that trade off, agency and pecking order considerations influence the capital structure decisions of firms in the US and elsewhere. Specifically, there is strong support for pecking order in a survey by Kamath (1997), as well as in Jordan, Lowe and Taylor (1998) and Titman and Wessels (1988). With reference to the trade off theory, the relevance of distress costs is illustrated particularly clearly in Alderson and Betker (1995) who manage to measure liquidation costs directly. There is, however, less agreement on the importance of non-debt tax shields as illustrated in Titman and Wessels (1988) and in Bradley, Jarrell and Kim (1984) where non-debt tax shield is positively related to debt. Agency-related considerations enter the debt decision in Wiwattanakantang (1999) who also illustrates the importance of control considerations. Finally, the relevance of the various theories to the debt decision of firms outside the US is illustrated in Rajan and Singales (1995) and Hirota (1999) in general, and in the case of emerging economies in particular in Wiwattanakantang (1999) and Hussain (1995).

In an attempt to contribute to the capital structure debate, this study draws from the key findings and procedures of previous work. In particular, the explanatory variables, their measurements, and predictions regarding relationships with the dependent variable, are based on the studies reviewed above. Further, the empirical approach here is in the spirit of Rajan and Zingales (1995) and the other studies that focus on economies different to the US.

4.3 A theoretical model of the determinants of capital structure

4.3.1 The model

Based on the capital structure theories discussed in Sections 4.1 and 4.2, and on the basis of previous empirical studies as reviewed in Harris and Raviv (1991) and Prasad, Green and Murinde (2001) it is useful to specify a generic model of capital structure as follows:

$$
\begin{aligned}
(LEVERAGE)_{i,t} = \alpha &+ \beta_1 (AGE)_{i,t} + \beta_2 (FIRM\ SIZE)_{i,t} + \beta_3 (AVPROFIT)_{i,t} \\
&+ \beta_4 (GROWTH)_{i,t} + \beta_5 (FIRM\ RISK)_{i,t} + \beta_6 (ASSETS)_{i,t} \\
&+ \beta_7 (TXSHIELD)_{i,t} + \beta_8 (DEBTORS)_{i,t} + \mu_{i,t} \qquad (4.1)
\end{aligned}
$$

Where variable definitions are as follows: LEVERAGE is the ratio of total liabilities to total assets; AGE is either the number of years since the year of incorporation (AGEINCOR) or the number of years since the year of listing on the Mauritius Stock Exchange (AGELIST); FIRM SIZE is either the natural log of total assets (SIZE), the natural log of turnover (SIZE2) or is represented by two dummy variables SMALL and

LARGE. SMALL is set to one for the smallest size firms whose log of total assets falls in the first quarter of the sample size distribution. LARGE is set to one for the largest size firms whose log of total assets falls in the forth quarter of the sample size distribution; AVPROFIT is a measure of profitability and is the average ratio of profit before interest and exceptional items to total assets for a period of three years; GROWTH is the annual percentage increase in total assets during the two years up to the current year; FIRM RISK is the volatility of earnings and is represented by stock price volatility. It is measured alternatively by RISK and by ARISK which are both based on the residuals from a regression of the natural log of the daily stock price on a constant and time; ASSETS is the asset structure, given by the ratio of fixed assets to total assets; TXSHIELD is a proxy for non-debt tax shield measured as the ratio of depreciation to total assets; DEBTORS is the ratio of debtors less creditors to total assets.

Alternatively the model of Equation (4.1) can be expressed in logarithmic form. In this case the natural logarithms are taken of the dependent variable and the explanatory variables that assume only positive values:

$$\begin{aligned}(LOGLEV)_{i,t} = \alpha &+ \beta_1 (AGE)_{i,t} + \beta_2 (FIRM\ SIZE)_{i,t} + \beta_3 (AVPROFIT)_{i,t} \\ &+ \beta_4 (GROWTH)_{i,t} + \beta_5 (FIRM\ RISK)_{i,t} + \beta_6 (LOGASST)_{i,t} \\ &+ \beta_7 (LOGTAX)_{i,t} + \beta_8 (DEBTORS)_{i,t} + \mu_{i,t} \qquad (4.2)\end{aligned}$$

Where all variables are as defined above excluding the following three variables: LOGLEV, which is the natural log of LEVERAGE; LOGASST, which is the natural log of ASSETS; and LOGTAX, which is the natural log of TXSHIELD. A more detailed description of all the variables in Equations (4.1) and (4.2) is contained in the Appendix 4A.

4.3.2 Theoretical predictions

The hypothesised directions of influence of the main explanatory variables on the endogenous leverage variable are based on the trade off, pecking order, agency, and control considerations as well as previous empirical studies. The predictions can thus be summarised as follows.

Age

The theoretical direction of relationship between the firm's age and its debt level is indeterminate. Based on trade off considerations, it may be argued that with the passage of time the firm establishes a historical record for honouring financial obligations and this reputation increases its debt capacity. Thus mature firms can borrow at better terms and the predicted impact of age on debt should be positive. In contrast, it may be argued that the greater availability of information on older firms reduces information asymmetries associated with equity. Hence in line with pecking order considerations, mature firms should tend to use the capital market for equity relatively more compared with younger firms. There is a further argument for a negative correlation between age and debt. Accordingly if firms follow a pecking order, and mature firms are likely to have accumulated higher levels of past retained earnings, then these firms need to rely less on external debt finance. Thus in the case of age the sign on the estimated coefficient distinguishes between the trade off theory, when the sign is expected to be positive, and pecking order considerations, when a negative sign is expected.

Size

Larger firms tend to be more diversified, and hence less risky and less prone to bankruptcy. These firms, therefore, have higher debt capacity and in line with the trade off theory a positive link is expected between size and leverage. This is consistent with the general results generated by Rajan and Zingales (1995), Wiwattanakantang (1999), Hussain (1997), and Hirota (1999). Further, if maintaining control is important then it is likely that firms achieve larger size through debt rather than equity financing. Thus control considerations also support positive correlation between size and debt. However, it could also be argued that size serves as a proxy for the availability of information that outsiders have about the firm. From a pecking order point of view, less information asymmetry makes equity issuance more appealing to the firm, thus a negative link can be expected between size and leverage. This view is consistent with some of the empirical results reported in Titman and Wessles (1988) and Rajan and Zingales (1995)[15]. The theoretical relationship between size and leverage is thus undetermined but can distinguish between pecking order and between trade off and control considerations. Specifically, positive correlation is in line with the trade off theory, while a negative

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[15] Rajan and Singales (1995) show that in Germany size and leverage are negatively related.

correlation is supportive of asymmetric information and pecking order considerations.

Profitability

Another indeterminate relationship is that between profitability and leverage. In the context of the pecking order theory of financing choices, profitable firms are likely to have sufficient internal finance that ensures they do not need to rely on external sources. Moreover, in an agency theory framework, if the market for corporate control is inefficient, managers of profitable firms will use the higher levels of retained earnings in order to avoid the disciplinary role of external finance. These two rationales point to a negative correlation between profitability and leverage. This prediction is consistent with the broad results in Titman and Wessels (1988), Rajan and Zingales (1995), Wiwattanakantang (1999), Hussain (1997) and Hirota (1999). However, it can also be argued that lenders prefer profitable borrowers with high current cash flows. Moreover, in an agency theory framework, if the market for corporate control is efficient, managers of profitable firms will seek debt as a disciplinary device because debt is regarded as a commitment to pay out cash in the future. Theory, therefore, also supports a positive correlation between profitability and leverage. This prediction is consistent with some of the results in Jordan, Lowe and Taylor (1998) and Hussain (1997). Thus to the extent that pecking order and supply side considerations, do not distort the results, the sign on the coefficient of the profitability gives an indication as to the level of efficiency of the market for corporate control[16].

Growth (investment opportunities)

The theoretical direction of the relationship between growth and leverage is undetermined. In line with the agency theory of debt, conflicts between owners and lenders point to a negative correlation between growth opportunities and leverage due to two problems. The first problem is that of under investment, or the tendency by highly levered firms to pass up profitable investments. The reason for this is that when debt levels are high investors are reluctant to provide further equity funds because they are aware that cash flows generated from investments will go to service debt before any is returned to them. Moreover, for the same reason existing shareholders will prefer the firm to pay out dividends rather than invest. The higher the firm's growth opportunities, the more severe are the consequences of the under investment problem. The second problem is that of risk shifting, or the tendency by equity holders to increase the firm's risk profile. Similar to the under investment problem, the consequences of the risk shifting problem also become more severe as growth opportunities increase. This is because firms with high investment opportunities provide more scope for shareholders to

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[16] Agency theory predicts both a negative and a positive relationship between profitability and debt. The precise direction depends on the efficiency of the market for corporate control. If the market is efficient, profitability is expected to be positively related to leverage because interest payments are a commitment to pay out cash which may otherwise be wasted by management. On the other hand, if the market is inefficient, profitability should be negatively related to leverage, as managers of profitable firms will use internal finance in order to avoid the disciplinary roles of the capital markets.

expropriate wealth from bondholders through changes to risk profiles. Thus the agency theory of debt predicts that due to the problems of under investment and risk shifting, growing firms should have low debt levels and use greater amount of equity finance.

Considerations based on the trade off theory also point to negative correlation between growth and leverage. For example, although growth opportunities add value, the firm cannot use growth opportunities as security for lenders in order to support more debt (Titman and Wessels, 1988). Furthermore, it may also be argued that growing firms face higher costs of financial distress, as growth opportunities have no value on liquidation. Thus the trade off theory and the agency theory of debt both support a negative relationship between the firm's growth opportunities and debt. This negative sign is consistent with the empirical results reported in Titman and Wessels (1988), Rajan and Zingales (1995), Wiwattanakantang (1999), and Hirota (1999).

However, in a corporate governance context, when tightly-controlled firms are growing, they have greater need for funds and may prefer debt to equity because the latter involves giving up control. This implies a positive correlation between growth and leverage and can be particularly applicable to the case of Mauritius[17]. Further, in line with pecking order theory growing firms, that need funds, prefer debt to external equity. Thus based on corporate governance and pecking order considerations, the relationship between growth opportunities and leverage is predicted to be positive. But based on the

[17] The structure of ownership in Mauritius is fairly concentrated, and control considerations tend to be important.

agency theory of debt and on the trade off theory the relationship between growth and leverage should be negative.

Earnings volatility (risk)

Risk should be negatively associated with leverage due to trade off considerations. Particularly, the probability of being unable to meet financial obligations increases with the volatility of earnings. As the present value of the costs of financial distress increases with the probability of being financially distress, risky firms prefer less debt. Further, the agency theory of debt also predicts a negative association between debt and risk. Specifically, as equity holders are aware that high risk implies that there may be insufficient funds to pay them, they become prone to risk shifting or under investment activities. These theoretical predictions are consistent with some of the empirical results reported in Bradley, Jarrell and Kim (1984) and Hirota (1999), but not with the findings in Jordan, Lowe and Taylor (1998).

Asset structure

The ratio of fixed to total assets represents the degree of assets' tangibility. The trade off theory predicts tangibility to be positively related to debt levels for two main reasons, namely security and the costs of financial distress. First, tangible assets normally provide high collateral value relative to intangible assets, which implies that these assets can support more debt. Second, tangible assets often reduce the costs of financial distress because they tend to have higher liquidation value.

In addition to these two reasons, agency theory provides another two reasons for a positive association between assets' tangibility and the firm's debt levels. The first of these reasons relates to the ease by which the variance of the cash flows generated from the asset can be increased. Viswanath and Frierman, (1995) note that it is usually more difficult to alter the variance of the cash flows generated from tangible rather than intangible assets. Thus asset tangibility reduces the scope for risk shifting and firms with tangible assets will support more debt. Second, Harris and Raviv (1990) develop the idea of the role of debt in disciplining management and providing information for this purpose. It is argued that tangible assets have higher value on liquidation, which means that liquidation is often the best strategy when the firm is financially distressed. However it is when liquidation may be the best course of action that managers, due to self-interest considerations, will be most reluctant to provide useful information that can lead to such outcome. Under these circumstances debt can ensure information is available because default on debt obligations, triggers investigation into the firm's affairs. Thus firms with tangible assets, whose managers tend to conceal information in order to avoid liquidation, will have more debt due to its role in disciplining managers and providing information.

Thus on the basis of both the trade off and agency theories, the ratio of fixed to total assets is predicted to be positively related to the level of debt in the capital structure. This positive sign is consistent with the empirical results reported in Rajan and Zingales (1995), Jordan, Lowe and Taylor (1998), and Hirota (1999). However, Titman and Wessels (1988) provide an agency theory based argument for a negative relationship between the tangibility of the firm's assets and leverage. Accordingly it is easier to monitor the use of tangible rather than intangible assets, which means that firms with intangible assets will tend to use more debt for monitoring purposes.

Non-debt tax shield

In the context of the trade off theory, non-debt tax shields provide alternative measures to interest tax shield. Therefore firms with high non-debt tax shields, such as accelerated depreciation and investment tax credits, relative to their expected cash flows, should use less debt. This leads to prediction of a negative correlation between non-debt tax shields and debt, which is consistent with the general results reported in Wiwattanakantang (1999) and Hirota (1999). There is one point to note, however, when the implications of corporate taxation on the capital structures of listed firms in Mauritius are considered. In general, the lower tax rate, which is faced by listed companies relative to other companies, reduces the value of tax shields. This implies that corporate tax considerations may not play as important role as they may otherwise do in determining the level of debt in firms' capital structures. Thus the predicted negative association between debt and other non-debt tax shields should be weaker for listed firms and the proxy for the latter may turn out to be insignificant.

Table 4.2 presents a summary of the predicted signs on the estimated coefficients of all the explanatory variables of Equations (4.1) and (4.2), which are included to proxy for the various theories as discussed above. In addition to these variables, a control variable, DEBTORS, is also included in the above equations and its relationship with the dependent variable is predicted below.

Table 4.2 Predicted signs on the proxies for the competing leverage determinants theories

Variable	Pecking order theory	Trade off theory	Agency theory	Control considerations
Age	(-) – Mature firms suffer less information problems thus find external equity more attractive (-) – Older firms with sufficient retained earnings rely primarily on internal funds	(+) – Older firms have access to debt at better terms due to having longer record of proper treatment of creditors		
Size	(-) – Larger firms suffer less information problems thus find external equity more attractive.	(+) – Larger firms tend to be more diversified, less risky and thus less prone to bankruptcy and can support more debt.		(+) – Firms achieve large size through debt rather than equity financing
Profitability	(-) – Profitable firms have sufficient retained earnings thus rely less on external funds.	(+) – Profitable firms enjoy better borrowing terms, as lenders prefer profitable firms.	(+) – In an efficient market, profitable firms employ debt to prevent waste by managers (-) – In an inefficient market, managers tend to avoid the disciplinary role of debt.	
Growth	(+) – Growing firms need funds, and they prefer debt to external equity because debt is less subject to mis-pricing.	(-) – Growth opportunities can not be offered as security to lenders. (-) – Growth does not generate current cash flows which may be protected from tax liability by interest (-) – Growth opportunities tend to have low value on liquidation	(-) – Risk shifting: growth opportunities give greater scope for expropriation of lenders' wealth (-) – Under investment: highly geared firms tend to pass up investment opportunities	(+) – Firms prefer to support growth through debt because this form of finance does not dilute control.
Risk		(-) – Earnings volatility increases the probability, and thus the present value, of the costs of financial distress	(-) – The probability of risk shifting or under investment increases with increases in the riskiness of the firm.	
Assets (tangibility)		(+) – Tangible assets can be offered as security to lenders and are likely to have high value on liquidation.	(-) – Difficult to monitor the use of intangible assets hence employ debt for this purpose (+) – Harder to engage in risk shifting when assets are in place	
Non-debt tax shield		(-) Reduces the value of the interest tax shield.		

Debtors

This is a control variable. Credit given to debtors is often determined by the industry in which the firm operates, and it is thus reasonable to expect that excess over the trade credit received from suppliers, should be financed by other liabilities of similar durability. Moreover, Mauritius is a small island economy hence to the extent that trade depends on imports and exports, matching trade debtors with creditors is likely to be more difficult leading to the need to meet trade credit with other liabilities. For these reasons, the variable net debtors to total assets, is expected to be positively related to the firm's total liabilities.

4.4 Mauritius and the database[18]

4.4.1 The Mauritius corporate sector and securities market

Mauritius is a small island in the Indian Ocean near Africa, with an area of less than 2,000 square kilometres, and population that totals just over 1 million. The island was occupied by the French from 1715 until 1810 and then by the British until 1968 when it gained independence. The economy has traditionally been based on the sugar industry, but more recently has diversified into manufacturing, tourism, and financial services. In spite of its small size, Teal (1999) notes that since the 1970s the Mauritian economy has became highly export oriented, and has experienced high growth rates[19].

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[18] Review of the Mauritian economy and corporate sector is based in part on the contribution of C. Ah-Hen, from the Department of Accounting and Finance, the University of Mauritius, to a joint paper that was presented at a Finance and Development Research Programme, Manchester University, 5-6 April 2001.

[19] Teal (1999) notes that the Mauritian economy had enjoyed 3-4% growth rates in real GDP per capita for the period 1971 to 1995. Further, the value of manufactured exports per capita in Mauritius, had risen from

The Mauritian corporate sector is governed by the Companies Act of 1984, while the tax law is defined in the Income Tax Act of 1995 with a tax year that typically ends on 30 June. The corporate sector is characterised by ownership structure that is predominantly family oriented, and by large fraction of unlisted firms. For example, in 1997 out of 616 public companies 46 were quoted on the official list of the Stock Exchange of Mauritius (SEM). Furthermore, SEM is not representative of the economy as a whole. For instance, none of the garment manufacturers which constitute an important part of the economy in general and of the exporting sector in particular, are listed on the stock exchange. This may be explained by the recent origin of SEM, which was set up by the Stock Exchange Act of 1988 and began operations in 1989. On inception, in 1989, SEM listed 5 companies with a market capitalisation of about US$ 90 million. But by 1999 market capitalisation has exceeded US$ 1 billion and the official list of SEM included over 40 companies and 16 debentures.

The market, however, is highly concentrated with the top 5 companies representing over 50 percent of market capitalisation. Furthermore, the SEM is characterised by low liquidity and is dominated by institutional investors with individual investors representing only 5 percent of the population at the end of 1996. Thus in order

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$341 in 1980 to $823 in 1995. Indeed, comparing Mauritius' performance with that of five other sub-Saharan African economies, it is concluded that Mauritius is the only economy which maintained growth of income and exports over the period from 1970 to 1995. Teal (1999) also illustrates the export orientation of the Mauritius economy through a survey conducted in 1994. It is recorded that over half of all firms in Mauritius export, while nearly 70% of firms in the labour-intensive textile and garment sector do so.

to stimulate activity and to encourage firms to list on the stock exchange, the government has introduced a number of incentives. For example, dividends received from listed companies and gains from the sale of shares and debentures of such companies are exempt from tax[20]. Likewise, companies quoted on the official list pay corporate tax at the reduced rate of 25 percent compared with the basic corporate tax rate of 35 percent. Further, in 1994 the stock market was opened to foreign investors with only limited restrictions, such as on holdings in sugar companies, remaining. Indeed, foreign participation on the SEM has increased from about 1 percent of turnover in 1994 to nearly 25 percent in 1999, and from just about 0.5 percent of volume in 1994 to nearly 22 percent of volume in 1999.

As at 31 October 2000, the official market comprises of 41 local companies, 1 foreign company and 20 corporate debentures. These companies are classified into seven sectors including banks and insurance, industry, investments, sugar, commerce, leisure and hotels and transport. The dataset for the present study focuses on the non-financial companies on the official market. Table 4A.1 lists the companies constituting the sample while the next sub section describes the database.

4.4.2 The database

The above brief description of the Mauritian corporate sector and securities market

[20] As from 1996 all dividends received from all firms, whether listed or unlisted, are exempt from tax.

provides background to the database. Indeed the dataset is based on accounting data and daily stock prices for all non-financial firms listed on the official market in Mauritius for the period 1990 to 2000. However, in spite of having data for eleven years, the empirical analysis covers only the nine years from 1992 to 2000. The reason for the loss of the two earliest years (1990 and 1991) is due to the way some of the variables in the model are defined. In particular, as detailed in the Appendix 4A, the variable GROWTH and the variable AVPROFIT are based on data for the current and previous two years.

There are twenty-four non-financial companies on the official market, distributed across five industry sectors as follows. Seven firms are classified under Commerce while a further seven are classified under Industry. Four firms are in Leisure and Hotels, five are in the traditional Sugar business and one is in Transport[21]. Companies names, their average size, average leverage and other variables averaged over the period studied are presented in Table 4A.2 of the Appendix[22].

The information presented in Table 4A.2 confirm the previously mentioned the deep roots of the Mauritian economy in the sugar industry. Indeed, as can be seen, listed

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[21] As noted in the previous sub section, in addition to the five non-financial sectors, there are another two financial sectors on the official market, which were excluded from this study. These are the Banks and Insurance sector and the Investments sector.

[22] The averages for each firm in Table 4A.2 are calculated over the period 1992 to 2000. However, due to missing data the number of years over which these averages are calculated varies between firms. In particular the number of years per firm ranges from a maximum of nine years (1992 to 2000) to a minimum of four years. Details of the years included in the calculation of the averages of each firm are given in Table 4A.1 of the Appendix.

firms in the sugar industry have, in general, been incorporated much earlier compared with listed firms in other industries. Another interesting observation from Table 4A.2 is the distribution of the average gearing ratios across firms from the same industrial sector. Looking at this distribution, it is not obvious that firms in the same sector have similar capital structures. For example, LEVERAGE in the Commerce sector ranges from just over 20 percent (CMPL) to nearly 70 percent (Rogers & Co). This is in contrast to the observation in Harris and Raviv (1991) where it is noted as a basic stylised fact that firms within an industry tend to have similar capital structures. It is likely, however, that this apparent lack of industry trend in the present sample is due its small size[23].

Table 4.3 is split into two panels the first of which, Panel A, presents descriptive statistics of the variables of interest for the 24 firms pooled over the period 1992 to 2000.

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[23] The observation in Harris and Raviv (1991) of the importance of industry classification in determining the capital structure of firms is consistent with a number of empirical studies. For example, Bradley, Jarrell and Kim, (1984), conclude that debt ratios are strongly related to industry classifications even when regulated firms are excluded. Titman and Wessels (1988) suggest that the type of assets firms hold is influenced by their industry and for that reason industry classification should also influence debt levels. Hussain (1997) suggests that some industries may enjoy better access to loans due to government policy. Indeed, Hussain (1997) finds that in Korea manufacturing firms tend to have higher bank-debt to equity ratios possibly due to preference access to government loans that is available to selected industries. The influence of government policy on the link between industry classification and capital structure should be particularly strong in Mauritius due to the various incentive schemes available in that economy. Thus the apparent lack of trend in the debt ratios of Mauritian firms across industries, as shown in Table 4A.2, is puzzling and may be an indication that by excluding non-quoted firms, the sample is not a good reflection of the Mauritian corporate sector as a whole. The fact that this study does not consider industrial classification is due to the small sample size properties of the data.

Table 4.3 Descriptive statistics for 24 firms for the period 1992 - 2000

Panel A: Results of covariance procedure

Variable	Mean	Std Dev	Minimum	Maximum	Sum	Variance	Skewness	Kurtosis	Median	1st Qrt	3rd Qrt
Dependent											
LEVERAGE	0.3619	0.1897	0.0226	0.8093	59.3457	0.0360	0.2914	-0.6581	0.3483	0.2222	0.4885
LOGLEV	-1.2084	0.7117	-3.7901	-0.2115	-198.1706	0.5064	-1.3107	1.9287	-1.0549	-1.5042	-0.7166
Age of firm											
AGEINCOR	42.0427	37.8438	3.0000	172.0000	6895.0000	1432.1515	2.0615	4.0751	32.0000	21.0000	44.0000
RESAGE	0.0000	25.6282	-65.9011	80.7257	0.0000	656.8040	0.7441	1.0744	-3.0823	-17.7967	15.0368
AGELIST	4.7866	2.6301	0.0000	10.0000	785.0000	6.9174	0.1838	-0.8561	5.0000	3.0000	7.0000
Size of firm											
SIZE	20.1171	1.1747	17.5242	22.9480	3299.1966	1.3800	0.5163	-0.0132	19.9924	19.3139	20.7442
SIZE2	20.4829	1.3419	17.3361	23.6334	3359.1943	1.8006	0.0066	-0.0426	20.4355	19.7532	21.1879
SMALL	0.1890	0.3927	0.0000	1.0000	31.0000	0.1542	1.6032	0.5772	0.0000	0.0000	0.0000
LARGE	0.2805	0.4506	0.0000	1.0000	46.0000	0.2031	0.9863	-1.0400	0.0000	0.0000	1.0000
Profitability of firm											
AVPROFIT	0.0936	0.0502	-0.0128	0.2711	15.3486	0.0025	0.4000	0.3466	0.0932	0.0570	0.1228
RESPROF	0.0000	0.0355	-0.1045	0.1042	0.0000	0.0013	0.3252	0.9618	-0.0028	-0.0230	0.0194
Firm growth											
GROWTH	0.1429	0.1411	-0.1700	0.8839	23.4345	0.0199	1.8532	6.5554	0.1137	0.0465	0.2139
Firm risk											
RISK	0.0599	0.0384	0.0084	0.2292	9.8233	0.0015	1.9774	4.9212	0.0525	0.0349	0.0694
ARISK	0.0073	0.0106	0.0001	0.0708	1.1950	0.0001	3.4939	13.8542	0.0043	0.0022	0.0077
Capital intensity											
ASSETS	0.6044	0.1958	0.1258	0.9742	99.1165	0.0383	-0.3211	-0.4289	0.6047	0.4748	0.7557
LOGASST	-0.5725	0.4086	-2.0732	-0.0261	-93.8907	0.1669	-1.5086	2.8110	-0.5031	-0.7449	-0.2801
Non-debt tax shield											
TXSHIELD	0.0372	0.0257	0.0049	0.1153	6.0942	0.0007	1.3453	1.3630	0.0326	0.0182	0.0456
RESTAX	0.0000	0.0157	-0.0336	0.0477	0.0000	0.0002	0.7285	0.6236	-0.0016	-0.0102	0.0085
LOGTAX	-3.5192	0.6937	-5.3135	-2.1603	-577.1466	0.4812	-0.1859	-0.2483	-3.4235	-4.0086	-3.0874
Net debtors to assets											
DEBTORS	-0.0506	0.1583	-0.4930	0.6462	-8.2944	0.0251	0.6619	2.3373	-0.0648	-0.1309	0.0313

For variable definitions see Appendix 4A; Number of observations is 164 as detailed in Table 4A.1

Table 4.3 Descriptive statistics for 24 firms for the period 1992 - 2000

Panel B: Correlation matrix

	LEVERAGE	LOGLEV	AGEINCOR	RESAGE	AGELIST	SIZE	SIZE2	SMALL	LARGE	AVPROFIT	RESPROF
Dependent											
LEVERAGE	1.0000										
LOGLEV	0.9136	1.0000									
Age of firm											
AGEINCOR	-0.4255	-0.4785	1.0000								
RESAGE	-0.2371	-0.2663	0.6772	1.0000							
AGELIST	-0.0561	-0.0343	0.2948	0.1185	1.0000						
Size of firm											
SIZE	0.6023	0.5185	-0.2017	0.0000	0.0706	1.0000					
SIZE2	0.3472	0.2327	0.1921	0.0000	0.1944	0.8117	1.0000				
SMALL	-0.1896	-0.2176	-0.0402	-0.2347	-0.1151	-0.6223	-0.5046	1.0000			
LARGE	0.5624	0.4635	-0.2335	-0.0947	-0.0268	0.8007	0.6738	-0.3014	1.0000		
Profitability of firm											
AVPROFIT	0.1189	0.1555	-0.5288	0.0000	-0.3213	-0.0078	-0.2670	-0.0927	-0.0113	1.0000	
RESPROF	-0.0800	-0.1033	0.0000	0.3364	0.0000	0.0000	0.0000	-0.1319	-0.0062	0.7079	1.0000
Firm growth											
GROWTH	0.0619	0.0468	-0.0675	0.0000	-0.1039	0.2058	0.3083	-0.1444	0.2021	0.2247	0.0000
Firm risk											
RISK	0.0535	-0.0022	0.0632	0.0000	0.0040	0.0078	0.0079	0.0355	-0.0252	-0.0725	0.0000
ARISK	0.0923	0.0554	0.0010	0.0000	0.0325	0.0644	0.0303	-0.0160	0.0148	0.0120	0.0000
Asset structure											
ASSETS	-0.4553	-0.4010	0.1707	0.0000	-0.2384	-0.2467	-0.0903	0.2334	-0.1223	-0.0899	0.0000
LOGASST	-0.4003	-0.3643	0.2150	0.0625	-0.2214	-0.2290	-0.0992	0.2263	-0.1350	-0.1316	-0.0175
Non-debt tax shield											
TXSHIELD	0.2005	0.2794	-0.3188	0.0000	-0.1372	-0.1201	-0.5311	-0.0482	-0.1962	0.3815	0.0000
RESTAX	0.1966	0.2135	0.0000	-0.2708	0.0000	0.0000	0.0000	-0.1205	-0.0914	0.0000	-0.2502
LOGTAX	0.2695	0.3680	-0.3480	-0.0215	-0.1575	-0.0411	-0.4609	-0.0776	-0.1299	0.3069	-0.0712
Net debtors to assets											
DEBTORS	-0.1919	-0.2495	0.2572	0.0000	0.1691	0.1084	0.3720	-0.1697	0.0238	-0.0774	0.0000

	GROWTH	RISK	ARISK	ASSETS	LOGASST	TXSHIELD	RESTAX	LOGTAX	DEBTORS
Firm growth									
GROWTH	1.0000								
Firm risk									
RISK	-0.0798	1.0000							
ARISK	-0.0933	0.9480	1.0000						
Asset structure									
ASSETS	0.1217	-0.2487	-0.2973	1.0000					
LOGASST	0.0714	-0.2812	-0.3432	0.9604	1.0000				
Non-debt tax shield									
TXSHIELD	-0.2623	-0.0646	-0.0431	-0.0600	0.0315	1.0000			
RESTAX	0.0000	0.0000	0.0000	0.0000	0.0630	0.6122	1.0000		
LOGTAX	-0.2456	-0.0945	-0.0655	-0.0668	0.0476	0.9204	0.5246	1.0000	
Net debtors to assets									
DEBTORS	0.1754	0.0937	0.1294	-0.2366	-0.3614	-0.4580	0.0000	-0.5312	1.0000

For variable definitions see Appendix 4A; Number of observations is 164 as detailed in Table 4A.1

Panel B of Table 4.3 presents the correlation matrix and there are a number of interesting points to note when looking at the matrix. First, as expected, there appears to be high and positive correlation between the alternative firm size proxies as well as between the alternative firm risk proxies. The correlation coefficient between SIZE and SIZE2 is 0.81, while that between RISK and ARISK is 0.95. The correlation between the alternative firm age variables, AGEINCOR and AGELIST, is somewhat weaker although still positive, at 0.29[24].

While a high positive correlation among alternative proxies is expected, high correlation among non-alternative explanatory variables may indicate the presence of multicollinearity. The effect of near multicollinearity among explanatory variables is to increase the estimated standard errors of the regression coefficients and to reduce the t-statistics. Large standard errors imply that estimated coefficients may by imprecise, while low t ratios may lead to misinterpretation of the importance of variables.

Another important point to note, therefore, when looking at Panel B of Table 4.3, is the high pair-wise correlations of, in particular, two of the explanatory variables of Equation (4.1). The proxy for non-tax shield, TXSHIELD, is highly and negatively correlated with AGEINCOR (-0.32), with SIZE2 (-0.53), with DEBTORS (-0.46) and

[24] Similarly, as expected, the correlation between variables and their log equivalents are also high. The correlation between LEVERAGE and LOGLEV, between ASSETS and LOGASST, and between TXSHIELD and LOGTAX are all above 0.90.

with GROWTH (-0.26). Similarly, the proxy for firm profitability, AVPROFIT, is highly and negatively correlated with AGEINCOR (-0.53), with AGELIST (-0.32) and with SIZE2 (-0.27). There is also high and positive correlation between TXSHIELD and AVPROFIT at 0.38[25].

To assess more directly whether the sample suffers from multicollinearity, the Variance Inflation Factors (VIF) for each of the explanatory variables were calculated[26], and the results are presented in Table 4.4. As can be seen from Table 4.4, all the VIFs are relatively small. None of the factors exceeds the value of 3 and most are below the value of 2. Consistent with the observation made from studying the correlation matrix of Table 4.3, the variables from Equation (4.1) associated with the highest VIF values include TXSHIELD (2.67) and AVPROFIT (2.00). Another variable associated with a high VIF value is AGEINCOR with a factor value of 2.18[27].

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[25] LOGTAX, which substitutes TXSHIELD in Equation (4.2) is also highly correlated with AGEINCOR (-0.35), with SIZE2 (-0.46), with DEBTORS (-0.53), with GROWTH (-0.25), and with AVPROFIT (0.31).

[26] The Variance Inflation Factor is defined as: VIF $(\beta_k) = 1/(1-R^2_k)$. Where R^2_k is the coefficient of multiple determination when the variable, X_k is regressed on all the other explanatory variables. The VIF can be interpreted as the ratio of the actual variance of the estimated coefficient, β_k, to what it would have been if there was no multicollinearity and $R^2_k = 0$.

[27] As can be seen from Table 4.4, the introduction of the log version of Equation (4.1), as presented in Equation (4.2), does not necessarily reduce VIF values. LOGTAX, in particular, has a relatively high VIF value of 2.52 while LOGASST also has a relatively high VIF value of 1.78.

Table 4.4 Variance Inflation Factors

Variable	**Definition**	**R^2_k**	**VIF**
Age of firm			
AGEINCOR	Number of years since the year of incorporation	0.5414	2.1805
RESAGE	Residuals from regression of AGEINCOR on rest of explanatory variables	0.1673	1.2009
AGELIST	Number of years since the year of listing	0.2357	1.3083
Size of firm			
SIZE	Log of turnover	0.2045	1.2570
SIZE2	Log of total assets	0.3900	1.6394
Firm profitability			
AVPROFIT	Average profit over current and previous two year	0.4989	1.9956
RESPROF	Residuals from regression of AVPROFIT on rest of explanatory variables	0.1419	1.1654
Firm growth			
GROWTH	Growth rate in total assets over past two years	0.3010	1.4306
Firm risk			
RISK	Mean of absolute residuals from regression of log of daily price on time.	0.0966	1.1069
ARISK	Mean of square residuals from regression of log of daily price on time.	0.1100	1.1236
Asset structure			
ASSETS	Ratio of fixed to total assets	0.3455	1.5280
LOGASST	Log of ASSETS	0.4391	1.7829
Non-debt tax shield			
TXSHIELD	Ratio of depreciation to total assets	0.6252	2.6680
LOGTAX	Log of TXSHIELD	0.6038	2.5240
RESTAX	Residuals from regression of TXSHIELD on rest of explanatory variables	0.1026	1.1144
Net debtors			
DEBTORS	Ratio of net debtors to total assets	0.4017	1.6713

R^2_k is the coefficient of multiple determination when the variable listed on the left column is regressed on the rest of the non-dummy explanatory variables of Equation (4.1) or (4.2); VIF is the Variance Inflation Factor, defined as VIF = $1/(1 - R^2_k)$. It represents the ratio of the actual variance of the estimated coefficient of the variable in question, to what it would have been in the absence of multicollinearity when R^2_k is zero.

In an attempt to deal with possible near multicollinearity and to isolate the separate effects of the explanatory variables, the three variables from Equation (4.1) with the highest VIF values are replaced by alternative variables. AGEINCOR, measuring age since incorporation, is regressed on a constant and the rest of the explanatory variables of Equation (4.1). The residuals from this regression, RESAGE, then replace AGEINCOR. Similarly, RESPROF replaces the original profitability measure, AVPROFIT, and is the series of residuals from a regression of AVPROFIT on a constant and the rest of the explanatory variables in (4.1). Finally, TXSHIELD, the non-debt tax shield proxy, is replaced by RESTAX, which is the series of residuals obtained by regressing TXSHIELD on a constant and the rest of the explanatory variables in (4.1)[28].

4.5 Empirical procedure

The empirical procedure is in two stages. The first stage involves cross-section analysis on a yearly basis. The second stage involves time-series cross-section analysis using the panel data procedure. Each of these stages is described in turn.

4.5.1 The yearly cross sectional analysis[29]

The yearly analysis uses variants of Equations (4.1) and (4.2) to run on yearly observations for each year from 1992 to 1999. For a given year, t, four regressions are run which are of the following form where all variables are as defined in Appendix 4A.

$$LEVERAGE_i = \alpha + \beta_1 AGEINCOR_i + \beta_2 SIZE_i + \beta_3 AVROFIT_i + \beta_4 GROWTH_i + \beta_5 RISK_i + \beta_6 ASSETS_i + \beta_7 TAXSHIELD_i + \beta_8 DEBTORS_i + \mu_i \qquad (4.1')$$

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[28] Appendix 4A presents definitions of the three alternative variables, while their means for each of the 24 firms is given in Table 4A.1. Descriptive statistics are included in Table 4.3, while VIF values are presented in Table 4.4.

[29] In some recent studies, yearly cross section analysis is used to track the movements in the residuals of the yearly regressions. However, in this study, the yearly regressions provide the background to the panel data analysis

That is, in (4.1') the dependent variable is LEVERAGE and the firm age proxy is AGEINCOR, age since incorporation.

$$LEVERAGE_i = \alpha + \beta_1 AGELIST_i + \beta_2 SIZE_i + \beta_3 AVROFIT_i + \beta_4 GROWTH_i$$
$$+ \beta_5 RISK_i + \beta_6 ASSETS_i + \beta_7 TAXSHIELD_i + \beta_8 DEBTORS_i + \mu_i \qquad (4.1'')$$

That is, in (4.1'') the dependent variable is LEVERAGE and the firm age proxy is AGELIST, age since listing on the Mauritius Stock Exchange.

$$LOGLEV_i = \alpha + \beta_1 AGEINCOR_i + \beta_2 SIZE_i + \beta_3 AVROFIT_i + \beta_4 GROWTH_i$$
$$+ \beta_5 RISK_i + \beta_6 LOGASST_i + \beta_7 LOGTAX_i + \beta_8 DEBTORS_i + \mu_i \qquad (4.2')$$

That is, in (4.2') the dependent variable is measured in log terms, LOGLEV, and the firm age proxy is AGEINCOR, age since incorporation. Further, LOGASST replaces ASSETS as a log representation of the asset structure of the firm, and LOGTAX replaces TXSHIELD as a log representation of non-debt tax shield.

$$LOGLEV_i = \alpha + \beta_1 AGELIST_i + \beta_2 SIZE_i + \beta_3 AVROFIT_i + \beta_4 GROWTH_i$$
$$+ \beta_5 RISK_i + \beta_6 LOGASST_i + \beta_7 LOGTAX_i + \beta_8 DEBTORS_i + \mu_i \qquad (4.2'')$$

That is, in (4.2'') the dependent variable is the log version, LOGLEV, and the firm age proxy is AGELIST, age since listing of the Mauritius Stock Exchange. Also here, LOGASST replaces ASSETS as a log representation of the asset structure of the firm, and LOGTAX replaces TXSHIELD as a log representation of non-debt tax shield.

The regression procedure in this stage is OLS, utilising the ROBUST facility in TSP 4.4 to correct standard errors for the effects of heteroscedasticity. One weakness, however, associated with the yearly analysis is low degrees of freedom. There are only twenty-four firms in the population, and the number of explanatory variables in the regressions, including the intercept, is nine. Therefore, the maximum degree of freedom, in a year where data is available for all firms, is 15 (24-9). Indeed, this is the reason why there are no results reported for the year 2000, when the number of firms with available information is insufficient to run a regression.

4.5.2 Time series cross sectional analysis – the panel data procedure

The second stage of the empirical procedure utilises all the available yearly observations from 1992 to 2000 for all the firms as detailed in Table 4A.1 of the Appendix. Also here the analysis is based on variants of Equations (4.1) and (4.2) using the alternative proxies to represent firm size, risk and age. There are three alternative measures of size (SIZE/ SIZE2/ SMALL & LARGE), two alternative measures of risk (RISK/ ARISK) and two alternative measures of age (AGEINCOR/ AGELIST). There are thus twelve different variations of Equation (4.1). A further twelve variants of Equation (4.1) are obtained when the residuals of AGEINCOR (namely, RESAGE), AVPROFIT (namely, RESPROF) and TXSHIELD (namely, RESTAX) replace the original regressors. Similarly there are twelve variants of Equation (4.2) when the logs of LEVERAGE (namely, LOGLEV), ASSETS (namely, LOGASST) and TXSHIELD (namely, LOGTAX) replace the original variables.

For each of the thirty six variants of Equations (4.1) and (4.2), the PANEL command in TSP 4.4 produces four regressions: the TOTAL model, the FIXED effects model, the BETWEEN model and the RANDOM effects model. The first three models produce OLS estimates while the RANDOM effect model produces FGLS estimates. Various tests are also produced to assist in selecting the most appropriate model. The basic model is of the form[30]:

$$Y_{i,t} = \alpha_i + \Sigma \beta_k X_{k,i,t} + \varepsilon_{i,t} \tag{4.3}$$

There are K regressors excluding the constant terms, α_i.

The TOTAL model is based on the assumption that both slopes and intercept coefficients are the same across firms and time. Under this assumption OLS provides consistent and efficient estimates of α and β_k, and Equation (4.3) becomes:

$$Y_{i,t} = \alpha + \Sigma \beta_k X_{k,i,t} + \varepsilon_{i,t} \tag{4.4}$$

The FIXED and RANDOM effects models relax the assumption that the intercept coefficients are constant across firms. The FIXED effects model takes α_i to be firm-specific constant terms while the RANDOM effects model takes α_i to be firm-specific disturbance terms that are constant across time for each firm. Thus the FIXED effects model allows for different intercepts for each individual firm. The procedure is to subtract the individual firm mean from each variable and run the regression on this transformed data. Because the firm-specific effects are assumed constant over time, by subtracting the individual means for each variable, the firm-specific effects are

[30] The following analysis is based on Hsiao (1999).

eliminated. They can, however, be recovered from the BETWEEN model. The BETWEEN model is an OLS regression on a constant and the means for each individual. It is thus equivalent to Equation (4.4) where the dependent variable, Y_i, the explanatory variables, $X_{k,i}$, and the disturbances ε_i, represent the means for firm i, while the constant, α, is the overall constant common to all firms[31]:

$$Y_i = \alpha + \Sigma \beta_k X_{k,i} + \varepsilon_i \tag{4.5}$$

The residuals obtained from Equation (4.5) are the mean residuals for each firm. They are therefore equivalent to the individual effects, α_i, in the FIXED effects model and represent the deviation of firm i from the common mean (or constant), α[32].

TSP 4.4 produces an F-test for the significance of the firm-specific effects, which is of the form:

$$F_{[(n-1),\ (no.\ observations\ -\ n\ -\ k)]} = \frac{(RSS^T - RSS^F) : (n-1)}{(RSS^F) : (no.\ obs - n - k)} \tag{4.6}$$

[31] There are only 24 observations for the BETWEEN model, the firms' means.

[32] For the individual effects, α_i, in the FIXED effects model, to represent the deviation of firm i from the common constant, the model has to be formulated with a constant, α, and n specific-firm effects, α_i. (Where n is the number of firms, 24). However, for the purpose of estimation one of the specific-firm effects has to be set to zero. Assume the specific effect for firm n is set to zero ($\alpha_n = 0$). Under this formulation, the constant, α', represents the specific-firm effect for firm n, so $\alpha' = \alpha_n$. The remaining (n-1) individual effects now represent deviation from firm n $[\alpha'_i = (\alpha_i - \alpha_n)]$. Alternatively the constant, α, may be omitted. In this case the fixed effects represent deviation from zero, so it is assumed that there is no common constant. In any event, as both the constant and the firm-specific effects are eliminated from the FIXED effects model, their precise specification is irrelevant. The firm-specific deviations, α_i, from the common constant, α, can be recovered from the BETWEEN model as explained in the body of the text.

Where n is the number of firms (24), RSS^T is the Residual Sum of Squares from the TOTAL model and RSS^F is the Residual Sum of Squares from the FIXED effects model. The null hypothesis is that there are no firm-specific effects: $\alpha_1 = \alpha_2 = \ldots = \alpha_{n-1} = 0$[33].

The FIXED effects model assumes that the differences between firms are permanent. In contrast, the RANDOM effects model assumes that the firm-specific terms are randomly distributed across firms. In this case Equation (4.3) becomes:

$$Y_{i,t} = (\alpha + u_i) + \Sigma \beta_k X_{k,i,t} + \varepsilon_{i,t} = \alpha + \Sigma \beta_k X_{k,i,t} + \omega_{i,t}, \quad (4.7)$$

$$\omega_{i,t} = (\varepsilon_{i,t} + u_i) \quad (4.8)$$

Where u_i is the random disturbance characterising firm i and is constant through time. Under this formulation the disturbance $\omega_{i,t}$ is correlated across observations for the same firm i. This means that OLS estimates are no longer efficient. Instead a FGLS transformation is applied where [1 – SQRT(θ)] times the individual firm mean is subtracted from each variable (including the constant term)[34]. Theta (θ) is defined as follows:

$$\theta = \frac{VWITH}{VWITH - T \times VBET} \quad (4.9)$$

T is the number of time observations for firm i, and is not necessarily equal for all firms.

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[33] Refer to the previous footnote for the reason that there are (n-1) restrictions instead of n.

[34] If the variance components, σ^2_u and σ^2_ε were known, the Generalised Least Squares (GLS) transformation would be applied. However, as these are unknown, they are first estimated using the residuals from an

VWITH is the estimate of σ^2_ε, the variance of the basic disturbance terms, $\varepsilon_{i,t}$. It is derived from the Sum of Squared Residuals (RSS) of the FIXED effects specification. (The FIXED effect RSS are based on deviations of individual firm/year observations from their firm means.) VBET is the estimate of σ^2_u, the variance of the firm-specific disturbance terms, u_i. It is derived from the difference between the RSS from the TOTAL regression and the RSS from the FIXED effects regression. (The TOTAL RSS are based on deviations of individual firm/year observations from the overall means.) Thus VBET is the difference between total variation of individual firm/year observations from the overall means, and the within group variation of individual firm/year observations from their firm means. It hence represents variation due to differences between firms.

At the one extreme, when $\theta = 1$ this implies VBET = 0 so u_i is constant and the RANDOM effects Equation (4.7) is the same as the TOTAL Equation (4.4). At the other extreme, when $\theta = 0$ this implies VWITH = 0 and all variation across observations are due to the random individual effects, u_i. Because the u_i's are constant over time, the RANDOM effect Equation (4.7) is equivalent to the FIXED effects Equation (4.3). Under this scenario the question of whether the firm-specific effects are fixed or random, becomes irrelevant, as the firm-specific effects are the only source of variation across firms. Thus the value of theta (θ) indicates whether the TOTAL model should be

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OLS regression and the FGLS transformation is then applied to the data.

preferred (if θ is closer to one) or whether the FIXED effects model better describes the behaviour of the data (if θ is closer to zero).

Providing the FIXED effects model is preferred to the TOTAL specifications, the question is whether the RANDOM model should be preferred to the FIXED effects model. For this purpose, the TSP 4.4 PANEL command generates the Hausman's Test for fixed verses random effects. Under the FIXED effects specifications there is no need to assume that the firm specific effects, α_i, are uncorrelated with the other regressors. However, under the RANDOM effects specifications the specific effects are random and part of the disturbance terms as in Equation (4.8). Under such specifications, if the firm specific effects are correlated with any of the explanatory variables, this would lead to the omitted variable problem resulting in the estimated coefficients becoming inconsistent.

The Hausman Test utilises this difference to test for random verses fixed effects. In particular the null hypothesis is of no correlation between the random firm-specific effects and any of the explanatory variables. In this case both the OLS estimates from the FIXED effects regression and the FGLS estimates from the RANDOM effects regression are consistent but the former are inefficient due to autocorrelation in the disturbance terms. Under the alternative hypothesis the OLS estimates from the FIXED effects regression are consistent but the FGLS estimates from the RANDOM effects regression are inconsistent due to correlation between the disturbance terms and the explanatory variables.

Based on the above and on the idea that the covariance of an efficient estimator with its difference from an inefficient estimator is zero, the Hausman Test is of the following form:

$$W = \frac{(b^F - b^R)^2}{Var(b^F) - Var(b^R)} \qquad (4.10)$$

Where b^F is the estimated coefficient from the FIXED effects model and b^R is the estimated coefficient from the RANDOM effects model. Under the null hypothesis, W is distributed as a $\chi^2_{(k)}$. Thus rejection of the test statistic is a rejection of the null hypothesis that the coefficient estimates from the RANDOM effects model are consistent, leading to preference of the FIXED effects model over the RANDOM effects model[35].

4.6 Estimation and testing results

4.6.1 The yearly cross sectional analysis

As discussed in section 4.5.1, there are four regressions per year for eight years (1992 to 1999), leading to a total of thirty-two yearly regressions, which are presented in Table 4.5. Panel A of Table 4.5 presents the yearly regressions of the form (4.1') and (4.1'') where the dependent variable is LEVERAGE, that is, total liabilities to total assets. Panel B of Table 4.5 presents the yearly regressions of the form (4.2') and (4.2'') where the dependent variable LOGLEV, is expressed in logarithmic form.

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[35] For derivation of the Hausman test see Greene (1997), pg. 632-633.

Table 4.5 The yearly regressions 1992 - 1999

Panel A: Ordinary Least Square regression of LEVERAGE on the determinants of capital structure

Regression	**1**		**2**		**3**		**4**	
YEAR	1999		1999		1998		1998	
No. obs.	21		21		23		23	
Adj. R-2	0.3274		0.3336		0.5571		0.5082	
Variable	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**
C	-1.1962	[.187]	-0.7877	[.421]	-0.7999	[.164]	-1.0839	[.122]
AGEINCOR	-0.0018	[.125]			-0.0023 **	[.038]		
AGELIST			-0.0232	[.219]			-0.0199	[.212]
SIZE	0.0919 *	[.051]	0.0748	[.108]	0.0651 **	[.018]	0.0881 ***	[.007]
AVPROFIT	-0.5896	[.469]			-0.0513	[.932]		
RESPROF			-0.5766	[.535]			0.1747	[.852]
GROWTH	-0.0322	[.920]	0.0663	[.818]	-0.0074	[.980]	-0.0080	[.979]
RISK	-0.1028	[.918]	0.1494	[.866]	2.9128 *	[.063]	0.4255	[.727]
ASSETS	-0.1643	[.423]	-0.2924	[.164]	-0.2412 *	[.085]	-0.3479 **	[.031]
TXSHIELD	-0.6008	[.665]			-0.5434	[.672]		
RESTAX			1.0094	[.710]			0.4418	[.835]
DEBTORS	0.0573	[.890]	-0.0716	[.830]	-0.0392	[.825]	-0.0890	[.665]
Regression	**5**		**6**		**7**		**8**	
YEAR	1997		1997		1996		1996	
No. obs.	24		24		24		24	
Adj. R-2	0.4562		0.5485		0.5104		0.6075	
Variable	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**
C	-0.8751	[.283]	-0.7199	[.394]	-0.8813	[.344]	-0.9173	[.269]
AGEINCOR	-0.0010	[.314]			-0.0010	[.248]		
AGELIST			-0.0180	[.192]			-0.0243	[.104]
SIZE	0.0749 **	[.044]	0.0730 *	[.055]	0.0762 *	[.063]	0.0819 **	[.041]
AVPROFIT	-1.1153	[.340]			-0.6198	[.432]		
RESPROF			-0.7117	[.446]			-0.4923	[.437]
GROWTH	0.0945	[.851]	-0.1768	[.582]	-0.1894	[.203]	-0.4038 **	[.029]
RISK	-0.5925	[.591]	-0.6740	[.492]	-0.8885	[.552]	-0.3511	[.781]
ASSETS	-0.3381 *	[.083]	-0.4198 **	[.023]	-0.2892 *	[.080]	-0.3440 **	[.049]
TXSHIELD	2.0581	[.293]			0.7464	[.548]		
RESTAX			1.9727	[.233]			0.7732	[.590]
DEBTORS	-0.3088	[.278]	-0.4088 *	[.091]	-0.2960	[.208]	-0.3101 *	[.068]
Regression	**9**		**10**		**11**		**12**	
YEAR	1995		1995		1994		1994	
No. obs.	22		22		18		18	
Adj. R-2	0.5800		0.6048		0.6638		0.6513	
Variable	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**
C	-0.4224	[.537]	-0.3794	[.579]	-0.8879	[.203]	-0.8475 **	[.031]
AGEINCOR	-0.0006	[.470]			-0.0007	[.600]		
AGELIST			-0.0166	[.404]			-0.0200	[.403]
SIZE	0.0457	[.171]	0.0504	[.136]	0.0618 **	[.027]	0.0683 ***	[.004]
AVPROFIT	-0.6300	[.388]			0.4460	[.761]		
RESPROF			-0.4269	[.490]			0.4925	[.750]
GROWTH	0.7117 *	[.079]	0.3765	[.293]	0.8844 **	[.041]	0.8452 **	[.049]
RISK	0.5304	[.441]	0.2931	[.772]	-0.6338	[.612]	-0.8943	[.358]
ASSETS	-0.4815 ***	[.002]	-0.5279 ***	[.004]	-0.2135	[.362]	-0.3219	[.259]
TXSHIELD	2.0823 *	[.096]			-0.0050	[.997]		
RESTAX			1.8678	[.118]			-0.6039	[.754]
DEBTORS	-0.4515	[.139]	-0.5519 *	[.068]	-0.5587 *	[.079]	-0.6379 *	[.053]
Regression	**13**		**14**		**15**		**16**	
YEAR	1993		1993		1992		1992	
No. obs.	17		17		13		13	
Adj. R-2	0.6693		0.5744		0.5134		0.4076	
Variable	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**
C	-0.2836	[.794]	-0.6050	[.498]	-3.2781	[.150]	-1.8766	[.350]
AGEINCOR	-0.0014	[.399]			0.0004	[.829]		
AGELIST			-0.0282	[.297]			-0.0530	[.614]
SIZE	0.0394	[.335]	0.0550	[.193]	0.1713 *	[.087]	0.1299	[.192]
AVPROFIT	0.2537	[.849]			2.2567	[.553]		
RESPROF			1.0478	[.504]			1.2738	[.788]
GROWTH	1.1509 **	[.050]	1.0835 *	[.067]	-0.7615	[.534]	-0.2691	[.773]
RISK	-0.9376	[.552]	0.3003	[.851]	2.3683	[.494]	0.8515	[.776]
ASSETS	-0.3941	[.170]	-0.4438 *	[.097]	-0.1483	[.772]	-0.4292	[.312]
TXSHIELD	0.4718	[.774]			0.6054	[.818]		
RESTAX			0.4903	[.826]			1.6193	[.589]
DEBTORS	-0.2718	[.538]	-0.6226	[.114]	-0.5895	[.320]	-0.5115	[.318]

For details of firms included in the yearly regressions and for variable definitions see Tables 4A.1 and Appendix 4A, respectively;
No regressions are run for the year 2000 due to insufficient number of observations; Standard Errors are heteroskedastic-consistent (HCTYPE=2);
*, **, *** indicate significance at the 10%, 5%, and 1% levels respectively.

Table 4.5 The yearly regressions 1992 - 1999

Panel B: Ordinary Least Square regression of LOGLEV on the determinants of capital structure

Regression	**1**		**2**		**3**		**4**	
YEAR	1999		1999		1998		1998	
No. obs.	21		21		23		23	
Adj. R-2	0.3424		0.3038		0.5522		0.5153	
Variable	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**
C	-5.0843 ***	[.006]	-4.0399 *	[.085]	-4.6388 **	[.022]	-5.6272 ***	[.003]
AGEINCOR	-0.0054	[.213]			-0.0057	[.114]		
AGELIST			-0.0618	[.179]			-0.0423	[.302]
SIZE	0.2299 ***	[.006]	0.1781 *	[.081]	0.1801 **	[.045]	0.2357 ***	[.006]
AVPROFIT	-1.4362	[.452]	-0.8194	[.688]	-0.0351	[.984]	0.9470	[.645]
GROWTH	0.1169	[.899]	0.4778	[.601]	0.1046	[.901]	0.0132	[.989]
RISK	0.2035	[.922]	0.4322	[.853]	7.3734	[.189]	1.7369	[.579]
LOGASST	-0.0835	[.694]	-0.3412	[.139]	-0.2729	[.136]	-0.4270 **	[.023]
LOGTAX	0.0869	[.643]	0.1042	[.604]	0.0973	[.587]	0.1018	[.594]
DEBTORS	0.2131	[.701]	-0.2708	[.720]	-0.1389	[.784]	-0.2703	[.647]
Regression	**5**		**6**		**7**		**8**	
YEAR	1997		1997		1996		1996	
No. obs.	24		24		24		24	
Adj. R-2	0.5379		0.5909		0.5225		0.5589	
Variable	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**
C	-5.3480 **	[.044]	-4.6364 *	[.092]	-6.0909 **	[.046]	-5.8550 *	[.058]
AGEINCOR	-0.0016	[.660]			-0.0030	[.428]		
AGELIST			-0.0681	[.167]			-0.0790	[.174]
SIZE	0.2628 **	[.038]	0.2330 *	[.068]	0.3012 **	[.040]	0.2955 **	[.040]
AVPROFIT	-0.2859	[.934]	-0.2182	[.943]	-2.0656	[.426]	-2.0540	[.368]
GROWTH	-1.4280	[.456]	-1.8578	[.311]	-0.7291	[.209]	-1.2423	[.119]
RISK	-4.0983	[.151]	-4.5062 *	[.071]	-3.0926	[.510]	-3.4319	[.513]
LOGASST	-0.4939	[.130]	-0.6095 *	[.069]	-0.4224	[.246]	-0.5253	[.180]
LOGTAX	0.2642	[.237]	0.2071	[.309]	0.2516	[.185]	0.2085	[.245]
DEBTORS	-0.7547	[.421]	-0.7825	[.388]	-0.9297	[.285]	-0.9917	[.191]
Regression	**9**		**10**		**11**		**12**	
YEAR	1995		1995		1994		1994	
No. obs.	22		22		18		18	
Adj. R-2	0.6161		0.6072		0.5707		0.5532	
Variable	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**
C	-2.0238	[.239]	-2.6905	[.116]	-2.6673	[.561]	-4.3861	[.249]
AGEINCOR	-0.0024	[.427]			-0.0061	[.404]		
AGELIST			-0.0309	[.619]			-0.1100	[.454]
SIZE	0.1060	[.157]	0.1330	[.106]	0.1345	[.244]	0.2051 *	[.093]
AVPROFIT	-3.8278	[.167]	-3.0704	[.163]	-5.4700	[.552]	-4.0691	[.629]
GROWTH	2.9375 **	[.025]	2.5687 **	[.047]	3.9750	[.171]	3.2321	[.245]
RISK	1.1232	[.519]	0.4396	[.852]	-2.0868	[.584]	-3.5034	[.268]
LOGASST	-0.7258 ***	[.001]	-0.8172 ***	[.001]	-0.6989	[.257]	-0.9882	[.214]
LOGTAX	0.5208 **	[.011]	0.4918 **	[.015]	0.4038	[.465]	0.3134	[.543]
DEBTORS	-1.3890	[.113]	-1.5694 *	[.088]	-1.6776	[.244]	-2.3113 *	[.069]
Regression	**13**		**14**		**15**		**16**	
YEAR	1993		1993		1992		1992	
No. obs.	17		17		13		13	
Adj. R-2	0.5975		0.5959		0.4841		0.5046	
Variable	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**	**Estimate**	**P-value**
C	-0.7423	[.898]	-4.2319	[.280]	-20.6027 *	[.086]	-11.9494	[.328]
AGEINCOR	-0.0087	[.402]			0.0074	[.493]		
AGELIST			-0.1845	[.319]			-0.2450	[.565]
SIZE	0.0192	[.922]	0.1313	[.430]	0.8390 *	[.070]	0.5630	[.201]
AVPROFIT	-3.9601	[.644]	-0.6753	[.928]	16.7412	[.377]	7.1418	[.700]
GROWTH	5.5594	[.129]	4.9331	[.164]	-8.0389	[.222]	-4.7486	[.402]
RISK	-3.3665	[.525]	4.2169	[.327]	25.3146	[.167]	11.9912	[.390]
LOGASST	-1.3260 *	[.093]	-1.2448	[.112]	-0.5249	[.663]	-0.8455	[.555]
LOGTAX	0.4181	[.382]	0.2669	[.493]	0.0426	[.942]	0.3605	[.677]
DEBTORS	-1.4131	[.538]	-3.3386 **	[.030]	-4.7896	[.177]	-2.4252	[.481]

For details of firms included in the yearly regressions and for variable definitions see Tables 4A.1 and Appendix 4A, respectively;

No regressions are run for the year 2000 due to insufficient number of observations; Standard Errors are heteroskedastic-consistent (HCTYPE=2);

*, **, *** indicate significance at the 10%, 5%, and 1% levels respectively.

As shown in Table 4.5 the adjusted R-Squared values are relatively high for cross section regressions, and vary from about 30 percent to nearly 70 percent. Further, excluding three explanatory variables (profitability, growth and risk) the estimated coefficients, including the constant, are in most cases consistently signed. There is, however, problem with the significance of variables and, as noted in Section 4.5.1, low degrees of freedom cast doubt on the validity of these results. Still, there are a number of observations worth noting with reference to Table 4.5, and these are mentioned here.

Studying Table 4.5, the intercept, C, is consistently negatively signed in both Panel A when the dependent variable is LEVERAGE, and in Panel B when the dependent variable is LOGLEV. It is, however, mostly insignificant. In Panel A it is significant at the 5 percent significance level in only one of sixteen regressions, while in Panel B it appears to be more important, being significant in just over half of the yearly regressions. Although no prediction was made regarding the sign of the intercept, a negative sign is consistent with the results in Hussain (1997)[36]. It is inconsistent, however, with other empirical results including Bradley, Jarrell and Kim (1984), Alderson and Betker (1995), and Jordan, Lowe and Taylor (1998).

Similarly, the variables that alternatively represent the age of the firm, AGEINCOR and AGELIST, generally have negative estimated coefficients but appear mostly insignificant. The estimated coefficient on age since incorporation, AGEINCOR,

[36] Hussain (1997) finds the constant to be negative and significant for both Korea and Malaysia in all but two of the total regressions.

is negative in all but two cases although it is significant at the 5 percent significance level in only one of these cases. The estimated coefficient on age since listing on the Mauritius Stock Exchange, AGELIST, is always negative but never significant. The negative sign is consistent with pecking order considerations, as summarised in Table 4.2.

Relatively strong results are obtained for SIZE, the variable measuring firm size in terms of turnover. Indeed, consistent with the trade off theory and with control considerations as shown in Table 4.2, SIZE is consistently positively linked to the dependent variable. In twelve out of thirty two regressions SIZE is also significant at the 10 percent level or higher. These findings are inconsistent with information asymmetries and pecking order explanations and with Titman and Wessels (1988). However they are in line with the general findings in Alderson and Betker (1995), Rajan and Zingales (1995), Wiwattanakantang (1999), Jordan, Lowe and Taylor (1998), Hussain (1997) and Hirota (1999).

The estimated coefficient on the firm profitability measure, AVPROFIT, is insignificant in all the yearly regressions and is also inconsistently signed. This apparent insignificance and inconsistency persist even when AVPROFIT is replaced by the residual, RESPROF, which attempts to deal with the possible effects of near multicollinearity. Based on pecking order theory and on agency theory when the market for corporate control is inefficient, Table 4.2 predicts a negative association between profitability and leverage. In contrast, a positive relation is consistent with a trade off theory explanation or with agency theory when the market for corporate control is efficient. In any case, the inconsistent relation between profitability and leverage is not uncommon in the literature. For example, in Hussain (1997) the estimated coefficient on the profitability measure is positive and significant in the case of Korea, but negative and significant in the case of Malaysia. In contrast, Jordan, Lowe and Taylor (1998) find the sign on the estimated coefficients on the profitability variable to be consistently positive, although insignificantly so in the FGLS regression. Other studies including Titman and Wessels (1988), Rajan and Zingales (1995), Wiwattanakantang (1999), and Hirota (1999) generally find profitability to be negatively related to leverage.

Similar to the case for the profitability variable, the sign on the estimated coefficient on the firm growth variable, GROWTH, is also inconsistent. GROWTH appears significant in only a quarter of the thirty-two yearly regressions although in seven out of these eight cases it is positively related to the leverage measure. A positive link is consistent with pecking order and corporate governance theories but inconsistent with the trade off and agency theories. Negative but insignificant relationship between growth and leverage is reported in Titman and Wessels (1988) and in Jordan, Lowe and Taylor (1998) while Rajan and Zingales (1995), Wiwattanakantang (1999), and Hirota (1999) report negative and significant association.

The third inconsistently signed variable in Table 4.5 is the firm risk variable, RISK. This variable is weakly significant in only two of thirty-two cases, positively related to leverage in one case and negative in the other. These findings are inconsistent with this study's prediction of a negative link between leverage and firm risk based on the trade off and agency theories. However, like in the case of profitability, the failure to find strong evidence for the nature of the risk-leverage link, is also reflected in the results of other studies. Specifically, Bradley, Jarrell and Kim (1984) show the estimated coefficient on the firm risk variable to be negative and significant while Jordan, Lowe and Taylor (1998) show it to be significant but positive. In Titman and Wessels (1988), Wiwattanakantang (1999) and Hirota (1999) evidence concerning risk is generally weak.

The results are relatively strong for the asset structure of the firm, whether it is measured by the ratio of fixed to total assets, ASSETS, or by the logarithmic form of this ratio, LOGASST. The estimated coefficients for both proxies are consistently negatively signed and significant in fourteen out of the thirty-two yearly regressions. This negative association between tangibility and debt is inconsistent with the trade off based explanations given in Section 4.3.2 as summarised in Table 4.2. It is also inconsistent with the agency rationale according to which leverage will be higher in firms with many tangible assets because it is more difficult to engage in risk shifting when tangible assets are already in place (Wiwattanakantang, 1999). Furthermore, these findings are inconsistent with the results in Rajan and Zingales (1995), Wiwattanakantang (1999), Jordan, Lowe and Taylor (1998) and Hirota (1999). However, a negative relationship between asset structure and leverage, is consistent with the agency-based rationale concerning the monitoring role of debt. Particularly, as noted in Titman and Wessels (1988) intangible assets are more difficult to monitor thus firms with many intangible assets tend to employ debt as a monitoring device.

The non-debt tax shield generally appears to be positively related to the dependent variable. This is contrary to the trade off based prediction of Table 4.2, but is in line with Bradley, Jarrell and Kim (1984) who report a positive (and significant) association between the non-debt tax shield and leverage. However, the results of Table 4.5 also indicate that the association between the non-debt tax shield and leverage is weak, which is consistent with Alderson and Betker (1995) and Titman and Wessels (1988). For example, TXSHIELD, the ratio of depreciation to total assets, has positive estimated coefficients in five out of eight cases but is weakly significant at the 10 percent significance level in only one of these cases. Likewise, RESTAX, the residual from a regression of TXSHIELD on the rest of the explanatory variables, has positive estimated coefficients in seven out of eight cases but is significant in none. LOGTAX, the logarithmic form of TXSHIELD, shows somewhat stronger results in terms of consistency, as it is positively related to LOGLEV across the sixteen regressions in which it is included. It is significant at the 5 percent significance level in only two of these regressions thus, like TXSHIELD and RESTAX, LOGTAX also appears unimportant. These results are at variance with the negative and significant association between non-debt tax shields and leverage as arising from the general results in Wiwattanakantang (1999) and Hirota (1999).

Lastly, DEBTORS, measuring the size of net debtors, is negatively related to the dependent variable in all but two out of thirty-two regressions, and significant in eight of these cases. These results conflict with the prediction of a positive relationship as explained in Section 4.3.2. The insignificance of most explanatory variables in the yearly analysis and the low degrees of freedom in these regressions, call for an alternative empirical approach to explain leverage ratios in the sample studied. Thus attention is now turned to the panel data procedure.

4.6.2 Time series cross sectional analysis – the panel data procedure

The results of the cross section yearly analysis, show firm size to be an important explanatory variable in the capital structure decisions of non-financial listed firms in Mauritius. The results of the panel data procedure are organised in a structure consistent with these findings and are presented in Table 4.6, which is dividend into six Panels A to F. Panels A, B and C give the results of the regressions where the dependent variable is LEVERAGE, the ratio of total liabilities to total assets. Panels D, E and F give the results from the regressions where the dependent variable, LOGLEV, is in logarithmic form. The panels of Table 4.6 can be further grouped as follows. In Panels A and D the firm size variable is SIZE, which is measured in terms of turnover as in the yearly regressions. In Panels B and E SIZE is substituted for by SIZE2, measuring firm size in terms of total assets. Finally, in Panels C and F the firm size variable is dropped and is replaced by two dummies, SMALL and LARGE, representing the largest and the smallest firm size observations.

Table 4.6 Panel regressions for period 1992 - 2000

Panel A: Dependent variable is LEVERAGE. Firm size variable is SIZE

MODEL		**1**			**2**			**3**			**4**	
Firm effects		RANDOM			RANDOM			RANDOM			RANDOM	
No. obs.	164			164			164			164		
Adj. R-2	0.5725			0.5353			0.5722			0.5354		
LM het. Test	1.3811	[.240]			0.0228	[.880]	1.5363	[.215]		0.0076	[.930]	
Variable	**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**	
AGEINCOR	-0.0011	[.080]	*				-0.0011	[.085]	*			
AGELIST				-0.0009	[.757]					-0.0008	[.760]	
SIZE	0.0713	[.000]	***	0.0744	[.000]	***	0.0714	[.000]	***	0.0745	[.000]	***
AVPROFIT	-0.4319	[.039]	**	-0.3330	[.122]		-0.4187	[.046]	**	-0.3204	[.136]	
GROWTH	0.1123	[.004]	***	0.1110	[.005]	***	0.1103	[.005]	***	0.1088	[.006]	***
RISK	-0.0562	[.657]		-0.0653	[.609]							
ARISK							-0.3965	[.391]		-0.4364	[.346]	
ASSETS	-0.3157	[.000]	***	-0.3168	[.000]	***	-0.3202	[.000]	***	-0.3215	[.000]	***
TXSHIELD	0.1284	[.809]		0.2445	[.646]		0.1442	[.786]		0.2600	[.625]	
DEBTORS	-0.4545	[.000]	***	-0.4816	[.000]	***	-0.4570	[.000]	***	-0.4836	[.000]	***
C	-0.8289	[.003]	***	-0.9472	[.002]	***	-0.8312	[.003]	***	-0.9480	[.002]	***
F-test FIXED v TOTAL	F(23,132) =	26.8600	[.0000]	F(23,132) =	27.8310	[.0000]	F(23,132) =	26.9950	[.0000]	F(23,132) =	27.9840	[.0000]
Theta (0=WITHIN,1=TOTAL)		0.0281			0.0272			0.0280			0.0270	
Hausman test	CHISQ(8) =	3.8195	[.8730]	CHISQ(8) =	8.3388	[.4011]	CHISQ(8) =	3.9159	[.8646]	CHISQ(8) =	8.2988	[.4048]
MODEL		**5**			**6**			**7**			**8**	
Firm effects		RANDOM			RANDOM			RANDOM			RANDOM	
No. obs.	164			164			164			164		
Adj. R-2	0.6077			0.5733			0.6111			0.5743		
LM het. Test	0.7525	[.386]		0.1588	[.690]		0.9053	[.341]		0.2213	[.638]	
Variable	**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**	
RESAGE	-0.0020	[.001]	***				-0.0019	[.001]	***			
AGELIST				-0.0015	[.580]					-0.0015	[.555]	
SIZE	0.0875	[.000]	***	0.0829	[.000]	***	0.0874	[.000]	***	0.0834	[.000]	***
RESPROF	0.4458	[.087]	*	0.1662	[.515]		0.4013	[.116]		0.1578	[.530]	
GROWTH	0.1432	[.001]	***	0.0854	[.034]	**	0.1355	[.001]	***	0.0809	[.044]	**
RISK	-0.2008	[.113]		-0.1451	[.271]							
ARISK							-0.7674	[.090]	*	-0.7689	[.103]	
ASSETS	-0.3205	[.000]	***	-0.3062	[.000]	***	-0.3242	[.000]	***	-0.3143	[.000]	***
RESTAX	0.7810	[.292]		1.9229	[.009]	***	0.8322	[.264]		1.9804	[.006]	***
DEBTORS	-0.4970	[.000]	***	-0.5255	[.000]	***	-0.4919	[.000]	***	-0.5241	[.000]	***
C	-1.2339	[.000]	***	-1.1401	[.000]	***	-1.2351	[.000]	***	-1.1460	[.000]	***
F-test FIXED v TOTAL	F(23,132) =	25.9980	[.0000]	F(23,132) =	25.5390	[.0000]	F(23,132) =	25.9910	[.0000]	F(23,132) =	25.8440	[.0000]
Theta (0=WITHIN,1=TOTAL)		0.0291			0.0296			0.0291			0.0293	
Hausman test	CHISQ(8) =	4.9854	[.7591]	CHISQ(8) =	7.3171	[.5028]	CHISQ(8) =	4.9438	[.7636]	CHISQ(8) =	7.3586	[.4985]

1. For variable definitions see Appendix 4A; ***, ** and * indicate significance at the 1%, 5% and 10% respectively;
2. Unbalanced data: No. of firms = 24; Minimum no. of time observations per firm = 4; Maximum no. of time observations per firm = 9; No. of firm/year observations = 164; See Appendix, Table 4A.1.
3. Model is either Fixed effects (WITHIN): Ordinary Least Squares (OLS) model where the firm individual mean is subtracted from each variable, or Random effects (VARCOMP): Feasible Generalised Least Squares (FGLS) model where data is transformed by subtracting [1-SQRT(θ)] times the individual firm mean from each variable. Where Theta (θ) = VWITH / (VWITH + T * VBET) evaluated at TMAX=9. If θ=1, this corresponds to VBET=0, and variation is due to individual (firm/year) observations. If θ =0, this corresponds to VWITH=0, and variation is due to differences across firms that are constant across time.
   - VWITH is the estimated variance of the basic disturbance terms within individual (firm/year) observations. It is based on the sum of squared residuals from the WITHIN model, and is computed from the small sample formula.
   - VBET is the estimated variance of the individual-specific disturbance terms and is the difference between VWITH and VTOT: VBET = VTOT - VWITH
   - VTOT is the estimated variance of the disturbance terms from the TOTAL model, assuming both slope and intercept coefficients are the same.
4. F-test FIXED versus TOTAL: H*o* is that both slope and intercept coefficients are the same across all firms. H*a* is that the regression slope coefficients are identical but that the intercepts are not.
5. Hausman test: Comaring the fixed effects and the random effects estimators. Under H*o* both OLS and FGLS estimators are consistent but the OLS is inefficient. Under H*a* OLS estimators are consistent but FGLS estimators are not.

Table 4.6 Panel regressions for period 1992 - 2000

Panel B: Dependent variable is LEVERAGE. Firm size variable is SIZE2

MODEL	**9**			**10**			**11**			**12**		
Firm effects	RANDOM			RANDOM			RANDOM			RANDOM		
No. obs.	164			164			164			164		
Adj. R-2	0.6091			0.5168			0.6090			0.5179		
LM het. Test	0.7614	[.383]		2.1093	[.146]		0.8771	[.349]		1.9955	[.158]	
Variable	**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**	
AGEINCOR	-0.0019	[.002]	***				-0.0019	[.002]	***			
AGELIST				-0.0052	[.085]	*				-0.0052	[.085]	*
SIZE2	0.0890	[.000]	***	0.1024	[.000]	***	0.0891	[.000]	***	0.1025	[.000]	***
AVPROFIT	-0.1776	[.396]		-0.0999	[.635]		-0.1643	[.433]		-0.0847	[.688]	
GROWTH	0.0799	[.040]	**	0.0744	[.059]	*	0.0779	[.045]	**	0.0720	[.068]	*
RISK	-0.0489	[.686]		-0.0876	[.474]							
ARISK							-0.3833	[.386]		-0.4927	[.267]	
ASSETS	-0.3048	[.000]	***	-0.3375	[.000]	***	-0.3095	[.000]	***	-0.3416	[.000]	***
TXSHIELD	1.3672	[.010]	**	1.7751	[.002]	***	1.3831	[.009]	***	1.7953	[.002]	***
DEBTORS	-0.4727	[.000]	***	-0.5140	[.000]	***	-0.4755	[.000]	***	-0.5152	[.000]	***
C	-1.2595	[.000]	***	-1.5892	[.000]	***	-1.2610	[.000]	***	-1.5940	[.000]	***
F-test FIXED v TOTAL	F(23,132) =	26.4780	[.0000]	F(23,132) =	30.7980	[.0000]	F(23,132) =	26.6030	[.0000]	F(23,132) =	30.9560	[.0000]
Theta (0=WITHIN,1=TOTAL)		0.0286			0.0245			0.0284			0.0244	
Hausman test	CHISQ(8) =	7.5655	[.4770]	CHISQ(8) =	13.0450	[.1103]	CHISQ(8) =	7.7290	[.4604]	CHISQ(8) =	13.0390	[.1105]
MODEL	**13**			**14**			**15**			**16**		
Firm effects	RANDOM			RANDOM			RANDOM			RANDOM		
No. obs.	164			164			164			164		
Adj. R-2	0.5000			0.4786			0.4965			0.4794		
LM het. Test	0.0035	[.953]		1.1952	[.274]		0.0013	[.971]		1.0451	[.307]	
Variable	**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**	
RESAGE	-0.0004	[.468]					-0.0004	[.549]				
AGELIST				-0.0035	[.227]					-0.0035	[.233]	
SIZE2	0.0704	[.000]	***	0.0847	[.000]	***	0.0705	[.000]	***	0.0842	[.000]	***
RESPROF	0.1559	[.560]		0.1083	[.668]		0.1316	[.614]		0.0932	[.708]	
GROWTH	0.0868	[.055]	*	0.0586	[.154]		0.0808	[.071]	*	0.0554	[.177]	
RISK	-0.1312	[.312]		-0.1423	[.268]							
ARISK							-0.6018	[.191]		-0.6576	[.152]	
ASSETS	-0.3217	[.000]	***	-0.3382	[.000]	***	-0.3257	[.000]	***	-0.3437	[.000]	***
RESTAX	1.0583	[.169]		1.4936	[.038]	**	1.1238	[.145]		1.5114	[.033]	**
DEBTORS	-0.5220	[.000]	***	-0.5410	[.000]	***	-0.5202	[.000]	***	-0.5371	[.000]	***
C	-0.9092	[.000]	***	-1.1728	[.000]	***	-0.9110	[.000]	***	-1.1634	[.000]	***
F-test FIXED v TOTAL	F(23,132) =	31.3980	[.0000]	F(23,132) =	31.8230	[.0000]	F(23,132) =	31.6870	[.0000]	F(23,132) =	32.1370	[.0000]
Theta (0=WITHIN,1=TOTAL)		0.0240			0.0237			0.0238			0.0235	
Hausman test	CHISQ(8) =	9.2373	[.3227]	CHISQ(8) =	13.0360	[.1106]	CHISQ(8) =	9.8133	[.2784]	CHISQ(8) =	13.1430	[.1070]

1. For variable definitions see Appendix 4A; ***, ** and * indicate significance at the 1%, 5% and 10% respectively;
2. Unbalanced data: No. of firms = 24; Minimum no. of time observations per firm = 4; Maximum no. of time observations per firm = 9; No. of firm/year observations = 164; See Appendix, Table 4A.1.
3. Model is either Fixed effects (WITHIN): Ordinary Least Squares (OLS) model where the firm individual mean is subtracted from each variable, or Random effects (VARCOMP): Feasible Generalised Least Squares (FGLS) model where data is transformed by subtracting [1-SQRT(θ)] times the individual firm mean from each variable. Where Theta (θ) = VWITH / (VWITH + T * VBET) evaluated at TMAX=9. If θ=1, this corresponds to VBET=0, and variation is due to individual (firm/year) observations. If θ =0, this corresponds to VWITH=0, and variation is due to differences across firms that are constant across time.
   - VWITH is the estimated variance of the basic disturbance terms within individual (firm/year) observations. It is based on the sum of squared residuals from the WITHIN model, and is computed from the small sample formula.
   - VBET is the estimated variance of the individual-specific disturbance terms and is the difference between VWITH and VTOT: VBET = VTOT - VWITH
   - VTOT is the estimated variance of the disturbance terms from the TOTAL model, assuming both slope and intercept coefficients are the same.
4. F-test FIXED versus TOTAL: H*o* is that both slope and intercept coefficients are the same across all firms. H*a* is that the regression slope coefficients are identical but that the intercepts are not.
5. Hausman test: Comaring the fixed effects and the random effects estimators. Under H*o* both OLS and FGLS estimators are consistent but the OLS is inefficient. Under H*a* OLS estimators are consistent but FGLS estimators are not.

Table 4.6 Panel regressions for period 1992 - 2000

Panel C: Dependent variable is LEVERAGE. Firm size variables are SMALL and LARGE

MODEL		**17**			**18**			**19**			**20**	
Firm effects		FIXED			FIXED			FIXED			FIXED	
No. obs.	164			164			164			164		
Adj. R-2	0.9143			0.9143			0.9147			0.9147		
LM het. Test	0.6475	[.421]		0.6475	[.421]		0.5942	[.441]		0.5942	[.441]	
Variable	**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**	
AGEINCOR	0.0067	[.018]	**				0.0067	[.018]	**			
AGELIST				0.0067	[.018]	**				0.0067	[.018]	**
AVPROFIT	-0.2124	[.393]		-0.2124	[.393]		-0.1958	[.431]		-0.1958	[.431]	
GROWTH	0.1360	[.001]	***	0.1360	[.001]	***	0.1338	[.001]	***	0.1338	[.001]	***
RISK	-0.0504	[.702]		-0.0504	[.702]							
ARISK							-0.4220	[.378]		-0.4220	[.378]	
ASSETS	-0.2388	[.004]	***	-0.2388	[.004]	***	-0.2456	[.003]	***	-0.2456	[.003]	***
TXSHIELD	-0.0330	[.960]		-0.0330	[.960]		0.0023	[.997]		0.0023	[.997]	
DEBTORS	-0.5131	[.000]	***	-0.5131	[.000]	***	-0.5193	[.000]	***	-0.5193	[.000]	***
SMALL	-0.0263	[.410]		-0.0263	[.410]		-0.0268	[.400]		-0.0268	[.400]	
LARGE	0.0339	[.174]		0.0339	[.174]		0.0350	[.160]		0.0350	[.160]	
F-test FIXED v TOTAL	F(23,131) =	26.0020	[.0000]	F(23,131) =	26.8350	[.0000]	F(23,131) =	26.1540	[.0000]	F(23,131) =	27.0120	[.0000]
Theta (0=WITHIN,1=TOTAL)		0.0289			0.0280			0.0287			0.0278	
Hausman test	CHISQ(9) =	22.7100	[.0069]	CHISQ(9) =	23.3440	[.0055]	CHISQ(9) =	22.9420	[.0063]	CHISQ(9) =	23.3440	[.0055]
MODEL		**21**			**22**			**23**			**24**	
Firm effects		FIXED			FIXED			FIXED			FIXED	
No. obs.	164			164			164			164		
Adj. R-2	0.9104			0.9142			0.9108			0.9149		
LM het. Test	1.9030	[.168]		1.0989	[.295]		1.8743	[.171]		0.9429	[.332]	
Variable	**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**	
RESAGE	-0.0011	[.189]					-0.0008	[.279]				
AGELIST				0.0073	[.006]	***				0.0071	[.007]	***
RESPROF	0.3719	[.238]		0.1762	[.546]		0.3099	[.310]		0.1778	[.533]	
GROWTH	0.1646	[.001]	***	0.1346	[.001]	***	0.1530	[.002]	***	0.1311	[.002]	***
RISK	-0.2126	[.132]		-0.0869	[.531]							
ARISK							-0.8374	[.092]	*	-0.5692	[.249]	
ASSETS	-0.3209	[.000]	***	-0.2156	[.007]	***	-0.3260	[.000]	***	-0.2259	[.005]	***
RESTAX	0.5991	[.533]		0.6582	[.435]		0.7112	[.462]		0.7481	[.366]	
DEBTORS	-0.5921	[.000]	***	-0.5536	[.000]	***	-0.5874	[.000]	***	-0.5560	[.000]	***
SMALL	-0.0535	[.090]	*	-0.0280	[.378]		-0.0525	[.096]	*	-0.0282	[.373]	
LARGE	0.0677	[.005]	***	0.0360	[.149]		0.0676	[.005]	***	0.0372	[.134]	
F-test FIXED v TOTAL	F(23,131) =	22.4590	[.0000]	F(23,131) =	24.0570	[.0000]	F(23,131) =	22.6030	[.0000]	F(23,131) =	24.3140	[.0000]
Theta (0=WITHIN,1=TOTAL)		0.0335			0.0313			0.0333			0.0309	
Hausman test	CHISQ(9) =	16.7490	[.0528]	CHISQ(9) =	26.0690	[.0020]	CHISQ(9) =	17.4460	[.0422]	CHISQ(9) =	26.2560	[.0019]

1. For variable definitions see Appendix 4A; ***, ** and * indicate significance at the 1%, 5% and 10% respectively;
2. Unbalanced data: No. of firms = 24; Minimum no. of time observations per firm = 4; Maximum no. of time observations per firm = 9; No. of firm/year observations = 164; See Appendix, Table 4A.1.
3. Model is either Fixed effects (WITHIN): Ordinary Least Squares (OLS) model where the firm individual mean is subtracted from each variable, or Random effects (VARCOMP): Feasible Generalised Least Squares (FGLS) model where data is transformed by subtracting [1-SQRT(θ)] times the individual firm mean from each variable. Where Theta (θ) = VWITH / (VWITH + T * VBET) evaluated at TMAX=9. If θ=1, this corresponds to VBET=0, and variation is due to individual (firm/year) observations. If θ =0, this corresponds to VWITH=0, and variation is due to differences across firms that are constant across time.
   - VWITH is the estimated variance of the basic disturbance terms within individual (firm/year) observations. It is based on the sum of squared residuals from the WITHIN model, and is computed from the small sample formula.
   - VBET is the estimated variance of the individual-specific disturbance terms and is the difference between VWITH and VTOT: VBET = VTOT - VWITH
   - VTOT is the estimated variance of the disturbance terms from the TOTAL model, assuming both slope and intercept coefficients are the same.
4. F-test FIXED versus TOTAL: H*o* is that both slope and intercept coefficients are the same across all firms. H*a* is that the regression slope coefficients are identical but that the intercepts are not.
5. Hausman test: Comaring the fixed effects and the random effects estimators. Under H*o* both OLS and FGLS estimators are consistent but the OLS is inefficient. Under H*a* OLS estimators are consistent but FGLS estimators are not.

Table 4.6 Panel regressions for period 1992 - 2000

Panel D: Dependent variable is LOGLEV. Firm size variable is SIZE

MODEL	**25**			**26**			**27**			**28**		
Firm effects		RANDOM			RANDON			RANDOM			RANDOM	
No. obs.	164			164			164			164		
Adj. R-2	0.5446			0.5070			0.5438			0.5066		
LM het. Test	15.1260	[.000]		16.4652	[.000]		14.8920	[.000]		16.0746	[.000]	
Variable	**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**	
AGEINCOR	-0.0032	[.199]					-0.0031	[.211]				
AGELIST				0.0088	[.490]					0.0094	[.457]	
SIZE	0.2839	[.000]	***	0.2757	[.000]	***	0.2859	[.000]	***	0.2760	[.000]	***
AVPROFIT	-1.2723	[.186]		-0.5567	[.567]		-1.2004	[.214]		-0.4785	[.622]	
GROWTH	0.6206	[.001]	***	0.6207	[.001]	***	0.6092	[.001]	***	0.6095	[.001]	***
RISK	-0.6618	[.283]		-0.6291	[.312]							
ARISK							-2.6990	[.233]		-2.7207	[.231]	
LOGASST	-0.7296	[.000]	***	-0.7025	[.000]	***	-0.7403	[.000]	***	-0.7124	[.000]	***
LOGTAX	0.0850	[.203]		0.0943	[.158]		0.0868	[.194]		0.0960	[.151]	
DEBTORS	-1.9696	[.000]	***	-2.0873	[.000]	***	-1.9653	[.000]	***	-2.0835	[.000]	***
C	-6.9183	[.000]	***	-6.9494	[.000]	***	-6.9865	[.000]	***	-6.9807	[.000]	***
F-test FIXED v TOTAL	F(23,132) =	14.9920	[.0000]	F(23,132) =	16.2080	[.0000]	F(23,132) =	15.1130	[.0000]	F(23,132) =	16.3860	[.0000]
Theta (0=WITHIN,1=TOTAL)		0.0508			0.0469			0.0504			0.0464	
Hausman test	CHISQ(8) =	5.9174	[.6565]	CHISQ(8) =	7.4562	[.4883]	CHISQ(8) =	5.7102	[.6797]	CHISQ(8) =	6.8082	[.5575]

See previous panels for notes

Panel E - Dependent variable is LOGLEV. Firm size variable is SIZE2

MODEL	**29**			**30**			**31**			**32**		
Firm effects		RANDOM			RANDOM			RANDOM			RANDOM	
No. obs.	164			164			164			164		
Adj. R-2	0.5695			0.4904			0.5689			0.4899		
LM het. Test	14.7647	[.000]		17.1127	[.000]		14.5471	[.000]		16.6799	[.000]	
Variable	**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**	
AGEINCOR	-0.0057	[.015]	**				-0.0057	[.016]	**			
AGELIST				0.0037	[.776]					0.0045	[.729]	
SIZE2	0.3021	[.000]	***	0.2871	[.000]	***	0.3040	[.000]	***	0.2873	[.000]	***
AVPROFIT	-0.4956	[.614]		0.3106	[.753]		-0.4184	[.671]		0.4007	[.685]	
GROWTH	0.5151	[.007]	***	0.5383	[.005]	***	0.5030	[.008]	***	0.5261	[.006]	***
RISK	-0.7020	[.249]		-0.7420	[.229]							
ARISK							-2.8116	[.210]		-3.0576	[.174]	
LOGASST	-0.7514	[.000]	***	-0.7651	[.000]	***	-0.7619	[.000]	***	-0.7741	[.000]	***
LOGTAX	0.2088	[.002]	***	0.2159	[.002]	***	0.2114	[.002]	***	0.2178	[.001]	***
DEBTORS	-2.0645	[.000]	***	-2.2489	[.000]	***	-2.0584	[.000]	***	-2.2407	[.000]	***
C	-6.9290	[.000]	***	-6.9386	[.000]	***	-6.9934	[.000]	***	-6.9738	[.000]	***
F-test FIXED v TOTAL	F(23,132) =	13.8100	[.0000]	F(23,132) =	16.4070	[.0000]	F(23,132) =	13.8760	[.0000]	F(23,132) =	16.5610	[.0000]
Theta (0=WITHIN,1=TOTAL)		0.0552			0.0463			0.0550			0.0459	
Hausman test	CHISQ(8) =	8.5824	[.3787]	CHISQ(8) =	12.6870	[.1231]	CHISQ(8) =	8.6277	[.3747]	CHISQ(8) =	12.2170	[.1418]

See previous panels for notes

Table 4.6 Panel regressions for period 1992 - 2000

Panel F: Dependent variable is LOGLEV. Firm size variables are SMALL and LARGE

MODEL		**33**			**34**			**35**			**36**	
Firm effects		FIXED			RANDOM			FIXED			RANDOM	
No. obs.	164			164			164			164		
Adj. R-2	0.8573			0.4315			0.8580			0.4300		
LM het. Test	38.4282	[.000]		18.3321	[.000]		37.8526	[.000]		17.7144	[.000]	
Variable	**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**		**Estimate**	**P-value**	
AGEINCOR	0.0324	[.019]	**				0.0326	[.017]	**			
AGELIST				0.0214	[.080]	*				0.0220	[.069]	*
AVPROFIT	-0.2142	[.857]		-0.4844	[.624]		-0.1221	[.918]		-0.3972	[.687]	
GROWTH	0.7105	[.000]	***	0.7268	[.000]	***	0.6987	[.000]	***	0.7138	[.000]	***
RISK	-0.5491	[.394]		-0.6608	[.295]							
ARISK							-2.7070	[.250]		-2.9527	[.199]	
LOGASST	-0.6126	[.005]	***	-0.7339	[.000]	***	-0.6325	[.004]	***	-0.7453	[.000]	***
LOGTAX	0.0757	[.319]		0.1028	[.130]		0.0791	[.297]		0.1047	[.123]	
DEBTORS	-2.2982	[.000]	***	-2.2145	[.000]	***	-2.3120	[.000]	***	-2.2140	[.000]	***
SMALL	-0.1026	[.506]		-0.1378	[.284]		-0.1038	[.500]		-0.1372	[.286]	
LARGE	0.2477	[.042]	**	0.3407	[.001]	***	0.2509	[.039]	**	0.3427	[.001]	***
C				-1.5463	[.000]	***				-1.5742	[.000]	***
F-test FIXED v TOTAL	F(23,131) =	15.3420	[.0000]	F(23,131) =	16.4640	[.0000]	F(23,131) =	15.4890	[.0000]	F(23,131) =	16.6600	[.0000]
Theta (0=WITHIN,1=TOTAL)		0.0493			0.0459			0.0488			0.0454	
Hausman test	CHISQ(9) =	15.9240	[.0685]	CHISQ(9) =	13.5360	[.1398]	CHISQ(9) =	16.2390	[.0620]	CHISQ(9) =	13.3240	[.1485]

1. For variable definitions see Appendix 4A; ***, ** and * indicate significance at the 1%, 5% and 10% respectively;
2. Unbalanced data: No. of firms = 24; Minimum no. of time observations per firm = 4; Maximum no. of time observations per firm = 9; No. of firm/year observations = 164; See Appendix, Table 4A.1.
3. Model is either Fixed effects (WITHIN): Ordinary Least Squares (OLS) model where the firm individual mean is subtracted from each variable, or Random effects (VARCOMP): Feasible Generalised Least Squares (FGLS) model where data is transformed by subtracting [1-SQRT(θ)] times the individual firm mean from each variable. Where Theta (θ) = VWITH / (VWITH + T * VBET) evaluated at TMAX=9. If θ=1, this corresponds to VBET=0, and variation is due to individual (firm/year) observations. If θ =0, this corresponds to VWITH=0, and variation is due to differences across firms that are constant across time.
   - VWITH is the estimated variance of the basic disturbance terms within individual (firm/year) observations. It is based on the sum of squared residuals from the WITHIN model, and is computed from the small sample formula.
   - VBET is the estimated variance of the individual-specific disturbance terms and is the difference between VWITH and VTOT: VBET = VTOT - VWITH
   - VTOT is the estimated variance of the disturbance terms from the TOTAL model, assuming both slope and intercept coefficients are the same.
4. F-test FIXED versus TOTAL: H*o* is that both slope and intercept coefficients are the same across all firms. H*a* is that the regression slope coefficients are identical but that the intercepts are not.
5. Hausman test: Comaring the fixed effects and the random effects estimators. Under H*o* both OLS and FGLS estimators are consistent but the OLS is inefficient. Under H*a* OLS estimators are consistent but FGLS estimators are not.

In Panels A and D of Table 4.6, (when firm size is SIZE), and in Panels B and E (when firm size is SIZE2), the Hausman test does not reject in any case, the null hypothesis that the FIXED effects estimates are inefficient. Thus with SIZE and SIZE2 the Hausman test rules in favour of the RANDOM effects model. In contrast, in Panel C both the F-test of the FIXED effects versus the TOTAL model and the Hausman test of the RANDOM effects versus the FIXED effects, select the FIXED effect model. Choice between RANODM effects and FIXED effects models is mixed in Panel F (where, like in the case of Panel C, the size variable is dropped and replaced by the dummies SMALL and LARGE)[37].

The first observation that emerges from looking at Table 4.6 reinforces the findings from the yearly regressions, namely the importance of firm size in determining the firm debt ratio. Throughout Table 4.6 the size variables, SIZE and SIZE2 are always highly significant with positively signed estimated coefficients. Furthermore, the effect of the firm size variables could also be the reason that the selected models in Panel C and to a lesser extent in Panel F of Table 4.6 is the FIXED effects model, while in the rest of the Panels it is always the RANDOM effects model. Specifically, by omitting an important explanatory variable (firm size), the assumption required for the RANDOM

[37] Note that the LM test for heteroskedasticity is not rejected in all cases when the dependent variable is LEVERAGE (Panels A, B and C of Table 4.6). In contrast, when the dependent variable is measured in log terms, (LOGLEVE), the null of homoskedasticity is always rejected (Panels D, E and F of Table 4.6). These results imply that the model based on Equation (4.1) provide more efficient estimates thus focusing on interpretation for this case is justified.

effects estimates to retain their consistency, is no longer valid[38].

When the firm size variable is dropped, as in Panels C and F of Table 4.6, its effect is likely to be reflected in the firm-specific effects. Indeed, this is borne by the fixed effects estimates presented in Table 4.7[39]. As can be seen from Panels A and B of Table 4.7, when SIZE/SIZE2 is included in the model specification, the fixed effects estimates are negative. However, in Panel C, when SIZE/SIZE2 is omitted, there is a marked increase in the estimated values of the fixed effects, to the extent, in most cases, that they turn positive. Further, the overall means from the BETWEEN model (top raw of Table 4.7) also change from negative in Panels A and B, to positive in Panel C, when SIZE/SIZE2 is omitted. Similar conclusions can be drawn when the dependent variable is in logarithmic form (LOGLEV) as presented in Panel D of Table 4.7[40].

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[38] The assumption required to retain the consistency of the RANDOM effects estimates, as explained in Section 4.5.2, is that there is no correlation between the disturbance terms and any of the explanatory variables.

[39] The fixed effects estimates in Table 4.7 are obtained from the BETWEEN regression as described in Section 4.5.2, and represent the deviation of each firm from the common mean.

[40] Looking at Panel D of Table 4.7, the following observations are noted. The estimated fixed effects in the LOGLEV regressions remain negative when the firm size variables are replaced by the dummies SMALL and LARGE, (Models 33 to 36). However, their values are substantially higher compared with the regressions where SIZE/SIZE2 are included (Models 25 to 32). Furthermore, as in the LEVERAGE regressions, the overall means from the BETWEEN model change from negative to positive when the size variables are dropped and the size dummies introduced.

Table 4.7 Firm-specific effects (expressed in deviation from the common constant)

Panel A: Dependent variable is LEVERAGE. Firm size variable is SIZE

	COMPANY NAME	model 1	model 2	model 3	model 4	model 5	model 6	model 7	model 8
	Estimated constant (BETWEEN model)	-0.8420	-0.7536	-0.8730	-0.8033	-1.0235	-0.7575	-1.0323	-0.7943
	Commerce								
1	CMPL	-0.7206	-0.6785	-0.7191	-0.6774	-1.4403	-0.8852	-1.4195	-0.9071
2	COURTS (MAURITIUS) LTD	-0.5006	-0.4866	-0.4985	-0.4846	-1.3672	-0.7132	-1.3426	-0.7394
3	HAPPY WORLD FOODS LTD	-0.6981	-0.6443	-0.6996	-0.6463	-1.4803	-0.9054	-1.4591	-0.9335
4	HAREL MALLAC & CO. LTD	-0.7299	-0.6505	-0.7304	-0.6516	-1.4667	-0.9103	-1.4452	-0.9366
5	IRELAND BLYTH LTD	-0.7149	-0.6635	-0.7172	-0.6663	-1.5701	-0.9460	-1.5480	-0.9793
6	ROGERS & COMPANY LTD	-0.5699	-0.4718	-0.5674	-0.4701	-1.3440	-0.7554	-1.3222	-0.7822
7	SHELL MAURITIUS LTD	-0.5797	-0.5774	-0.5842	-0.5819	-1.4607	-0.8674	-1.4372	-0.8974
	Industry								
8	GAMMA-CIVIC LTD	-0.4598	-0.3827	-0.4608	-0.3843	-1.2334	-0.6797	-1.2141	-0.7095
9	MAURITIUS BREWERIES LTD	-0.8287	-0.7516	-0.8284	-0.7519	-1.5825	-1.0470	-1.5613	-1.0719
10	MCFI	-0.7903	-0.7576	-0.7917	-0.7593	-1.5956	-1.0114	-1.5719	-1.0386
11	MAURITIUS OIL REFINERIES LTD	-0.7731	-0.7217	-0.7744	-0.7234	-1.5048	-0.9656	-1.4841	-0.9899
12	MAURITIUS STATIONERY LTD	-0.5219	-0.4682	-0.5232	-0.4699	-1.2960	-0.7368	-1.2715	-0.7615
13	PLASTIC INDUSTRY (MTIUS) LTD	-0.4678	-0.4140	-0.4717	-0.4184	-1.2019	-0.7100	-1.1829	-0.7371
14	THE UNITED BASALT PRODUCTS LTD	-0.7040	-0.6199	-0.7075	-0.6241	-1.4883	-0.9664	-1.4692	-0.9973
	Leisure & hotels								
15	AUTOMATIC SYSTEMS LTD	-0.6430	-0.6360	-0.6474	-0.6404	-1.4517	-0.9666	-1.4339	-0.9934
16	GRAND BAIE HOTEL LTD	-0.6058	-0.5731	-0.6062	-0.5738	-1.4704	-0.8760	-1.4365	-0.8959
17	NEW MAURITIUS HOTELS LTD	-0.6148	-0.5400	-0.6131	-0.5390	-1.4750	-0.8406	-1.4442	-0.8668
18	SUN RESORTS LTD	-0.6133	-0.5923	-0.6127	-0.5919	-1.5432	-0.8817	-1.5096	-0.9069
	Sugar								
19	HAREL FRERES LTD	-0.7317	-0.6616	-0.7301	-0.6606	-1.5645	-0.9324	-1.5369	-0.9593
20	MON DESERT ALMA LTD	-1.0866	-0.7082	-1.0814	-0.7060	-1.2945	-0.9321	-1.2915	-0.9562
21	MON TRESOR & MON DESERT LTD	-0.9616	-0.8144	-0.9603	-0.8143	-1.5967	-1.0710	-1.5762	-1.0944
22	SAVANNAH SUGAR ESTATES LTD	-1.0078	-0.7578	-1.0054	-0.7575	-1.4745	-0.9972	-1.4620	-1.0239
23	THE MOUNT SUGAR ESTATES LTD	-0.9430	-0.7631	-0.9393	-0.7609	-1.5034	-0.9806	-1.4867	-1.0043
	Transport								
24	AIR MAURITIUS LTD	-0.3861	-0.3230	-0.3857	-0.3231	-1.2866	-0.6056	-1.2615	-0.6399
	Explanatory variables in the Model:								
		AGEINCOR	AGELIST	AGEINCOR	AGELIST	RESAGE	AGELIST	RESAGE	AGELIST
		SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE
		AVPROFIT	AVPROFIT	AVPROFIT	AVPROFIT	RESPROF	RESPROF	RESPROF	RESPROF
		GROWTH	GROWTH	GROWTH	GROWTH	GROWTH	GROWTH	GROWTH	GROWTH
		RISK	RISK	ARISK	ARISK	RISK	RISK	ARISK	ARISK
		ASSETS	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS
		TXSHIELD	TXSHIELD	TXSHIELD	TXSHIELD	RESTAX	RESTAX	RESTAX	RESTAX
		DEBTORS	DEBTORS	DEBTORS	DEBTORS	DEBTORS	DEBTORS	DEBTORS	DEBTORS

For number of yearly observations per firm and for variable definitions see Tables 4A.1 and Appendix 4A; For Models specifications see Table 4.6.
The fixed effects estimates are obtained from the BETWEEN regression and represent the deviation of the i^{th} firm from the common mean (the constant in the BETWEEN regression).
The BETWEEN model is an OLS regression of the mean dependent variable of each firm on a constant and the means explanatory variables for each firm.

Table 4.7 Firm-specific effects (expressed in deviation from the common constant)

Panel B: Dependent variable is LEVERAGE. Firm size variable is SIZE2

	COMPANY NAME	model 9	model 10	model 11	model 12	model 13	model 14	model 15	model 16
	Estimated constant (BETWEEN model)	-1.2156	-1.0677	-1.2174	-1.1087	-0.6472	-0.4865	-0.7175	-0.5651
	Commerce								
1	CMPL	-2.3059	-2.5022	-2.2945	-2.4877	-1.2095	-1.9278	-1.1904	-1.8937
2	COURTS (MAURITIUS) LTD	-2.4662	-2.5316	-2.4508	-2.5152	-1.1040	-1.9334	-1.0829	-1.8968
3	HAPPY WORLD FOODS LTD	-2.4547	-2.7055	-2.4440	-2.6909	-1.2520	-2.0763	-1.2347	-2.0383
4	HAREL MALLAC & CO. LTD	-2.3177	-2.6884	-2.3087	-2.6737	-1.2777	-2.0818	-1.2604	-2.0443
5	IRELAND BLYTH LTD	-2.6536	-2.8935	-2.6418	-2.8780	-1.3277	-2.2274	-1.3114	-2.1881
6	ROGERS & COMPANY LTD	-2.2589	-2.7168	-2.2474	-2.6982	-1.1571	-2.0479	-1.1365	-2.0042
7	SHELL MAURITIUS LTD	-2.6163	-2.6272	-2.6039	-2.6147	-1.1683	-1.9841	-1.1523	-1.9466
	Industry								
8	GAMMA-CIVIC LTD	-2.1178	-2.4775	-2.1090	-2.4632	-1.0318	-1.8526	-1.0167	-1.8161
9	MAURITIUS BREWERIES LTD	-2.4414	-2.8012	-2.4320	-2.7862	-1.3874	-2.1826	-1.3696	-2.1436
10	MCFI	-2.5949	-2.7475	-2.5831	-2.7334	-1.3530	-2.1401	-1.3362	-2.1040
11	MAURITIUS OIL REFINERIES LTD	-2.3813	-2.6212	-2.3719	-2.6080	-1.2804	-2.0258	-1.2632	-1.9902
12	MAURITIUS STATIONERY LTD	-2.1633	-2.4141	-2.1544	-2.4012	-1.0919	-1.8436	-1.0753	-1.8083
13	PLASTIC INDUSTRY (MTIUS) LTD	-2.0394	-2.2901	-2.0327	-2.2796	-0.9897	-1.7118	-0.9773	-1.6792
14	THE UNITED BASALT PRODUCTS LTD	-2.3123	-2.7048	-2.3069	-2.6933	-1.2946	-2.0863	-1.2825	-2.0509
	Leisure & hotels								
15	AUTOMATIC SYSTEMS LTD	-2.4654	-2.4981	-2.4555	-2.4877	-1.1610	-1.8704	-1.1479	-1.8359
16	GRAND BAIE HOTEL LTD	-2.4665	-2.6192	-2.4545	-2.6048	-1.2717	-2.0608	-1.2505	-2.0195
17	NEW MAURITIUS HOTELS LTD	-2.4677	-2.8165	-2.4549	-2.7984	-1.2988	-2.1949	-1.2781	-2.1513
18	SUN RESORTS LTD	-2.6889	-2.7871	-2.6734	-2.7700	-1.3090	-2.1761	-1.2876	-2.1336
	Sugar								
19	HAREL FRERES LTD	-2.5040	-2.8311	-2.4922	-2.8143	-1.3753	-2.2274	-1.3560	-2.1881
20	MON DESERT ALMA LTD	-1.0500	-2.8161	-1.0603	-2.7992	-1.4218	-2.2147	-1.4073	-2.1766
21	MON TRESOR & MON DESERT LTD	-2.1744	-2.8613	-2.1702	-2.8465	-1.4904	-2.2788	-1.4722	-2.2406
22	SAVANNAH SUGAR ESTATES LTD	-1.7105	-2.8771	-1.7130	-2.8615	-1.4708	-2.2856	-1.4556	-2.2488
23	THE MOUNT SUGAR ESTATES LTD	-1.9378	-2.7773	-1.9350	-2.7615	-1.4323	-2.2124	-1.4142	-2.1768
	Transport								
24	AIR MAURITIUS LTD	-2.3887	-2.6831	-2.3752	-2.6651	-1.0632	-2.0162	-1.0451	-1.9756
	Explanatory variables in the Model:								
		AGEINCOR SIZE2 AVPROFIT GROWTH RISK ASSETS TXSHIELD DEBTORS	AGELIST SIZE2 AVPROFIT GROWTH RISK ASSETS TXSHIELD DEBTORS	AGEINCOR SIZE2 AVPROFIT GROWTH ARISK ASSETS TXSHIELD DEBTORS	AGELIST SIZE2 AVPROFIT GROWTH ARISK ASSETS TXSHIELD DEBTORS	RESAGE SIZE2 RESPROF GROWTH RISK ASSETS RESTAX DEBTORS	AGELIST SIZE2 RESPROF GROWTH RISK ASSETS RESTAX DEBTORS	RESAGE SIZE2 RESPROF GROWTH ARISK ASSETS RESTAX DEBTORS	AGELIST SIZE2 RESPROF GROWTH ARISK ASSETS RESTAX DEBTORS

For number of yearly observations per firm and for variable definitions see Tables 4A.1 and Appendix 4A; For Models specifications see Table 4.6.

The fixed effects estimates are obtained from the BETWEEN regression and represent the deviation of the i^{th} firm from the common mean (the constant in the BETWEEN regression).

The BETWEEN model is an OLS regression of the mean dependent variable of each firm on a constant and the means explanatory variables for each firm.

Table 4.7 Firm-specific effects (expressed in deviation from the common constant)

Panel C: Dependent variable is LEVERAGE. Firm size variables are the dummies SMALL and LARGE

	COMPANY NAME	model 17	model 18	model 19	model 20	model 21	model 22	model 23	model 24
	Estimated constant (BETWEEN model)	0.4364	0.4412	0.3548	0.3535	0.5201	0.5974	0.4454	0.5161
	Commerce								
1	CMPL	0.2248	0.3463	0.2297	0.3501	0.4706	0.3366	0.4696	0.3459
2	COURTS (MAURITIUS) LTD	0.5559	0.5964	0.5608	0.6010	0.6363	0.5858	0.6385	0.5934
3	HAPPY WORLD FOODS LTD	0.2905	0.4456	0.2910	0.4449	0.4694	0.4149	0.4672	0.4198
4	HAREL MALLAC & CO. LTD	0.1870	0.4163	0.1899	0.4173	0.4682	0.3833	0.4669	0.3895
5	IRELAND BLYTH LTD	0.3406	0.4890	0.3399	0.4871	0.4852	0.4588	0.4816	0.4605
6	ROGERS & COMPANY LTD	0.4218	0.7051	0.4275	0.7084	0.7641	0.6714	0.7612	0.6800
7	SHELL MAURITIUS LTD	0.5163	0.5230	0.5124	0.5191	0.5250	0.4747	0.5235	0.4779
	Industry								
8	GAMMA-CIVIC LTD	0.4711	0.6937	0.4736	0.6943	0.7210	0.6490	0.7167	0.6525
9	MAURITIUS BREWERIES LTD	0.1056	0.3283	0.1095	0.3302	0.3851	0.2758	0.3834	0.2838
10	MCFI	0.2138	0.3083	0.2150	0.3086	0.3690	0.2808	0.3691	0.2862
11	MAURITIUS OIL REFINERIES LTD	0.1706	0.3190	0.1721	0.3193	0.3975	0.2879	0.3959	0.2952
12	MAURITIUS STATIONERY LTD	0.3916	0.5468	0.3937	0.5475	0.6141	0.5003	0.6153	0.5062
13	PLASTIC INDUSTRY (MTIUS) LTD	0.4028	0.5579	0.4014	0.5553	0.5713	0.4983	0.5678	0.5005
14	THE UNITED BASALT PRODUCTS LTD	0.1869	0.4298	0.1868	0.4276	0.4498	0.3510	0.4444	0.3526
	Leisure & hotels								
15	AUTOMATIC SYSTEMS LTD	0.3858	0.4060	0.3833	0.4033	0.4458	0.3320	0.4404	0.3371
16	GRAND BAIE HOTEL LTD	0.3573	0.4517	0.3597	0.4533	0.4689	0.3755	0.4796	0.3855
17	NEW MAURITIUS HOTELS LTD	0.3399	0.5558	0.3442	0.5582	0.5511	0.5046	0.5569	0.5111
18	SUN RESORTS LTD	0.4363	0.4970	0.4386	0.4988	0.5000	0.4473	0.5085	0.4546
	Sugar								
19	HAREL FRERES LTD	0.2153	0.4177	0.2204	0.4210	0.4649	0.3830	0.4681	0.3892
20	MON DESERT ALMA LTD	-0.7606	0.3324	-0.7464	0.3371	0.5240	0.3164	0.5064	0.3243
21	MON TRESOR & MON DESERT LTD	-0.2054	0.2197	-0.1995	0.2219	0.3051	0.1778	0.3034	0.1859
22	SAVANNAH SUGAR ESTATES LTD	-0.4388	0.2831	-0.4297	0.2859	0.4003	0.2593	0.3908	0.2647
23	THE MOUNT SUGAR ESTATES LTD	-0.2578	0.2616	-0.2481	0.2670	0.3934	0.2465	0.3883	0.2543
	Transport								
24	AIR MAURITIUS LTD	0.6829	0.8651	0.6861	0.8667	0.8769	0.8435	0.8752	0.8457
	Explanatory variables in the Model:								
		AGEINCOR	AGELIST	AGEINCOR	AGELIST	RESAGE	AGELIST	RESAGE	AGELIST
		AVPROFIT	AVPROFIT	AVPROFIT	AVPROFIT	RESPROF	RESPROF	RESPROF	RESPROF
		GROWTH	GROWTH	GROWTH	GROWTH	GROWTH	GROWTH	GROWTH	GROWTH
		RISK	RISK	ARISK	ARISK	RISK	RISK	ARISK	ARISK
		ASSETS	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS	ASSETS
		TXSHIELD	TXSHIELD	TXSHIELD	TXSHIELD	RESTAX	RESTAX	RESTAX	RESTAX
		DEBTORS	DEBTORS	DEBTORS	DEBTORS	DEBTORS	DEBTORS	DEBTORS	DEBTORS
		SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
		LARGE	LARGE	LARGE	LARGE	LARGE	LARGE	LARGE	LARGE

For number of yearly observations per firm and for variable definitions see Tables 4A.1 and Appendix 4A; For Models specifications see Table 4.6.
The fixed effects estimates are obtained from the BETWEEN regression and represent the deviation of the i^{th} firm from the common mean (the constant in the BETWEEN regression).
The BETWEEN model is an OLS regression of the mean dependent variable of each firm on a constant and the means explanatory variables for each firm.

Table 4.7 Firm-specific effects (expressed in deviation from the common constant)

Panel D: Dependent variable is LOGLEV

		Firm size variable is SIZE				Firm size variable is SIZE2				Firm size variables are SMALL and LARGE			
	COMPANY NAME	**model 25**	**model 26**	**model 27**	**model 28**	**model 29**	**model 30**	**model 31**	**model 32**	**model 33**	**model 34**	**model 35**	**model 36**
	Estimated constant (BETWEEN model)	-4.4322	-4.9094	-4.6033	-5.2459	-5.1417	-5.5084	-5.2508	-5.7922	0.4932	0.4593	0.4286	0.3489
	Commerce												
1	CMPL	-7.5538	-7.3719	-7.5470	-7.3554	-10.2821	-10.5967	-10.1817	-10.4672	-2.3109	-1.7282	-2.3269	-1.7406
2	COURTS (MAURITIUS) LTD	-7.3141	-7.2535	-7.3123	-7.2484	-10.8917	-10.9965	-10.7690	-10.8642	-1.4151	-1.2208	-1.4447	-1.2493
3	HAPPY WORLD FOODS LTD	-7.7950	-7.5626	-7.7967	-7.5518	-10.8660	-11.2679	-10.7603	-11.1251	-2.3295	-1.5849	-2.3616	-1.6124
4	HAREL MALLAC & CO. LTD	-7.9661	-7.6225	-7.9759	-7.6138	-10.7744	-11.3686	-10.6913	-11.2305	-2.8147	-1.7141	-2.8470	-1.7395
5	IRELAND BLYTH LTD	-8.3265	-8.1042	-8.3309	-8.0966	-11.7991	-12.1836	-11.6827	-12.0316	-2.5248	-1.8126	-2.5645	-1.8479
6	ROGERS & COMPANY LTD	-7.9876	-7.5631	-7.9851	-7.5378	-10.9160	-11.6501	-10.8189	-11.4849	-2.4835	-1.1238	-2.5051	-1.1370
7	SHELL MAURITIUS LTD	-7.8455	-7.8354	-7.8453	-7.8346	-11.4006	-11.4181	-11.2682	-11.2841	-1.8621	-1.8297	-1.9038	-1.8712
	Industry												
8	GAMMA-CIVIC LTD	-7.2994	-6.9659	-7.3080	-6.9566	-10.1995	-10.7762	-10.1141	-10.6375	-2.0844	-1.0161	-2.1152	-1.0403
9	MAURITIUS BREWERIES LTD	-8.2392	-7.9057	-8.2414	-7.8900	-11.0321	-11.6089	-10.9435	-11.4669	-3.0054	-1.9371	-3.0289	-1.9539
10	MCFI	-7.9932	-7.8517	-7.9896	-7.8405	-11.1918	-11.4365	-11.0764	-11.2984	-2.4083	-1.9551	-2.4338	-1.9778
11	MAURITIUS OIL REFINERIES LTD	-7.9230	-7.5631	-7.9263	-7.6920	-10.6721	-11.0566	-10.5786	-10.9275	-2.6590	-1.9468	-2.6880	-1.9714
12	MAURITIUS STATIONERY LTD	-7.0105	-7.8354	-7.0166	-6.7717	-9.9767	-10.3786	-9.8868	-10.2515	-1.9258	-1.1813	-1.9543	-1.2051
13	PLASTIC INDUSTRY (MTIUS) LTD	-7.0950	-6.9659	-7.1083	-6.8634	-9.7498	-10.1518	-9.6707	-10.0355	-2.2706	-1.5260	-2.3085	-1.5593
14	THE UNITED BASALT PRODUCTS LTD	-7.7978	-7.9057	-7.8187	-7.4353	-10.5517	-11.1808	-10.4848	-11.0557	-2.7955	-1.6300	-2.8377	-1.6650
	Leisure & hotels												
15	AUTOMATIC SYSTEMS LTD	-7.4709	-7.8517	-7.4675	-7.4356	-10.3353	-10.3878	-10.2210	-10.2685	-1.7793	-1.6822	-1.8092	-1.7114
16	GRAND BAIE HOTEL LTD	-7.3085	-7.1670	-7.3038	-7.1547	-10.8352	-11.0798	-10.7182	-10.9402	-1.9461	-1.4929	-1.9681	-1.5121
17	NEW MAURITIUS HOTELS LTD	-7.5214	-7.1980	-7.5137	-7.1729	-11.0419	-11.6012	-10.9263	-11.4338	-2.2254	-1.1895	-2.2441	-1.2017
18	SUN RESORTS LTD	-7.4739	-7.3829	-7.4572	-7.3614	-11.3915	-11.5488	-11.2467	-11.3894	-1.6883	-1.3970	-1.7056	-1.4124
	Sugar												
19	HAREL FRERES LTD	-7.7451	-7.4419	-7.7420	-7.4225	-11.0790	-11.6033	-10.9746	-11.4504	-2.4449	-1.4737	-2.4641	-1.4869
20	MON DESERT ALMA LTD	-9.1891	-7.5518	-9.2567	-7.5314	-8.7927	-11.6240	-8.9065	-11.4757	-7.0142	-1.7697	-7.0556	-1.7787
21	MON TRESOR & MON DESERT LTD	-9.2720	-8.6353	-9.2944	-8.6235	-11.3879	-12.4890	-11.3526	-12.3518	-4.9368	-2.8973	-4.9695	-2.9174
22	SAVANNAH SUGAR ESTATES LTD	-8.9398	-7.8584	-8.9856	-7.8460	-10.0838	-11.9538	-10.1150	-11.8119	-5.5368	-2.0729	-5.5767	-2.0913
23	THE MOUNT SUGAR ESTATES LTD	-8.9887	-8.2105	-9.0137	-8.1937	-10.6826	-12.0283	-10.6704	-11.8915	-5.0275	-2.5348	-5.0531	-2.5449
	Transport												
24	AIR MAURITIUS LTD	-7.2571	-6.9842	-7.2537	-6.9662	-10.9898	-11.4617	-10.8672	-11.2954	-1.3560	-0.4819	-1.3824	-0.5029
	Explanatory variables in the Model:												
		AGEINCOR SIZE AVPROFIT GROWTH RISK LOGASST LOGTAX DEBTORS	AGELIST SIZE AVPROFIT GROWTH RISK LOGASST LOGTAX DEBTORS	AGEINCOR SIZE AVPROFIT GROWTH ARISK LOGASST LOGTAX DEBTORS	AGELIST SIZE AVPROFIT GROWTH ARISK LOGASST LOGTAX DEBTORS	AGEINCOR SIZE2 AVPROFIT GROWTH RISK LOGASST LOGTAX DEBTORS	AGELIST SIZE2 AVPROFIT GROWTH RISK LOGASST LOGTAX DEBTORS	AGEINCOR SIZE2 AVPROFIT GROWTH ARISK LOGASST LOGTAX DEBTORS	AGELIST SIZE2 AVPROFIT GROWTH ARISK LOGASST LOGTAX DEBTORS	AGEINCOR AVPROFIT GROWTH RISK LOGASST LOGTAX DEBTORS SMALL LARGE	AGELIST AVPROFIT GROWTH RISK LOGASST LOGTAX DEBTORS SMALL LARGE	AGEINCOR AVPROFIT GROWTH ARISK LOGASST LOGTAX DEBTORS SMALL LARGE	AGELIST AVPROFIT GROWTH ARISK LOGASST LOGTAX DEBTORS SMALL LARGE

For number of yearly observations per firm and for variable definitions see Tables 4A.1 and Appendix 4A; For Models specifications see Table 4.6; The fixed effects estimates are obtained from the BETWEEN regression and represent the deviation of the i^{th} firm from the common mean (the constant in the BETWEEN regression).; The BETWEEN model is an OLS regression of the mean dependent variable of each firm on a constant and the means explanatory variables for each firm.

The change in the fixed effects estimates when SIZE/SIZE2 is dropped is likely to be a reflection of the influence of this omitted variable. This is particularly so given the strong positive correlation of SIZE/SIZE2 with the dependent variable[41]. Further, as can be seen from the correlation matrix in Panel B of Table 4.3, the firm size variable, SIZE/SIZE2, is correlated with other explanatory variables. And from their definitions, the dummy variables, SMALL and LARGE, are also likely to be correlated with SIZE/SIZE2 even if these dummies do not capture the full effects of firm size. This implies correlation between the firm-specific effects and other explanatory variables, which does not have serious implications under the FIXED effects model.

However, under the RANDOM effects model, the firm-specific effects are part of the disturbance terms. In this case correlation between the firm-specific effects and some of the explanatory variables means that the estimated coefficients are no longer consistent. This is the reason that the Hausman tests, in Panel C of Table 4.6 (and in two out of four cases in Panel F), reject the null hypothesis in favour of the alternative hypothesis that the RANDOM effects estimates are inconsistent. This point is reinforced by Table 4.8

[41] See the correlation matrix in Panel B of Table 4.3. The correlation between LEVERAGE and SIZE is 0.60, between LEVERAGE and SIZE2 is 0.35, between LOGLEV and SIZE is 0.52, and between LOGLEV and SIZE2 is 0.23. Also refer to the results of the yearly regression in Table 4.5 where SIZE/SIZE2 is consistently (and often significantly) positively related to LEVERAGE.

Table 4.8 Correlation matrix for residuals and explanatory variables

Panel A: Dependent variable is LEVERAGE. Firm size variable is SIZE

	Model 1		**Model 2**		**Model 3**		**Model 4**		**Model 5**		**Model 6**		**Model 7**		**Model 8**	
	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV
@RESW	1.0000		1.0000		1.0000		1.0000		1.0000		1.0000		1.0000		1.0000	
@RESV	0.4063	1.0000	0.3877	1.0000	0.4053	1.0000	0.3871	1.0000	0.4085	1.0000	0.4046	1.0000	0.4103	1.0000	0.4033	1.0000
SIZE	0.0000	0.0936	0.0000	0.1367	0.0000	0.0951	0.0000	0.1378	0.0000	0.0035	0.0000	0.0734	0.0000	0.0079	0.0000	0.0710
AGEINCOR	0.0000	-0.0088			0.0000	-0.0089										
RESAGE									0.0000	0.0415			0.0000	0.0217		
AGELIST			0.0000	-0.1521			0.0000	-0.1510			0.0000	-0.1042			0.0000	-0.1048
AVPROFIT	0.0000	0.0505	0.0000	0.1708	0.0000	0.0479	0.0000	0.1663								
RESPROF									0.0000	-0.0908	0.0000	-0.1116	0.0000	-0.0846	0.0000	-0.1075
GROWTH	0.0000	0.0120	0.0000	0.0313	0.0000	0.0138	0.0000	0.0328	0.0000	-0.0760	0.0000	0.0057	0.0000	-0.0684	0.0000	0.0085
RISK	0.0000	0.0466	0.0000	0.0327					0.0000	0.0901	0.0000	0.0729				
ARISK					0.0000	0.0738	0.0000	0.0763					0.0000	0.1041	0.0000	0.1075
ASSETS	0.0000	-0.1470	0.0000	-0.1971	0.0000	-0.1459	0.0000	-0.1953	0.0000	-0.1833	0.0000	-0.2134	0.0000	-0.1795	0.0000	-0.2075
TXSHIELD	0.0000	0.0557	0.0000	0.1073	0.0000	0.0491	0.0000	0.1000								
RESTAX									0.0000	0.1290	0.0000	0.0704	0.0000	0.1263	0.0000	0.0624
DEBTORS	0.0000	0.1663	0.0000	0.1194	0.0000	0.1715	0.0000	0.1252	0.0000	0.1161	0.0000	0.1744	0.0000	0.1127	0.0000	0.1748

Panel B: Dependent variable is LEVERAGE. Firm size variable is SIZE2

	Model 9		**Model 10**		**Model 11**		**Model 12**		**Model 13**		**Model 14**		**Model 15**		**Model 16**	
	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV
@RESW	1.0000		1.0000		1.0000		1.0000		1.0000		1.0000		1.0000		1.0000	
@RESV	0.4067	1.0000	0.3658	1.0000	0.4059	1.0000	0.3656	1.0000	0.3615	1.0000	0.3557	1.0000	0.3595	1.0000	0.3551	1.0000
SIZE2	0.0000	-0.0387	0.0000	-0.1934	0.0000	-0.0348	0.0000	-0.1900	0.0000	-0.0549	0.0000	-0.1692	0.0000	-0.0538	0.0000	-0.1651
AGEINCOR	0.0000	0.0443			0.0000	0.0446										
RESAGE									0.0000	-0.2340			0.0000	-0.2451		
AGELIST			0.0000	-0.1538			0.0000	-0.1531			0.0000	-0.1782			0.0000	-0.1805
AVPROFIT	0.0000	-0.0165	0.0000	0.2145	0.0000	-0.0197	0.0000	0.2104								
RESPROF									0.0000	-0.0961	0.0000	-0.0982	0.0000	-0.0927	0.0000	-0.0938
GROWTH	0.0000	-0.0844	0.0000	-0.0577	0.0000	-0.0826	0.0000	-0.0566	0.0000	-0.0593	0.0000	-0.0740	0.0000	-0.0542	0.0000	-0.0706
RISK	0.0000	0.0894	0.0000	0.0553					0.0000	0.0565	0.0000	0.0522				
ARISK					0.0000	0.1071	0.0000	0.0985					0.0000	0.1035	0.0000	0.0977
ASSETS	0.0000	-0.1889	0.0000	-0.2353	0.0000	-0.1879	0.0000	-0.2336	0.0000	-0.2798	0.0000	-0.2597	0.0000	-0.2767	0.0000	-0.2556
TXSHIELD	0.0000	0.1017	0.0000	0.2077	0.0000	0.0947	0.0000	0.2009								
RESTAX									0.0000	0.1430	0.0000	0.1104	0.0000	0.1376	0.0000	0.1073
DEBTORS	0.0000	0.1035	0.0000	-0.0036	0.0000	0.1094	0.0000	0.0010	0.0000	-0.0415	0.0000	-0.0604	0.0000	-0.0414	0.0000	-0.0621

The series @RESW and @RESV are the residuals from the FIXED effects and RANDOM effects models respectively. Other variables are defined in the Appendix 4A.
For Models specifications see Table 4.6.

Table 4.8 Correlation matrix for residuals and explanatory variables

Panel C: Dependent variable is LEVERAGE. Firm size variables are SMALL and LARGE

	Model 17		**Model 18**		**Model 19**		**Model 20**		**Model 21**		**Model 22**		**Model 23**		**Model 24**	
	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV
@RESW	1.0000		1.0000		1.0000		1.0000		1.0000		1.0000		1.0000		1.0000	
@RESV	0.3716	1.0000	0.3398	1.0000	0.3704	1.0000	0.3390	1.0000	0.3882	1.0000	0.3491	1.0000	0.3876	1.0000	0.3484	1.0000
SIZE	0.0233	0.4098	0.0233	0.4742	0.0232	0.4106	0.0232	0.4745	0.0631	0.4320	0.0247	0.4811	0.0621	0.4355	0.0255	0.4817
AGEINCOR	0.0000	-0.0747			0.0000	-0.0761										
RESAGE									0.0000	-0.0739			0.0000	-0.0908		
AGELIST			0.0000	-0.1650			0.0000	-0.1637			0.0000	-0.1387			0.0000	-0.1387
AVPROFIT	0.0000	0.0504	0.0000	0.1374	0.0000	0.0484	0.0000	0.1330								
RESPROF									0.0000	-0.1097	0.0000	-0.1148	0.0000	-0.1038	0.0000	-0.1121
GROWTH	0.0000	0.0569	0.0000	0.0716	0.0000	0.0584	0.0000	0.0730	0.0000	0.0045	0.0000	0.0588	0.0000	0.0117	0.0000	0.0615
RISK	0.0000	0.0506	0.0000	0.0445					0.0000	0.0867	0.0000	0.0697				
ARISK					0.0000	0.0923	0.0000	0.1012					0.0000	0.1236	0.0000	0.1225
ASSETS	0.0000	-0.1610	0.0000	-0.2423	0.0000	-0.1598	0.0000	-0.2407	0.0000	-0.2067	0.0000	-0.2595	0.0000	-0.2034	0.0000	-0.2560
TXSHIELD	0.0000	0.0243	0.0000	0.0654	0.0000	0.0187	0.0000	0.0584								
RESTAX									0.0000	0.1572	0.0000	0.1447	0.0000	0.1540	0.0000	0.1381
DEBTORS	0.0000	0.1934	0.0000	0.1523	0.0000	0.1974	0.0000	0.1583	0.0000	0.1857	0.0000	0.1928	0.0000	0.1836	0.0000	0.1950
SMALL	0.0000	-0.0441	0.0000	-0.0552	0.0000	-0.0430	0.0000	-0.0544	0.0000	-0.0279	0.0000	-0.0347	0.0000	-0.0269	0.0000	-0.0342
LARGE	0.0000	0.3559	0.0000	0.4293	0.0000	0.3563	0.0000	0.4290	0.0000	0.3590	0.0000	0.4373	0.0000	0.3639	0.0000	0.4376

Panel D: Dependent variable is LOGLEV

	Firm size variable is SIZE							
	Model 25		**Model 26**		**Model 27**		**Model 28**	
	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV
@RESW	1.0000		1.0000		1.0000		1.0000	
@RESV	0.5089	1.0000	0.4907	1.0000	0.5074	1.0000	0.4897	1.0000
SIZE/SIZE2	0.0000	-0.0829	0.0000	-0.0036	0.0000	-0.0846	0.0000	-0.0023
AGEINCOR	0.0000	-0.0326			0.0000	-0.0343		
AGELIST			0.0000	-0.1386			0.0000	-0.1396
AVPROFIT	0.0000	0.0235	0.0000	0.0898	0.0000	0.0224	0.0000	0.0860
GROWTH	0.0000	-0.0601	0.0000	-0.0404	0.0000	-0.0593	0.0000	-0.0394
RISK	0.0000	-0.0381	0.0000	-0.0383				
ARISK					0.0000	-0.0093	0.0000	0.0041
LOGASST	0.0000	0.0077	0.0000	-0.0661	0.0000	0.0128	0.0000	-0.0616
LOGTAX	0.0000	0.1328	0.0000	0.1630	0.0000	0.1314	0.0000	0.1596
DEBTORS	0.0000	0.0733	0.0000	0.0608	0.0000	0.0718	0.0000	0.0614
SMALL								
LARGE								

	Firm size variable is SIZE2							
	Model 29		**Model 30**		**Model 31**		**Model 32**	
	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV
@RESW	1.0000		1.0000		1.0000		1.0000	
@RESV	0.5186	1.0000	0.4774	1.0000	0.5178	1.0000	0.4768	1.0000
SIZE/SIZE2	0.0000	-0.1519	0.0000	-0.1415	0.0000	-0.1531	0.0000	-0.1383
AGEINCOR	0.0000	-0.0183			0.0000	-0.0200		
AGELIST			0.0000	-0.1644			0.0000	-0.1659
AVPROFIT	0.0000	0.0024	0.0000	0.1358	0.0000	0.0012	0.0000	0.1323
GROWTH	0.0000	-0.1331	0.0000	-0.0901	0.0000	-0.1327	0.0000	-0.0892
RISK	0.0000	-0.0048	0.0000	-0.0189				
ARISK					0.0000	0.0193	0.0000	0.0275
LOGASST	0.0000	-0.0145	0.0000	-0.1078	0.0000	-0.0093	0.0000	-0.1033
LOGTAX	0.0000	0.2031	0.0000	0.2586	0.0000	0.2023	0.0000	0.2560
DEBTORS	0.0000	0.0172	0.0000	-0.0189	0.0000	0.0149	0.0000	-0.0193
SMALL								
LARGE								

	Firm size variables are SMALL and LARGE							
	Model 33		**Model 34**		**Model 35**		**Model 36**	
	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV	@RESW	@RESV
@RESW	1.0000		1.0000		1.0000		1.0000	
@RESV	0.4902	1.0000	0.4610	1.0000	0.4882	1.0000	0.4595	1.0000
SIZE/SIZE2	0.0220	0.2207	0.0220	0.3053	0.0217	0.2203	0.0217	0.3060
AGEINCOR	0.0000	-0.0687			0.0000	-0.0714		
AGELIST			0.0000	-0.1450			0.0000	-0.1453
AVPROFIT	0.0000	0.0145	0.0000	0.0697	0.0000	0.0136	0.0000	0.0654
GROWTH	0.0000	-0.0174	0.0000	0.0030	0.0000	-0.0163	0.0000	0.0042
RISK	0.0000	-0.0249	0.0000	-0.0171				
ARISK					0.0000	0.0186	0.0000	0.0399
LOGASST	0.0000	-0.0119	0.0000	-0.1180	0.0000	-0.0068	0.0000	-0.1138
LOGTAX	0.0000	0.1190	0.0000	0.1406	0.0000	0.1178	0.0000	0.1365
DEBTORS	0.0000	0.1252	0.0000	0.1199	0.0000	0.1239	0.0000	0.1217
SMALL	0.0000	-0.0164	0.0000	-0.0394	0.0000	-0.0146	0.0000	-0.0391
LARGE	0.0000	0.1280	0.0000	0.2238	0.0000	0.1274	0.0000	0.2241

The series @RESW and @RESV are the residuals from the FIXED effects and RANDOM effects models respectively. Other variables are defined in the Appendix 4A.
For Models specifications see Table 4.6.

Table 4.8 is split into four Panels and presents the correlation matrix of the explanatory variables and the residuals from both the FIXED effects and RANDOM effects models. Panels A, B and C of Table 4.8 relate to the regressions when the dependent variable is LEVERAGE. In Panel A and in Panel B the firm size variable is measured by SIZE and SIZE2 respectively, while in Panel C SMALL and LARGE replace the firm size variable. Panel D contains all the alternative firm size specification when the dependent variable is LOGLEV, the log form of LEVERAGE.

In panels A and B of Table 4.8 there does not appear to be a problem of correlation between the residuals obtained from the FIXED effects and RANDOM effects regressions and any of the explanatory variables. Indeed, in both these Panels (which include the firm size variable SIZE/SIZE2) none of the pair-wise correlation coefficient reaches the value of 0.30. This holds true also for Models 25 to 32 of Panel D, which include the firm size variable SIZE/SIZE2 in the LOGLEV regressions.

Panel C of Table 4.8 and Models 33 to 36 of Panel D, contain the pair-wise correlation coefficients between the explanatory variables and the residuals obtained from the regressions that omit SIZE/SIZE2. As can be seen from Panel C, when the RANDOM effects model is used, this results in high correlation coefficients (of above 0.30) between the residuals and the dummy variable, LARGE. Moreover, the omitted variable, SIZE, is now highly correlated with @RESV, the residuals from the RANDOM effects model. This pattern in the correlation matrix of Table 4.8 indicates an omitted variable problem[42].

Aside from the firm size variable, SIZE/SIZE2, the panel procedure results for the other explanatory variables that are included in Table 4.6, can be summarised as follows. The intercept throughout Table 4.6, is consistently negatively signed and significant at the 1 percent significance level. This is consistent with the results of the yearly analysis.

The panel procedure produces stronger evidence, compared with the yearly analysis, in support of the notion that the firm age (since incorporation) is an important determinant of its capital structure. In Panels A, B, D and E of Table 4.6, when combined with SIZE/SIZE2, the estimated coefficients of AGEINCOR are consistently negatively signed. This is the same as in the yearly analysis of Table 4.5, only now AGEINCOR appears significant in six out of eight cases[43]. In contrast, in Panels C and F of Table 4.6, when SIZE/SIZE2 is replaced by the SMALL and LARGE dummies, the estimated coefficients on AGEINCOR become positive and significant at the 5 percent significant level. As mentioned above, however, this could be a reflection of the influence of the omitted size variable. Indeed, the alternative age variable, AGELIST, measuring age since listing on the Mauritius Stock Exchange, is also positively and significantly related to the dependent variable in all the regressions that include SMALL

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[42] Evidence of omitted variable problem when SIZE/SIZE2 is omitted is weaker in Panel D of Table 4.8 when the dependent variable is LOGLEV.

[43] Compared with the yearly analysis of Table 4.5, where it is significant in only one out of sixteen regressions, in which it is included.

and LARGE.

The LEVERAGE regressions in Panels A, B, and C of Table 4.6 also replace the age since incorporation variable, AGEINCOR, by the alternative measure, RESAGE (the residuals from a regression of AGEINCOR on the rest of the explanatory variables). Also here, the estimated coefficients on RESAGE are consistently negative in the SIZE/SIZE2 regressions (Panels A and B) and also significant in half of the cases. However, unlike in the case of both AGEINCOR and AGELIST, the estimated coefficients on RESAGE remain negative, although insignificant, when SMALL and LARGE replace SIZE/SIZE2 in Panel C of Table 4.6. This could be interpreted as evidence that using RESAGE has succeeded in eliminating the correlation between the size and age variables. This implies that, compared with AGEINCOR, the estimated coefficients of the age variable, RESAGE, better reflect the separate influence of firm age since incorporation, on its capital structure.

The firm age since listing on the official market, AGELIST, appears to be less important and its relation with the dependent variable less clear compared with AGEINCOR. When SIZE/SIZE2 is included, AGELIST is consistently negatively related to LEVERAGE (Panels A and B of Table 4.6) but weakly significant in only two out of eight regressions. In the LOGLEV regressions that include SIZE/SIZE2 (Panels D and E of Table 4.6), the estimated coefficients on AGELIST become insignificant and positive.

Similar to the results of the yearly analysis, the importance of firm profitability in determining capital structure and thus the nature of the relationship between leverage and profitability is unclear from the panel data procedure. The estimated coefficients on AVPROFIT, in Table 4.6, are negatively signed in twenty-two out of twenty-four regressions. However, AVPROFIT appear significant at the 5 percent significance level in only two cases. Further, when AVPROFIT is replaced by RESPROF, the residuals from a regression of AVPROFIT on the rest of the explanatory variables, the sign on the estimated coefficients become positive and in one case also weakly significant.

GROWTH, the variable measuring the firm growth potential is positively related to the dependent variable under all specifications. It also appears to be an important determinant of the firm capital-structure decision, as it is significant in all but two of the thirty-six regressions of Table 4.6. This is in contrast to the findings from the yearly analysis of Table 4.5, where GROWTH is shown to be inconsistently signed and largely insignificant. These findings reinforce the strong evidence, as reflected in the positive sign of the estimated coefficients of the firm size variables, in support of the importance of control considerations.

The firm risk measure (obtained from the residuals in a regression of daily prices on time) is consistently negatively related to the dependent variable as predicted. This result holds whether risk is measured by RISK (the mean of the absolute residuals) or by ARISK (the mean of the squared residuals). This contrasts with the results of the yearly analysis where the nature of the relationship between leverage and risk could not be established. However, the risk variable is not shown to be an important determinant of leverage. RISK is always insignificant in Table 4.6, while ARISK is significant in only two of eighteen regressions in which it is included.

ASSETS, the variable measuring the firm asset structure, is negatively and highly significantly related to the dependent variable in all the models of Table 4.6. This is consistent with the results of the yearly analysis, and with the agency theory rationale under which debt is a monitoring device used when assets are difficult to monitor. It is, however, inconsistent with the trade off theory and with an alternative agency explanation as detailed in Table 4.2.

Also inconsistent with expectations is the negative sign on the estimated coefficient of the variable measuring the non-debt tax shield. This variable is alternatively measured by TXSHIELD (the ratio of depreciation to assets), RESTAX (the residual from the TXSHIELD auxiliary regression) and by LOGTAX (the logarithmic transformation). Regardless of the proxy used, the non-debt tax shield is positively related to the dependent variable in thirty-four out of thirty-six cases. However, similar to the findings from the yearly analysis, it is significant in only third of all regressions.

The panel data procedure lends strong support for the notion that DEBTORS is negatively and significantly related to the dependent variable. Under all the specifications of Table 4.6, DEBTORS appear highly significant at the 1 percent significance level with negatively signed estimated coefficients. This is opposite to the prediction of Section 4.3.2.

In contrast, as expected, the SMALL and LARGE dummies in Panels C and F of

Table 4.6, are respectively negatively and positively related to the dependent variable. However, SMALL is weakly significant in only two out of twelve regressions, while LARGE appears more important, being significant in half of the twelve regressions in which it is included. For the benefit of clarity, Table 4.9 summarises the main results of both the yearly analysis and the panel procedure, while conclusions are discussed next.

4.7 Conclusions and promising research ideas

As emerges from Table 4.9 the results, in particular from the panel data procedure, seem to support the predictions[44]. It is illustrated that the factors previously found to be important in determining the capital structures of firms in other countries, have similar influence on the capital structures of non-financial, listed Mauritian firms. The main conclusions are as follows.

The age of the firm since incorporation appears more important to the capital structure decision than age since listing on the Mauritius Stock Exchange. This can be expected considering the recent origin, small size, high volatility and lack of sophistication of the Exchange. Consistent with pecking order theory the empirical results indicate that as firms mature, information problems are reduced, allowing firms to increase their reliance on the capital market for equity.

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[44] As the panel data procedure is deemed more robust compared with the yearly analysis, it is the results from the former approach on which the following conclusions are chiefly based. See also footnote 37.

Table 4.9 Summary results of the empirical analysis

Variable	Sign predicted	Estimated coefficient from the yearly regressions	Estimated coefficients from the panel procedure
CONSTANT	(?)	• Consistently negative. In the LOGLEV regression it is also significant in 9 out of 16 cases.	• Consistently negative and highly significant at the 1 percent significance level
Age of firm AGEINCOR	(-) pecking (+) trade off	• Excluding 2 cases, it is always negative regardless of whether the dependent variable is LEVERAGE or LOGLEV. It is, however, only significantly negative in one case.	• When combined with SIZE/SIZE2 it is consistently negative and significantly so in 6 out of 8 cases. • When combined with SMALL & LARGE it is consistently positive and significant.
RESAGE		• Not included	• Consistently negative. Highly significant in 2 of 6 cases.
AGELIST		• Consistently negative but never significant	• In the LEVERAGE regressions it is negative when combined with SIZE/SIZE2 but significant in only 2 of 8 regressions. • When combined with SIZE/SIZE2 in the LOGLEV regressions it is consistently insignificantly positive. • When combined with SMALL & LARGE it is consistently positive and significant regardless of the dependent variable.
Size of firm SIZE/ SIZE2	(-) pecking (+) trade off/ control	• Consistently positive but insignificant in 12 out of 32 cases. (Only SIZE is included)	• Consistently positive and highly significant at the 1 percent significance level.
SMALL		• Not included	• Consistently negative. Weakly significant in 2 of 12 cases
LARGE		• Not included	• Consistently positive. • When the dependent variable is LOGLEV it is consistently significant. In the rest of the cases it is highly significant in 2 out of 8 cases
Profitability AVPROFIT	(-) pecking (+) trade off (+/-) agency	• Never significant and inconsistently signed.	• In the LEVERAGE regressions it is consistently negative and significant in 2 out of 12 cases. • In the LOGLEV regressions it is negative in 10 out of 12 cases but never significant
RESPROF		• Never significant and inconsistently signed.	• Consistently positive but weakly significant in only 1 of 12 cases.
Growth GROWTH	(-) pecking/ control (+) trade off/agency	• Inconsistently signed. • Significant in 8 out of 32 cases and in 1 out of these 8 cases it is positively signed.	• Consistently positive and significant in all but 2 out of 36 cases.
Firm risk RISK/ ARISK	(-) trade off/ agency	• Inconsistently signed. • Weakly significant in only 2 out of 32 cases. • Only RISK is included	• Consistently negative • ARISK is weakly significant in 2 out of 18 cases.
Asset structure ASSETS/ LOGASSET	(+) trade off (+/-) agency	• Consistently negative. • Significant in 14 out of 32 regressions	• Consistently negative and highly significant.
Non-debt tax shield TXSHIELD	(-) trade off	• Positive in 5 out of 8 cases, and weakly significant in 1 case out of these 5.	• Positive in 10 out of 12 cases. In 4 out of these 10 it is also significant
RESTAX		• Positive in 7 out of 8 cases, but never significant.	• Consistently positive. Significant in only 4 out of 12 cases.
LOGTAX		• Consistently positive. Significant in 2 out of 8 cases.	• Consistently positive. Highly significant in 4 out of 12 cases.
DEBTORS	(+)	• Negative in 30 out of 32 cases and significantly so in 8.	• Consistently negative and highly significant.

For variable definitions see Appendix 4A; The indicated sign in the second column refers to the most likely sign as predicted in Table 4.2; The terms 'highly significant' and 'weakly significant' refer to significance at the 1 percent and 10 percent levels respectively.

Perhaps the single most unambiguous finding of this study in that size matters in firms' capital structure decisions. Indeed, in line with the trade off theory and control considerations, leverage tends to increase with size. Likewise, the strong and positive association between growth and leverage may be explained in terms of control considerations as noted in Jordan Lowe and Taylor (1998). Accordingly, the fairly concentrated nature of the ownership structure of Mauritian firms, and the predominance of family ownership, may explain the reluctance of growing firms to fund expansion by dilution of control. Alternatively, the strong and positive impact of growth on the level of debt may be explained in terms of pecking order theory. Particularly it appears that growing firms with needs for funds prefer debt to external equity, possibly due to debt being less subject to mispricing. All the same, it has to be noted that according to agency theory, growth increases the potential for debt holders' wealth expropriation by managers on behalf of owners. This, however, may be less applicable in the Mauritian case because in that environment debt comes mainly in the form of loans rather than debenture securities. It could thus be argued that close relationship with lenders reduce the scope for debt/equity conflicts.

Thus common to both firm size and firm growth is that the strong positive results for each of these variables support control consideration. However, although positive sign on growth is consistent with both pecking order and control considerations, the findings for the size variable are consistent with the latter but inconsistent with the former. Specifically, pecking order predicts that large firms should rely more on the capital market due to reduced information problems. Particularly in the case of Mauritius, where the capital market is dominated by equity securities, this should result in less borrowings by large firms. Similarly, the positive sign on the size variable is consistent with both the trade off theory and control considerations. However, if the trade off theory is valid, than growth should be negatively related to debt. Thus the combination of strong positive signs on the estimated coefficients of both size and growth distinguishes the importance of control considerations over competing capital structure theories.

The impacts of profitability and risk on the capital structure decision are not very strong. Nonetheless, the negative association between profitability and leverage is consistent with the pecking order notion that firms with sufficient internal funds tend to avoid external debt. Risk also tends to be negatively correlated with debt levels of firms and this is in line with trade off and agency considerations.

The strong and negative association between asset structure and leverage is consistent with the agency theory explanation that firms with many intangible assets, that are more difficult to monitor, tend to use debt for that purpose. However this negative link contradicts the positive prediction based on the trade off theory. Similarly the positive association between the non-debt tax shield and leverage, is inconsistent with the trade off based prediction for a negative association. These contradicting results for the asset structure and the non-debt tax shield variables may however be linked to one another and not necessarily inconsistent with the trade off theory[45].

Finally, the strong and negative association between the ratio of net debtors to leverage is inconsistent with expectations, but may be due to the way in which the dependent variable is measured[46]. All in all and in the context of Mauritian firms it may be generalised that pecking order, trade off, agency and control considerations all play an important role in determining capital structure decisions.

First, the importance of maintaining control through debt financing as opposed to external equity is strongly supported by the results for size and age. Second, the pecking order theory is strongly supported by the results for firm age and growth, and weakly supported by the results for profitability. Third, the trade off theory is strongly supported

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[45] The non-debt tax shield proxy, namely the ratio of depreciation to total assets, and the asset structure proxy, namely the ratio of fixed to total assets, are closely related. It is plausible, therefore, that blurring in what they are supposed to represent is the cause for the perverse signs on their estimated coefficients. Put differently, it is possible that the ratio of depreciation to total assets is a measure of the tangibility of assets and thus the positive association between this variable and the debt level is as predicted by the trade off theory. Similarly if the ratio of fixed to total assets, represents the availability of yearly tax allowances or other investment related tax brakes, then the negative correlation between this variable and leverage is also consistent with the trade off theory. In short, the perverse signs on the asset structure and the non-debt tax shield variables may be due to measurement problems and not inconsistent with the trade off theory.

[46] The dependent variable is measured as the ratio of total liabilities to total assets and therefore the nominator includes the value of creditors. However, while the value of creditors is added to the nominator of the dependent variable, it is deducted from the nominator of DEBTORS. Thus the negative association between leverage and net debtors may be driven by measurement problems and in particular by the opposite treatment of creditors. In retrospect a gross measure of the level of debtors would probably serve as a better measure.

by the results for size, and weakly supported by the results for risk. Forth, agency theory and the monitoring role of debt are strongly supported by the results for the asset structure, although there is also some evidence to support agency behaviour when the market for corporate control is inefficient. In particular the tendency by management to avoid the disciplinary role of debt is weakly supported by the profitability variable. Similarly, the tendency of owners to engage in wealth expropriation from debt holders, is weakly supported by the results for the risk variable.

In terms of promising research ideas, the question of whether the asset structure variable represents tangibility, or is a proxy for the availability of non-debt tax shield, clearly calls for further investigations. Similarly, more research is required to determine the role and importance of the contentious variables including the non-debt tax shield, debtors, profitability, and risk. Possible approaches to investigating these issues could be to use alternative measures to proxy for these variables or to undertake cross-country comparisons as in Rajan and Zingales (1995) or Booth Aivazian Demirguc-Kunt and Maksimovic (2001).

Another promising research idea is to investigate capital structure decisions of unlisted as opposed to quoted companies. In the context of Mauritius this approach should achieve two important goals. First the population of non-quoted companies dominate those that are quoted on the official list, thus understanding how non-quoted companies in this environment take their capital structure decisions is important. Second, extending the sample to include non-listed firms should prove beneficial given the small population of listed companies and the fact that this population is not representative of the economy as a whole.

Other extensions to this study could allow for interaction terms, industry classifications, or the addition of explanatory variables such as dividends or ownership structure. Furthermore, additional research could also help to distinguish the impact of group affiliation on the capital structure decision. Indeed, it could be argued that business groups theories have been neglected by researches particularly given their dominant role in many business environments. This last issue is taken up in Chapter 6.

Appendix 4A: Variable definitions

Dependent variable

LEVERAGE (Long term liabilities+ Short term liabilities)/ Total assets

LOGLEV Natural Log (LEVERAGE)

Age of firm

AGEINCOR Number of years since the year of incroporation (YEAR - Year of incorporation)

RESAGE The residuals from a regression of AGEINCOR on a constant, and the rest of the explanatory variables: SIZE, SIZE2, AVPROFIT, GROWTH, RISK, ARISK, ASSETS, TXSHIELD, DEBTORS.

AGELIST Number of years since the year of listing (YEAR - Year of listing)

Size of firm

SIZE Natural Log (Turnover)

SIZE2 Natural Log (Total assets)

SMALL A dummy variable to represent the smallest firms with SIZE [LN (Turnover)] value that falls in the first quarter of the sample SIZE distribution. SMALL = 1 if SIZE < 1st quartile value (19.3139).

LARGE A dummy variable to represent the largest firms with SIZE [LN (Turnover)] value that falls in the forth quarter of the sample SIZE distribution. LARGE = 1 if SIZE > 3st quartile value (20.7442).

Profitability of firm

AVPROFIT Average of [(PROFIT,t),(PROFIT,t-1),(PROFIT,t-2)].

PROFIT Profit Before Interest & Exceptional Items (PBIEI) / Total assets

RESPROF The residuals from a regression of AVPROFIT on a constant, and the rest of the explanatory variables: AGEINCOR, AGELIST, SIZE, SIZE2, GROWTH, RISK, ARISK, ASSETS, TXSHIELD, DEBTORS.

Firm growth

GROWTH	Rate of annual growth in assets over current and past 2 years. Defined as: Squared root of [(TOTAL ASSETS t) / (TOTAL ASSETS t-2)] -1

Firm risk

RISK	The mean of the absolute values of the residuals obtained from yearly regressions for each firm, i, of the form: Natural Log of (Daily adj. Price) on a constant and time
ARISK	Alternative measure of risk: The mean of the squared values of the residuals obtained from yearly regressions for each firm, i, of the form: Natural Log of (Daily adj. Price) on a constant and time

A note on the auxiliary price regressions used to obtain RISK/ARISK:

The price regressions were run for each of the 24 firms in each of the 9 years from 1992 to 2000. However, only 192 regressions were run because in 24 firm/year cases no daily price data was available. These 24 cases include: 10 firms in 1992; 7 firms in 1993; 5 firms in 1994; 2 firms in 1995. For the 192 regressions, the number of daily price observations per regression varies from 10 (one firm in 1994) to 250 (all firms in 1999). The average no. of observations per regression is 147 and the median is 146. Finally, as the year 2000 was not over when the data was collected, the no. of observations for each of the 24 regressions for the year 2000, is 26.

Asset structure

ASSETS	FIXED ASSETS / TOTAL ASSETS
LOGASST	Natural Log (ASSETS)

Non-debt tax shield

TXSHIELD	DEPRECIATION / TOTAL ASSETS
RESTAX	The residuals from a regression of TXSHIELD on a constant and the rest of the explanatory variables: AGEINCOR, AGELIST, SIZE, SIZE2, AVPROFIT, GROWTH, RISK, ARISK, ASSETS, DEBTORS.
LOGTAX	Natural Log (TXSHIELD)

Others

DEBTORS	Net debtors to assets: the ratio of debtors less creditors to total assets
TOTAL ASSETS	financial assets + inventories + other assets + investments + fixed assets = liabilities (short & long term) + deferred profit + reserves (capital & revenue) + shareholders equity (ordinary & preference)

Table 4A.1 List of the companies constituting the sample

	COMPANY NAME	YEARS INCLUDED IN DATASET	NUMBER OF YEARS	YEAR ENDING DATE	YEARS WITH NO: ACCOUNTING DATA	YEARS WITH NO: PRICE DATA
	Commerce					
1	CMPL	1992 - 1999	8	JUNE	2000	
2	COURTS (MAURITIUS) LTD	1992 - 2000	9	MARCH		
3	HAPPY WORLD FOODS LTD	1996 - 1999	4	JUNE	2000	1992 - 1995
4	HAREL MALLAC & CO. LTD	1992 - 1999	8	DECEMBER	2000	
5	IRELAND BLYTH LTD	1995 - 1999	5	DECEMBER	2000	1992 - 1994
6	ROGERS & COMPANY LTD	1992 - 1999	8	SEPTEMBER	2000	
7	SHELL MAURITIUS LTD	1993 - 1999	7	DECEMBER	1990, 2000	
	Industry					
8	GAMMA-CIVIC LTD	1995 - 1999	5	JUNE	1990 - 1992, 2000	
9	MAURITIUS BREWERIES LTD	1993 - 1999	7	JUNE	1990, 2000	1992
10	MCFI (Mauritius Chemical & Fertilizer Industry Ltd)	1992 - 1999	8	JUNE	2000	
11	MAURITIUS OIL REFINERIES LTD (MOROIL)	1992 - 1998	7	JUNE	1999, 2000	
12	MAURITIUS STATIONERY LTD	1992 - 1999	8	JUNE	2000	
13	PLASTIC INDUSTRY (MTIUS) LTD	1993 - 1997	5	JUNE	1998 - 2000	1992
14	THE UNITED BASALT PRODUCTS LTD	1992 - 1999	8	JUNE	2000	
	Leisure & hotels					
15	AUTOMATIC SYSTEMS LTD	1994 - 1999	6	JUNE	1990, 2000	1992, 1993
16	GRAND BAIE HOTEL LTD	1995 - 1999	5	SEPTEMBER	2000	1992 - 1994
17	NEW MAURITIUS HOTELS LTD	1996 - 1999	4	SEPTEMBER	2000	1992 - 1995
18	SUN RESORTS LTD	1993 - 1999	7	DECEMBER	2000	1992
	Sugar					
19	HAREL FRERES LTD	1992 - 1999	8	DECEMBER	2000	
20	MON DESERT ALMA LTD	1992 - 1999	8	DECEMBER	2000	
21	MON TRESOR & MON DESERT LTD	1992 - 1999	8	MARCH	2000	
22	SAVANNAH SUGAR ESTATES LTD	1992 - 1998	7	DECEMBER	1999, 2000	
23	THE MOUNT SUGAR ESTATES LTD	1992 - 1999	8	DECEMBER	2000	
	Transport					
24	AIR MAURITIUS LTD	1995 - 2000	6	MARCH	1990 - 1992	1992 - 1994
	TOTAL OBSERVATIONS:		**164**			

Table 4A.2 Variable means for each individual firm for the period 1992 – 2000.

Panel A: Dependent variable and age

	COMPANY NAME	Year of incorporation	Year of listing	Dependent variable		Age of firm		
				LEVERAGE	LOGLEV	AGEINCOR	RESAGE	AGELIST
	Commerce							
1	CMPL	1973	1991	0.2154	-1.5482	22.50	-22.7044	4.50
2	COURTS (MAURITIUS) LTD	1984	1990	0.4301	-0.8943	12.00	-17.5198	6.00
3	HAPPY WORLD FOODS LTD	1973	1996	0.3924	-0.9448	24.50	13.9283	1.50
4	HAREL MALLAC & CO. LTD	1956	1990	0.4071	-0.9123	39.50	7.3290	5.50
5	IRELAND BLYTH LTD	1972	1994	0.5699	-0.5625	25.00	-4.2642	3.00
6*	ROGERS & COMPANY LTD	1948	1990	0.6809	-0.3846	47.50	22.9309	5.50
7	SHELL MAURITIUS LTD	1990	1991	0.6100	-0.4991	6.00	10.6370	5.00
	Industry							
8	GAMMA-CIVIC LTD	1961	1994	0.6206	-0.4941	36.00	-8.6584	3.00
9	MAURITIUS BREWERIES LTD	1960	1993	0.1868	-1.7077	36.00	11.6619	3.00
10	MCFI	1975	1989	0.2855	-1.2625	20.50	-14.1203	6.50
11	MAURITIUS OIL REFINERIES LTD	1968	1990	0.3047	-1.2187	27.00	7.5075	5.00
12	MAURITIUS STATIONERY LTD	1966	1989	0.4416	-0.8219	29.50	-15.1294	6.50
13	PLASTIC INDUSTRY (MTIUS) LTD	1970	1993	0.5761	-0.5664	25.00	-13.9190	2.00
14	THE UNITED BASALT PRODUCTS LTD	1953	1989	0.3659	-1.0208	42.50	-1.4861	6.50
	Leisure & hotels							
15	AUTOMATIC SYSTEMS LTD	1991	1994	0.2833	-1.2664	5.50	13.3375	2.50
16	GRAND BAIE HOTEL LTD	1981	1995	0.2713	-1.3787	16.00	-4.9413	2.00
17*	NEW MAURITIUS HOTELS LTD	1964	1996	0.4184	-0.8781	33.50	-23.5656	1.50
18*	SUN RESORTS LTD	1983	1992	0.4116	-0.8948	13.00	-29.9301	4.00
	Sugar							
19	HAREL FRERES LTD	1960	1990	0.2904	-1.2669	35.50	-38.4345	5.50
20	MON DESERT ALMA LTD	1827	1989	0.1872	-1.7368	168.50	70.5409	6.50
21*	MON TRESOR & MON DESERT LTD	1926	1989	0.1151	-2.5681	69.50	24.6462	6.50
22	SAVANNAH SUGAR ESTATES LTD	1882	1989	0.1498	-1.9794	113.00	26.8789	6.00
23	THE MOUNT SUGAR ESTATES LTD	1913	1990	0.0705	-2.7253	82.50	-3.7558	5.50
	Transport							
24*	AIR MAURITIUS LTD	1967	1994	0.7045	-0.3579	30.50	-25.1171	3.50

For the years included in the calculations of means and for variable definitions see Table 4A.1 and Appendix 4A, respectively.
Unbalanced data: No. of firms = 24; Minimum no. of time observations per firm = 4; Maximum no. of time observations per firm = 9; No. of firm/year observations = 164.
* indicates a company on the list of top 7 on the Official Market by market capitalisation as at 31 October 2000.

Table 4A.2 Variable means for each individual firm for the period 1992 – 2000.

Panel B: Size, profitability and growth

		Firm size		Size dummies		Firm profitability		Firm growth
	COMPANY NAME	**SIZE**	**SIZE2**	**SMALL**	**LARGE**	**AVPROFIT**	**RESPROF**	**GROWTH**
	Commerce							
1	CMPL	18.7040	18.5723	1.0000	0.0000	0.0302	-0.0574	0.0219
2	COURTS (MAURITIUS) LTD	20.3390	20.7351	0.0000	0.3333	0.1248	0.0061	0.1825
3	HAPPY WORLD FOODS LTD	20.7136	20.4858	0.0000	0.7500	0.1164	-0.0069	0.2668
4	HAREL MALLAC & CO. LTD	20.0350	20.2785	0.0000	0.0000	0.1047	0.0074	0.1235
5	IRELAND BLYTH LTD	21.9915	22.0121	0.0000	1.0000	0.0622	-0.0202	0.1249
6*	ROGERS & COMPANY LTD	22.6430	22.6798	0.0000	1.0000	0.0847	0.0104	0.1459
7	SHELL MAURITIUS LTD	21.3543	20.5452	0.0000	1.0000	0.1245	0.0305	0.0574
	Industry							
8	GAMMA-CIVIC LTD	20.0842	20.2460	0.0000	0.0000	0.0976	-0.0330	0.2375
9	MAURITIUS BREWERIES LTD	20.2539	20.1211	0.0000	0.0000	0.1335	0.0110	0.1907
10	MCFI	20.0703	20.0345	0.0000	0.0000	0.0708	-0.0302	0.0771
11	MAURITIUS OIL REFINERIES LTD	19.5864	19.2563	0.1429	0.0000	0.0907	-0.0062	0.1392
12	MAURITIUS STATIONERY LTD	18.9103	19.3511	0.7500	0.0000	0.1136	0.0122	0.1089
13	PLASTIC INDUSTRY (MTIUS) LTD	17.7641	17.5585	1.0000	0.0000	0.1188	-0.0136	0.0439
14	THE UNITED BASALT PRODUCTS LTD	19.9517	19.9910	0.0000	0.0000	0.1409	0.0290	0.0880
	Leisure & hotels							
15	AUTOMATIC SYSTEMS LTD	19.6644	17.9346	0.0000	0.0000	0.1630	0.0033	0.0531
16	GRAND BAIE HOTEL LTD	19.1458	20.0437	0.6000	0.0000	0.2163	0.0936	0.2988
17*	NEW MAURITIUS HOTELS LTD	21.0292	22.2479	0.0000	1.0000	0.0977	-0.0036	0.2689
18*	SUN RESORTS LTD	21.0284	21.9201	0.0000	0.8571	0.1039	0.0100	0.2278
	Sugar							
19	HAREL FRERES LTD	20.4042	21.5987	0.0000	0.2500	0.0493	-0.0291	0.1589
20	MON DESERT ALMA LTD	19.4766	21.0063	0.0000	0.0000	0.0059	-0.0039	0.0624
21*	MON TRESOR & MON DESERT LTD	19.8110	20.7479	0.0000	0.2500	0.1192	0.0411	0.2980
22	SAVANNAH SUGAR ESTATES LTD	19.4734	20.9903	0.0000	0.0000	0.0448	0.0053	0.1005
23	THE MOUNT SUGAR ESTATES LTD	18.6819	20.1255	1.0000	0.0000	0.0398	-0.0163	0.1257
	Transport							
24*	AIR MAURITIUS LTD	22.4804	23.3031	0.0000	1.0000	0.0603	-0.0374	0.1857

For the years included in the calculations of means and for variable definitions see Table 4A.1 and Appendix 4A, respectively.
Unbalanced data: No. of firms = 24; Minimum no. of time observations per firm = 4; Maximum no. of time observations per firm = 9; No. of firm/year observations = 164.
* indicates a company on the list of top 7 on the Official Market by market capitalisation as at 31 October 2000.

Table 4A.2 Variable means for each individual firm for the period 1992 – 2000.

Panel C: Risk, asset structure, non-debt tax shield and net debtors

		Firm risk		Asset structure		Non-debt tax shield			Net debtors
	COMPANY NAME	**RISK**	**ARISK**	**ASSETS**	**LOGASST**	**TXSHIELD**	**RESTAX**	**LOGTAX**	**DEBTORS**
	Commerce								
1	CMPL	0.0675	0.0076	0.8220	-0.1966	0.0308	-0.0160	-3.5073	-0.1349
2	COURTS (MAURITIUS) LTD	0.1011	0.0203	0.1667	-1.8067	0.0117	-0.0118	-4.4665	0.3334
3	HAPPY WORLD FOODS LTD	0.0442	0.0031	0.5420	-0.6218	0.0322	-0.0141	-3.4407	-0.0631
4	HAREL MALLAC & CO. LTD	0.0677	0.0116	0.3582	-1.0290	0.0346	-0.0065	-3.3676	-0.0958
5	IRELAND BLYTH LTD	0.0672	0.0075	0.3909	-0.9400	0.0365	-0.0006	-3.3112	-0.2356
6*	ROGERS & COMPANY LTD	0.0918	0.0178	0.5549	-0.6172	0.0307	-0.0073	-3.7487	-0.0801
7	SHELL MAURITIUS LTD	0.0532	0.0046	0.4508	-0.8006	0.0506	-0.0157	-2.9880	-0.2924
	Industry								
8	GAMMA-CIVIC LTD	0.0689	0.0096	0.4842	-0.7404	0.0629	0.0250	-2.7889	-0.0315
9	MAURITIUS BREWERIES LTD	0.0624	0.0092	0.7241	-0.3232	0.0547	0.0046	-2.9265	-0.0362
10	MCFI	0.0416	0.0046	0.4857	-0.7332	0.0418	-0.0021	-3.1777	-0.1118
11	MAURITIUS OIL REFINERIES LTD	0.0571	0.0056	0.6343	-0.4592	0.0379	-0.0184	-3.2824	-0.2175
12	MAURITIUS STATIONERY LTD	0.0439	0.0034	0.6232	-0.4768	0.0427	0.0019	-3.1735	-0.0631
13	PLASTIC INDUSTRY (MTIUS) LTD	0.0654	0.0086	0.4690	-0.7595	0.0813	0.0197	-2.5222	-0.3278
14	THE UNITED BASALT PRODUCTS LTD	0.0604	0.0064	0.5174	-0.6598	0.0900	0.0370	-2.4104	-0.0774
	Leisure & hotels								
15	AUTOMATIC SYSTEMS LTD	0.0441	0.0035	0.7926	-0.2483	0.1099	0.0161	-2.2105	-0.1616
16	GRAND BAIE HOTEL LTD	0.0354	0.0021	0.9112	-0.0942	0.0192	-0.0153	-4.0188	-0.0918
17*	NEW MAURITIUS HOTELS LTD	0.0368	0.0024	0.9110	-0.0933	0.0208	0.0096	-3.8821	-0.0443
18*	SUN RESORTS LTD	0.0394	0.0027	0.8586	-0.1529	0.0175	-0.0021	-4.0640	-0.1116
	Sugar								
19	HAREL FRERES LTD	0.0533	0.0048	0.7801	-0.2493	0.0241	0.0130	-3.7573	-0.0111
20	MON DESERT ALMA LTD	0.0638	0.0071	0.7406	-0.3024	0.0191	-0.0037	-3.9803	0.0302
21*	MON TRESOR & MON DESERT LTD	0.0556	0.0050	0.6856	-0.3914	0.0164	-0.0128	-4.1718	0.0099
22	SAVANNAH SUGAR ESTATES LTD	0.0576	0.0047	0.6024	-0.5149	0.0171	0.0003	-4.0831	0.0597
23	THE MOUNT SUGAR ESTATES LTD	0.0784	0.0094	0.6929	-0.3763	0.0107	-0.0030	-4.6396	0.0796
	Transport								
24*	AIR MAURITIUS LTD	0.0435	0.0035	0.4665	-0.7663	0.0244	0.0164	-3.7180	0.2263

For the years included in the calculations of means and for variable definitions see Table 4A.1 and Appendix 4A, respectively.
Unbalanced data: No. of firms = 24; Minimum no. of time observations per firm = 4; Maximum no. of time observations per firm = 9; No. of firm/year observations = 164.
* indicates a company on the list of top 7 on the Official Market by market capitalisation as at 31 October 2000.

CHAPTER 5: BUSINESS GROUPS AND DIVIDEND POLICY - EVIDENCE ON INDIAN FIRMS

5.1 Introduction

Business-groups are a common feature of the Indian business environment as they are in many other emerging markets. Many of these groups started as a family business where the family has maintained controlling interests even after the business has gone public. Various explanations for the business group phenomenon in emerging markets have been suggested by various studies, some of which will be subsequently mentioned. A common explanation is that the business group structure, which typically includes firms in a wide variety of industries, has evolved in emerging markets to mitigate informational problems and other market imperfections that characterise these markets.

This chapter investigates the effect of group affiliation on the firm's dividend policy within an emerging market context. Pecking order and the transaction cost theory of dividend suggest that as internal funds are cheaper than external funds, a firm that depends more heavily on the latter will adopt a low payout policy. The gap between external and internal finance is expected to be particularly wide in emerging markets due to information asymmetry and other market imperfections. Hence dependency on external finance should be particularly important in determining the payout policies of firms in these markets.

However, it is often argued that the group structure can narrow the gap between the cost of using external and internal finance. For instance, costly external finance may be the result of an underdeveloped financial sector, which is unable to fulfil its traditional monitoring role. Here the group's headquarters may be well positioned to monitor member firms and to generate information thus substituting for inadequate financial intermediaries. The group may also be able to create internal markets, to save underwriting fees, or to secure the availability of external finance through its access to bureaucrats. Subsequently, it is hypothesised that group-affiliated firms are relatively less dependent on formal capital markets. Their dividend policies are thus less sensitive to investment needs, access to formal capital markets or to flotation cost. Instead, the dividend policies of group-affiliated firms are likely to be determined by the preferences of the controlling entity and by the cash needs of other group-members.

The contribution of this chapter is therefore threefold. First, this is one of the few empirical works that examines dividend policy decisions in the context of business groups. Specifically, the paper synthesises the theory on business groups with the transaction cost theory of dividend. Existing studies of business groups in industrial as well as emerging markets have mainly focused on the effects of group affiliation on firms' performance and value. Thus, by focusing on the dividend policies of group-affiliated firms, this chapter offers a different perspective on the implications of the business group phenomenon. Second, the chapter adds empirical evidence to the dividend policy literature, and in particular to the literature on the transaction cost theory of dividend, in the context of an emerging market. This contribution may be valuable given that most empirical studies of these issues are from developed markets. Third, the chapter contributes to the literature on business groups by looking at business groups in India (or business houses, as they are locally known), which constitute a very active and important part in the Indian business environment. Indeed, the business group structure in India is that important that ignoring this phenomenon is practically inconceivable.

The structure of the paper is as follows. Section 5.2 begins with a brief review of the transaction cost theory of dividend, followed by a review of some studies on business groups in general and in emerging markets and India in particular. Section 5.3 describes the model and presents the predictions, while Section 5.4 describes the sample and group size and diversification measures. Section 5.5 presents a comparative analysis of the payout behaviour of independent firms and firms that are affiliated with groups at various levels of diversification, and reports the results from multivariate testing and estimation. The conclusions are offered in Section 5.6.

5.2 A selective review of literature

5.2.1 The transaction cost theory of dividend

The literature on dividend policy is mainly concerned with explaining observations on the dividend practices of firms. For example Lintner (1956) observes that dividend policy is important to managers and that the market reacts positively to dividend increase announcements and negatively to decreases. Two important theories to explain these observations include the signalling and agency theories of dividend. The signalling theory of dividend emphasises the role of dividend in conveying information about the prospects of the firm. The agency theory of dividend emphasises the role of dividend in controlling agency behaviour. In both cases dividend reduce information or agency problems but the limitation of using dividend for these purposes is the firm dependency on external finance.

In the signalling models of Bhattacharya (1979) and Miller and Rock (1985) it is assumed that there is preference for internal finance and that dependency on external finance partly explains firms' dividend policies. What distinguishes between good and bad quality firms is that in the case of the former the gain from high dividend more than offset the associated cost. In Bhattacharya (1979) frictionless access to extra external financing is assumed to be unavailable, and the cost of paying high dividend is the issue cost of having to resort to outside financing to meet the dividend commitment. Thus dependency on external finance is determined by the flotation cost of raising external finance, which implies that firms that face lower issue costs are able to use more signalling. In Miller and Rock (1985) the cost of paying high dividend is the need to cut planned investment. Hence in Miller and Rock (1985) dependency on external finance, and thus the firm's dividend policy, are partly determined by the need for funds for expansion.

Moreover, dependency on external finance explicitly enters the dividend model in a number of studies. For example, in the cost minimisation model of Rozeff (1982), the optimal payout ratio is at the level that minimises the sum of agency costs and the cost of raising external finance. Similarly in Higgins (1972) the optimal payout ratio is at the level that minimises the sum of the cost of holding idle resources and the cost of issuing external finance. Hence as is implied in the signalling theories of Bhattacharya (1979) and Miller and Rock (1985), the optimal dividend policy in Rozeff (1982) and in Higgins (1972) is explicitly modelled as an inverse function of dependency on external finance.

This inverse relationship between dependency on external finance and the firm's dividend policy is referred to as the transaction cost theory of dividend. In Rozeff (1982), dependency on external finance is measured in terms of growth prospects and firm's risk. Other possible proxies for dependency on external finance include issue costs, ease of access to capital markets and the availability of surplus cash. However, regardless of how dependency on external finance is measured, the transaction cost theory of dividend is partly based on pecking order theory, information asymmetry and other market imperfections. This is the reason that the transaction cost theory should explain particularly well the dividend policies of firms that rely on capital markets that are characterised by distortions and imperfections. Indeed, these are the characteristics of many capital markets in emerging economies.

Capital markets in emerging economies are often differentiated from their counterparts in developed economies partly in terms of their effectiveness in fulfilling their intended functions. Failure in the case of the former is often attributed to high risk due to political and social instability, high transaction costs, lack of liquidity, and asymmetric information and agency problems. These problems are typically caused by lack of adequate disclosure, inappropriate trading systems, weak and erratic regulations and under-developed financial intermediaries that in efficient markets provide monitoring and market for corporate control.

Indeed, Kumar and Tsetsekos (1999) argue that the institutional infrastructure of emerging markets tend to be inferior to that in developed markets in terms of the legal, technological and regulatory framework. A comparative analysis finds the financial and corporate sectors in emerging markets to be substantially less developed compared with those in developed markets. It is suggested that this can be partly explained by their more recent origins. Similarly, Glen, Karmokolias, Miller and Shah (1995), note that the dividend levels in developing countries are substantially lower compared with developed countries. It is suggested that the lower dividend level could be a reflection of less efficient markets, leading to greater reliance on internal finance. The study also finds evidence in a group of developing countries of a positive relationship between payout rates and the fraction of total investment that is financed by retained earnings. This is taken as another indication of a relationship in developing countries between dividend policy and the gap between external and internal finance[1].

Consistent with the above discussion and particularly with Glen, Karmokolias, Miller and Shah (1995) the dividend policies of firms in emerging markets should be

[1] Appendix 5A, Note (1) presents further details on the study by Kumar and Tsetsekos (1999), while Note (2) has details on the study by Glen, Karmokolias, Miller and Shah (1995).

particularly sensitive to dependency on external finance. Thus the first hypothesis in this study is that a transaction cost model of dividend should have a good fit when applied to firms from an emerging market. However, the business environment of many emerging economies are characterised by business groups, hence it is important to understand this organisational structure and its implications for the first hypothesis.

5.2.2 Business group theories

From corporations' point of view, one important function of the capital market is to provide a source of capital. As noted in Glen (1994), this is particularly important in emerging markets as often these are characterised by shortage of capital. Hence ineffective capital markets are particularly critical in environments where they are most likely to be found, and this is often stated as the reason for one feature common to these environments, namely the business group.

A business group is a collection of independent firms from various industries that are linked together either formally or informally. A formal link is achieved through cross shareholding where firms in the group hold the shares of other members. An informal link may include family or other social ties such as religion or ethnicity, or where firms in the group share common directors. This definition is based on the definition in Granovetter (1995), but draws from various other studies as is highlighted in the following discussion.

Granovetter (1995) proposes that the link between firms in a business group is stable but at the intermediate level. Thus each individual firm in the group is an independent legal entity with a separate management and board of directors. It is noted that most American conglomerates do not fall into the business group category. This is because subsidiaries are acquired on financial grounds thus the typical American conglomerate structure is unstable and the link among subsidiaries is weak. It is further noted, however, that other conglomerates, such as the Korean chaebol, can be classified as business groups because stable operational and social links are formed among all member firms.

Leff (1976) is one of the first studies to analyse the role of business groups, in mitigating capital market distortions. It is argued that the group structure provides a mechanism for pooling and mobilising managerial talent and technical knowledge, and that group diversification increases the flow of information thus reducing risk. Moreover, Leff (1976) argues that the group structure provides an efficient internal capital market, which is possible due to the group's superior access to resources. This access is achieved through the large proportions of corporate shares, which groups in emerging markets typically hold and which entitle them to large proportions of corporate profits. Further, groups' returns tend to be relatively high due to their monopoly power, and they also have access to large parts of private savings as they are typically connected to wealthy families.

Thus according to Leff (1976) the group structure performs the functions of a capital market when the capital market is distorted, as is often the case in emerging markets. This theory referred to as the market failure theory, and although not the only theory to explain the business group phenomenon, it is the more popular reason cited in the literature. However, before expanding further on the market failure theory it is worth mentioning some of the competing views on the economic problems that have led to the creation of business groups.

Guillen (2000) discusses four theories to explain the importance of business groups in emerging markets including market failure, social structure, state autonomy, and the resource-based view. The first theory is the market failure theory, which, as mentioned above, explains the importance of business groups by the absence of well-functioning markets. The second theory is the social structure theory, which suggests that business organisations tend to correspond to the social structure in which they operate. Thus the business group organisation is typical of an autocratic social structure.

The third theory suggested by Guillen (2000) is the state autonomy theory which relates business groups to the level of autonomy of states and to the level of corruption. Khanna and Palepu (2000b) refers to this theory as political economy or the rent-seeking view[2]. Accordingly business groups seek economic rent through exchanging bribes and political support in exchange for favours such as escaping curbing regulations. Further,

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[2] Brealey and Myers (2000) explain the concept of economic rent as profits in excess of the competitive level which when discounted give the Net Present Value of a project. It is explained that when an industry settles into long-run competitive equilibrium, its assets are expected to earn their opportunity cost of capital. Profits that more than cover the opportunity cost after the firm has settled into long-run competitive equilibrium, may arise if the firm has monopoly or market power.

Khanna and Palepu (2000b) note that favours are rare and costly since the risk to bureaucrats of getting caught increases with the number of favours granted. Diversified groups are the main recipients of these favours because they have greater opportunities to benefits from them.

The fourth theory suggested by Guillen (2000) is the resource-based view which explains the importance of the business group structure in terms of access to resources. In particular the resource-based view suggests that some entrepreneurs and firms posses the skills required for repeated entry into new industries. These skills become valuable when government policy make access to resources difficult, such as when foreign trade and investment policies are asymmetric. In such circumstances, those possessing the skills required for repeated entry into new industries will employ these valuable assets, leading to the creation of the business group.

Utilising data on the top ten business groups from nine emerging markets, Guillen (2000) finds strong support for the resource-based view. Further though weaker support is also reported for the role of corruption (political economy theory) in explaining the importance of business groups. The results for the other theories, including the market failure theory and the social structure theory, are significant but bear the opposite sign to that predicted[3].

In spite of the rejection in Guillen (2000) of the market failure theory, the idea in

[3] Appendix 5A, Note (3) gives details on the empirical procedure and results of Guillen (2000).

Leff (1976) that the group structure mitigates capital market failures by forming internal capital market is supported by other studies. Particular attention has been paid to the value of diversified business groups in emerging markets. For example, Chang and Choi (1988) point to the importance of the Korean business group, the chaebol, in improving the performance of affiliated firms. The chaebol structure consists of legally independent firms that are often owned and controlled by a single family, where the top groups are typically integrated both vertically and horizontally. Chang and Choi (1988) show that firms that are affiliated with these top groups can increase their profits. This is explained by the ability of the group structure to overcome market distortions, such as high government intervention policies. It is suggested that the horizontally integrated group can create a pool of funds from affiliated firms and reallocate these funds according to investment opportunities. This can be valuable when investment opportunities arise in an area considered by government to be of low priority, leading to difficulties in accessing formal capital markets[4].

Claessens, Djankov, Fan and Lang (1999) propose that when external markets are distorted the combination of group-affiliation and firm-level diversification offers the lowest cost method of obtaining resources. They find that diversification, in high-income

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[4] Chang and Choi (1988) also point to the importance of vertical integration, a strategy which the top groups typically adopt, as a means of controlling inefficiencies in intermediate markets. Particularly, by integrating up and down the production and distribution stages, the group can avoid the problem, which is common in developing countries, when the market for intermediate goods is controlled by monopolies or oligopolies. Further details for the Chang and Choi (1988) study are given in Appendix 5A, Note (4).

economies, has an adverse effect on excess value as the cost of diversification exceeds its benefit. This may be due to efficient intermediaries that reduce information and contracting problems thus reduce transaction costs for products, labour, and capital. However, it is found that diversification in low-income economies has a positive effect on excess value and this positive effect is particularly strong for group-affiliated firms[5].

The benefits from diversification in emerging markets is also the subject of Khanna and Palepu (2000b), who look at the case of Chile over the period 1988 to 1996. In particular the study seeks to distinguish between benefits that are due to affiliation with a diversified group, and benefits from group affiliation that are non-diversification-related. It is noted that non-diversification related benefits from group affiliation could be due to social links amongst member firms. Such links reduce transaction costs by encouraging information dissemination among group firms, and by providing low cost mechanism for resolving disputes and solving contracting problems. Indeed, after group-diversification is controlled for, Khanna and Palepu (2000b) find evidence of non-diversification related benefits from group affiliation.

Further, consistent with Claessens, Djankov, Fan and Lang (1999) diversification is also found to be important, with a curvilinear relationship between firm performance and the level of group diversification. Khanna and Palepu (2000b) suggest that once group diversification exceeds a threshold level, the mainly fixed costs that are associated

[5] Appendix 5A, Note (5) contains further details on the study by Claessens, Djankov, Fan and Lang (1999).

with diversification are more than offset by the benefits obtained. Particularly, once diversification exceeds a threshold level the group is able to enjoy a stable collective cash flow and an internal managerial labour market to meet the needs of the group. Alternatively the curvilinear relationship between firm performance and the level of group diversification is explained in terms of political economy or the ability of well diversified groups to accrue economic rents.

Khanna and Palepu (2000b) further assess the extent to which group affiliation effects change over time as the institutional context changes. It is hypothesised that liberalisation programmes and the introduction of democracy in Chile in 1990 should gradually bring about changes that reduce the benefits of group affiliation. These changes include more free flow of information, better enforcement of contracts and the gradual emergence of efficient intermediaries in the economy. Indeed it is found that the group diversification threshold above which firm performance increases, rises over time. Further, there is also evidence that non-diversification related benefits from group affiliation tend to diminish over time[6].

There are two important points that emerge from Khanna and Palepu's (2000b) study of Chilean business groups. First, it is shown that benefits from group affiliation tend to diminish over time, ant it is suggested that this is due to the gradual change in the institutional context, which alters the value-creating potential of business groups. Indeed,

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[6] Details of the empirical procedures and results in Khanna and Palepu (2000b) are given in Appendix 5A, Note (6).

Khanna and Palepu (1999) note that this process is not unique to Chile, but typical of emerging markets. Second, Khanna and Palepu (2000b) show that there is curvilinear relationship between firm performance and the level of group diversification which is due to trade off between costs and benefits of group affiliation. Indeed, attention is drawn to some costs that may be associated with group affiliation. These include costs that arise from inefficient decisions by groups, which persist due to ineffective governance mechanism, and the costs of creating co-ordinating mechanism between member firms. Further, it is noted that obtaining favours from bureaucrats is costly as are the additional conflicts of interests that arise between minority and controlling shareholders.

The last point, namely conflicts of interests within business groups is also addressed in Khanna (2000), who reviews the theoretical and empirical work on the role of business groups in emerging markets. Specifically, Khanna (2000) acknowledges that group affiliation enhances value due to the ability of the group structure to substitute for missing formal institutions. However, it is also acknowledged that the group structure can reduce value through the potential for minority shareholders' exploitation. In particular, even though group-affiliation may contribute to firm's efficiency, the risk for minority shareholders is that the gains will not accrue to them. Hence the presence of a controlling shareholder leads to conflicts of interests between controlling and minority shareholders and results in a discount in the value of the firm. These two conflicting implications of group affiliation for firms are also investigated in Khanna and Palepu (2000a) in the special case of the Indian business houses.

Khanna and Palepu (2000a) start by pointing to some of the benefits, of being affiliated with an Indian business house. It is suggested that the group structure may help reducing labour market problems such as lack of skilled workforce, achieve access to foreign technology, and create reputation. Specifically, group reputation can be created based on the group's track record for efficient allocation of capital, which is due to the group having access to more information or being able to shift resources amongst firms. Reputation may also relate to the ability of the controlling entity to effectively monitor and influence the behaviour of the management teams of member firms (as in the context of Shleifer and Vishny, 1986). Further, reputation may be created from the group's preferential access to bureaucrats, which can make member firms attractive to domestic and international investors. Indeed, establishing reputation can be extremely valuable as it reduces information problems and enhances access to the investment community, and in particular to international investors[7].

However, Khanna and Palepu (2000a) also note some costs that may be associated with group affiliation. For example, the potential for conflicts of interests between controlling and minority shareholders in group-affiliated firms may harm the

[7] Indeed, examining 1996 Indian data, Khanna and Palepu (2000a) find that international analysts collectively covered 180 group-affiliated firms but only 70 non-group affiliated firms. Further, a Tobit analysis of the number of analysts covering a given firm, on firm size and group affiliation shows both to be positively and significantly (at the 1 percent level) correlated with the dependent variable. Thus groups are relatively good at attracting international analysts and this in turn can further reduce information problems.

reputation of these firms. Such conflicts may arise if the controlling entity pursue objectives other than shareholder wealth maximisation, such as investment in unprofitable projects due to family or group wide considerations. Similarly, the controlling family may push for management compensation schemes or management selection procedures that are inefficient[8]. Moreover, DeAngelo and DeAngelo (2000) question the value of a large shareholder in disciplining management[9].

The empirical results in Khanna and Palepu (2000a) for India are consistent with the results in Khanna and Palepu (2000b) for Chile, and with the idea that there are both benefits and costs related to being a member of a group. In particular the results point to a quadratic relationship between firm performance and the diversification level of the group with which the firm is affiliated. At low level of group diversification, group affiliation has a negative effect on the performance of the firm. However, this relationship reverses once group diversification reaches a certain level. The findings suggest that affiliation with one of the most diversified Indian business houses add value.

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[8] Maman (1999) also points to possible conflicts of interest that may arise within business groups. Such conflicts can arise between the wish of member firms on the one hand, to maintain autonomy, and the need of the controlling entity on the other hand, to monitor the separate firms, provide long-term planning for the group as a whole, and allocate resources within the group.

[9] DeAngelo and DeAngelo (2000) study the case of a NYSE-listed firm, the Times Mirror Company (TM), which has been controlled by the Chandler family for 100 years. The study focuses on the period between 1980 and 1995, a period in which TM had experienced poor operating performance. It is concluded that the presence of a large block shareholder (the Chandler family) did not act as an effective device for disciplining management. A possible reason is stated as the personal ties that have developed between the management team at TM and the Chandler family.

In accordance with the market failure theory, this value is achieved by substituting for missing institutions and overcoming informational inefficiencies. Alternatively, in line with political economy, highly diversified business groups can create value through superior access to bureaucrats in an economy characterised by high level of government intervention and corruption[10].

Ghemawat and Khanna (1998) attempt to distinguish between these two theories, namely market failure and political economy, by studying the reaction of two of India's largest business houses following the country's 1991 policy reforms. The Indian 1991 reforms were designed to move the economy from a planned to a market model. The idea is that an immediate and strong reaction by business groups to the introduction of the reforms implies that the original role of the group structure was to distort policy rather than to mitigate informational problems. The reasoning behind this idea is as follows.

The Indian economic reforms sought to address both the distortions caused by government intervention policies and the distortions caused by informational problems. However, while intervention policies can quickly be changed, informational problems require more time. Indeed, intervention policies such as the licensing system and price and competition controls were lifted, leading to an immediate downward impact on the ability of well connected groups to distort policy through preferential access to bureaucrats. This implies that if the reason for the presence of the group structure is to

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[10] Details from the Khanna and Palepu (2000a) study are presented in Appendix 5A, Note (8).

distort policy, the reaction by groups to the 1991 reforms should be immediate and radical. In contrast, the study notes that problems concerning enforcement of disclosure rules, liquidity and settlement of trades have not completely been eliminated immediately following the introduction of the reforms. This implies that if the reason, for the development of the group structure, is informational imperfections then groups would not react immediately to the introduction of the reforms.

Ghemawat and Khanna (1998) find evidence in support of the political economy theory, which they term the policy distortion explanation for the group structure. In particular the introduction of the Indian reforms resulted in the initiation of restructuring plans by Ballarpur Industries Limited (BILT) and RPG Enterprises, the two groups studied. The restructuring included reduction in group's diversity and entry into new sectors where access to bureaucrats could still offer value. These sectors include the power generation and telecommunications where permits requirements were not lifted.

Thus while the emphasis in the literature is on the market failure theory of business groups, Ghemawat and Khanna (1998) rule in favour of the political economy theory in the case of India[11]. This chapter draws no distinction between the various theories of business groups in emerging markets, but instead the focus is on these two theories. Explicitly, it is the market failure and political economy theories of business groups together that form the basis for the hypothesised impact of group affiliation on the

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[11] Key findings and conclusions from empirical and theoretical studies of business groups, including those mentioned in Section 5.2.2 are summarised in Table 6.1 of Chapter 6.

firm's dividend decision. This hypothesis is now clarified.

The studies reviewed in Section 5.2.1 suggest that using the capital market to obtain funds in an emerging market can be problematic due to various distortions. However, as discussed in this section, within emerging markets, group-affiliated firms may have better access to finance. The group may enhance profitability, ease information problems, create reputation, form internal markets, improve access to government grants or subsidies or distort other policies through preferential access to bureaucrats. The second hypothesis[12] is therefore that the dividend policies of group-affiliated firms are less sensitive to transaction costs that relate to raising external finance in the formal capital market.

Thus, as noted in the introduction, the third contribution of this study is the linking of the transaction cost theory of dividend with business group theory. The idea is to utilise the differences between independent and group affiliated firms in India to better understand the validity of the transaction cost theory of dividends[13]. The reason for

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[12] The first hypothesis is laid out at the end of Section 5.2.1 and predicts that a transaction cost model of dividend should fit particularly well to firms from an emerging market.

[13] This is in the spirit of Dewenter and Warther (1998), who assess the signalling theory of dividend by comparing the dividend policies of US firms with the policies of Japanese firms. The hypothesis there is that in Japan, and in particular within the Japanese keiretsu structure, there are less information problems hence less need for the dividend-signalling device. Instead, due to equity cross holding among members of a group, dividend policy can be used to distribute cash among member firms. Indeed using various methodologies, including an event study, logit analysis and the Lintner model, Dewenter and Warther (1998), find that keiretsu members experience smaller price reactions to dividend change announcements

choosing India is firstly because it is an emerging market, and secondly because the Indian business houses lend themselves particularly well to empirical investigation. A description of Indian business houses, and an explanation of why they lend themselves to empirical investigation, is given in Khanna and Palepu (2000a) as follows.

First, the Indian business environment is characterised by containing several hundreds business houses but where firms are typically associated with only one group. Thus the sample size of group affiliated firms is expected to be large with no ambiguity as to group affiliation[14]. Second, while Indian firms are commonly focused, the large business houses are usually well diversified. This means that the impact of group diversification on the dividend decision can be investigated. Third, business houses dominate the Indian private sector, which also provide good rationale for investigating their behaviour. Indeed, Ghemawat and Khanna (1998) note that at the end of 1980 the top 20 business houses accounted for about 60 percent of the total Indian private sector industrial assets. It is further noted that more recently, in 1993, group-affiliated firms accounted for 89 percent of total sales and assets of listed Private Sector Indian companies.

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and that their dividends are more responsive to earnings changes. Appendix 5A, Note (9), contains further details on the study by Dewenter and Warther (1998).

[14] One caveat however, with regards the classification of firms into groups is that the Indian Business House is not an organisational structure that is legally recognised. For example, groups are not obliged to produce group-accounts and thus group affiliation in this study is based on the classification system provided by the database used.

Other important features of the Indian business houses include the nature of the link between member firms. Green, Murinde and Suppakitjarak (2001) note that direct financial relationship between firms in Indian business houses does not appear to be important. Indeed it is reported that investments by group-affiliated firms in shares and debentures of other group members, as well as inter-group liabilities, are negligible. Instead, Khanna and Palepu (2000a) observe that the link between firms in Indian groups is typically the significant block of shares held by the family associated with the group as well as common board members across the different firms in the group[15]. Granovetter (1995) further notes that the Indian business houses are characterised by multiple sources of social links among member firms including family, caste, religion, language ethnicity and region. Indeed, it is suggested that this multiple bases of solidarity are one of the sources of strength of the Indian business houses[16].

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[15] With reference to the family orientation of business groups in India, Ghemawat and Khanna (1998) state that of the top 20 business houses at the end of 1980, more than 75 percent were family-controlled. With reference to the common board membership, the role of common directors across group-affiliated firms is investigated in Maman (1999), in the context of Israel. It is suggested that in societies where the business group structure is the dominant form of organisation, common directorship is one of the means to co-ordinate and control firms in the group. Through shared directorship the group diffuses information across affiliated firms, maintains its unity, and promotes transactions between member firms. For further details refer to Appendix 5A, Note (7).

[16] Granovetter (1995) suggests that the basis of solidarity of the group may also be its weakness. For example, business groups that are bound by immigrant ethnicity are always vulnerable to hostility from the native community. For that reason, business groups may try to link with powerful groups in the government or military, or to create multiple bases of solidarity.

Thus, having established the importance of the business houses in the Indian context, and their suitability for empirical investigation, the next task is to construct the model. In particular, given the two hypotheses to be investigated, the model should link dependency on external finance, to the firm's payout ratio while allowing for a distinction between group affiliated and independent firms.

5.3 The model

The first hypothesis, as articulated at the end of Section 5.2.1, is based on the idea that the gap between external and internal finance is typically high in emerging markets. Hence the need for funds, access to capital markets, and the cost of raising external finance in the capital markets are particularly important determinants of the dividend policies of firms operating in emerging markets. The transaction cost model of dividend is formulated as follows:

$$PAYOUT_i = \alpha + \beta_1 GROW_i + \beta_2 REPUT_i + \beta_3 FLOAT_i + \beta_4 FCF_i + \varepsilon_i \qquad (5.1)$$

Where PAYOUT is the dividend payout ratio; GROW is a measure of the rate of expansion; REPUT is a proxy for the ease of access to the capital market achieved through reputation; FLOAT is a proxy for flotation cost; and FCF is free cash flow. These variables are defined in Appendix 5B.

As described in Appendix 5B the dependent variable, PAYOUT, is measured as the ratio of dividend to Profit Before Depreciation, Interest and Tax (PBDIT). The use of

PBDIT in place of the more common measure of profit after tax is to ensure firms that pay dividend when their net profit is negative are not excluded. The RHS variables in Equation (5.1) measure dependency on, access to and the cost of raising external finance in the capital markets. The first three explanatory variables namely growth, reputation, and floatation cost, are measured by alternative proxies as is now explained.

The rate of growth of the firm is measured by four proxies denoted GROW1 to GROW4. GROW1 represents past growth and is defined as the average annual growth in sales over the previous five-year period. The remaining three growth proxies, GROW2 to GROW4 measure growth expectations in terms of R&D expenditure, PE ratio and the market to book ratio respectively. Growing firms require more funds for investment, and as external finance is more expensive than internal finance, growing firms establish lower dividend policies. The direction of the relationship between the rate of growth and the payout ratio is therefore expected to be negative. Alternatively, however, it could be argued that for signalling purposes growing firms opt for high dividend to signal these opportunities, leading to a positive association between growth and payout.

The ease of access to the capital market is measured in terms of firm's reputation, which is represented by the firm size and age. REPUT1 and REPUT2 measure firm size in terms of book value of assets and market capitalisation respectively. REPUT3 measures reputation in terms of the age of the firm. A positive association between payout and reputation is predicted because firms with better access to the capital market rely less on internal funds.

The flotation cost faced by a firm when raising funds in the capital market is measured by two proxies, FLOAT1 and FLOAT2. FLOAT1 is the standard deviation of the stock's daily rate of return over the year. In line with Crutchley and Hansen (1989) firms with larger standard deviation of returns are assumed to face higher flotation cost due to higher underwriting risk premiums[17]. FLOAT2 is an inverse measure of liquidity, which is based on relative trading days. It is defined as 1 minus the ratio of the days the company's stock traded on the Bombay Stock Exchange (BSE) to the number of days that trading took place on the exchange during the year. Both FLOAT1 and FLOAT2 are expected to be inversely related to the payout ratio because the cost of raising external finance is expected to have a negative impact on the payout ratio.

Free cash flow, FCF, is calculated as the closing cash balance before dividends, scaled by total assets. It is the surplus cash that is not required for operations or for investments, and is expected to be positively related to the payout ratio because it represents the net cash flow available for dividends. It can also be argued that by using free cash flow to pay dividends, the firm saves the costs of holding idle funds and the

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[17] Crutchley and Hansen (1989) assume that flotation cost have the following structure: *(flotation cost)* = α + β *(rate of return standard deviation for the firm's common stock)* + γ *(the amount of capital raised).* It is noted that there is economies of scale in flotation cost in the sense that underwriting fees per $1 raised decrease with the size of the issue. More relevant to the approach in this study, it is noted that firms with larger rate of return standard deviation pay higher floatation cost. Crutchley and Hansen (1989) interpret this as indicating that riskier firms pay higher underwriting risk premiums. Of course, how to proxy for firm's risk is a debatable issue, and as an alternative to the rate of return standard deviation other measure such as the average variance obtained from a GARCH model of volatility could have been used.

agency costs associated with free cash flow.

Table 5.1 summarises the discussion above. Particularly the table presents the predicted signs on the estimated coefficients of the explanatory variables of Equation (5.1), that is before group-affiliation is considered.

Table 5.1 The predicted association between the payout ratio and the explanatory variables

Name	**Description**	**Predicted sign**
GROW1	Past growth. Average annual growth in sales over past five years.	(-)
GROW2	Growth expectations. Ratio of R&D expenditure to sales.	(-)
GROW3	Growth expectations. Price to earnings ratio.	(-)
GROW4	Growth expectations. Market to book ratio.	(-)
REPUT1	Firm size. Log of total assets.	(+)
REPUT2	Firm size. Log of market capitalisation.	(+)
REPUT3	Firm age. Log of number of years since incorporation.	(+)
FLOAT1	Standard deviation of the stock's daily returns over the year.	(-)
FLOAT2	1 - the ratio of relative trading days of the stock on the stock exchange	(-)
FCF	Free cash flow after paying for future investments but before dividends	(+)

Variable definitions are given in Appendix 5B.

The predictions of Table 5.1 and the transaction cost model of Equation (5.1) assume that the dividend decision can be expressed as a function of dependency on external finance. This is in line with the first hypothesis as stated at the end of Section 5.2.1. The second hypothesis, articulated at the end of Section 5.2.2, is that group affiliation mitigates formal markets' imperfections and makes dependency on external finance a less important determinant of the firm's dividend policy. To test the impact of group affiliation on the payout decision, the transaction cost dividend model of Equation

(5.1) is augmented as follows:

$$PAYOUT_i = \alpha + \alpha_1 GP_i + \beta_1 GROW_i + \beta_2 REPUT_i + \beta_3 FLOAT_i + \beta_4 FCF_i + \gamma_1 (GP\ GROW)_i + \gamma_2 (GP\ REPUT)_i + \gamma_3 (GP\ FLOAT)_i + \gamma_4 (GP\ FCF)_i + \varepsilon_i \tag{5.2}$$

Where GP is a dummy variable that equals 1 if the firm is group-affiliated and 0 otherwise, and the rest of the variables are as defined above. A full definition of each variable is given in Appendix 5B while a list of the 375 Indian business houses is given in Appendix 5C.

By including a group dummy, GP, the extended model of Equation (5.2) allows for the constant in the model to differ when the firm is group-affiliated. Furthermore, the extended model also allows for interaction terms between the group dummy variable and each of the other explanatory variables. In line with the second hypothesis, the expectation is that group-affiliation reduces reliance on formal markets. The estimated coefficients on all the interaction terms, excluding the free cash flow interaction term, are therefore predicted to have opposite signs to that on the explanatory variable on their own. These predictions are explained in more detail below.

The direction of the relationship between the rate of growth and the payout ratio is predicted in Table 5.1 to be negative. However, if groups are able to create internal markets, then the relationship between growth and payout in the case of group-affiliated firms should be weaker. This implies positive estimated coefficients on the interaction terms of the group-affiliation dummy and the growth variables, GROW1-GROW4.

Table 5.1 predicts a positive association between payout and the ease of access to the capital market as measured by REPUT1-REPUT3. However, in the case of group-affiliated firms the association between the firm's reputation and its payout ratio is predicted to be weaker. The reason is that group-affiliated firms can rely on group reputation rather than on their own reputation. Hence negative signs are expected on the estimated coefficients of the interaction terms of the group-affiliated dummy and the reputation variables, REPUT1-REPUT3.

The flotation cost variables FLOAT1 and FLOAT2 are predicted in Table 5.1 to be inversely related to the payout ratio. In the case of group-affiliated firms this relationship is predicted to be weaker because the group may be able to enjoy lower flotation costs. For example, instead of the underwritten public offer, the firm may find it more attractive to raise funds by direct offering to its dominant shareholders being the group headquarters and member firms. This would result in substantial savings as noted in Smith (1977) and in Hansen and Pinkerton (1982)[18]. Thus with respect to the

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[18] Hansen and Pinkerton (1982) note that the equity financing paradox, of why firms choose underwriting public offering over the cheaper method of non-underwritten direct offering, could be explained in terms of ownership structure. They identify all US direct offerings from the SEC Registered Offering Statistic tapes for the period January 1971 through December 1979, totalling 54 direct offers. It is then illustrated that the 13 largest direct offerings in their sample, are the equity issues of subsidiaries of American Telephone and Telegraph (ATT). It is noted that at levels of high control the direct offer amounts to passing a cheque from the dominant stockholder to the issuing firm, at very low flotation cost. If this observation is applied to the case of group-affiliated firms in India, then it implies that these firms should use the direct offering

interaction terms of the group-affiliation dummy and the flotation variables, FLOAT1, and FLOAT2, the prediction is of positively signed estimated coefficients.

Free cash flow is expected to be positively related to the payout ratio. For group-affiliated firms, the free cash flow measure includes intra-group flows. If details of intra-group cash flows (such as dividend) were available separately, this could be deducted in arriving at the surplus cash figure. Such separation of group and non-group cash flows would facilitate testing of the extent to which the dividend decision of group-affiliated firms is insensitive to free cash availability due to cash provided by the group. However, this data is not available, thus there appears to be no strong justification for predicting that group-affiliated firms would be less sensitive to free cash flow. No prediction is therefore made regarding the direction of the relationship between the payout ratio and the interaction term of the free cash flow and the group-affiliation dummy.

Equation (5.2) include the transaction cost variables, a group-affiliation dummy variable, and group-affiliation interaction terms. This extended model is applied to data from an emerging market, India, which is assumed to offer a good environment for

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route, saving underwriting fees and obtaining finance at competitive rates. It may also be reasonable to argue that flotation expenses to various government agencies should be lower for group-affiliated firms if the group exercises its preferential access to bureaucrats. However, both the notion that group-affiliated firms will opt for non-underwritten direct offering, and the notion that these firms may enjoy lower flotation fees to government agencies are merely hypotheses that require further investigation. In any event, for the purpose of this study, and based on these assumptions, the prediction is that flotation cost considerations are less likely to influence the dividend decision of group-affiliated firms.

testing the impact of business groups[19]. The next stage is the empirical procedure, which begins with a description of the sample and the construction of group size and diversification measures.

5.4 The sample and group size and diversification measures

5.4.1 The sample

The data are retrieved from PROWESS database provided by the Centre for Monitoring the Indian Economy (CMIE) and updated to 22 March 2001. The initial data set includes the universe of all quoted and unquoted Indian Private Sector firms available on PROWESS, totalling 6,548 firms, and comprising 4,506 independent firms and 2,042 group affiliated firms. Thus over 30 percent of all quoted and unquoted Indian Private Sector firms that are available on the database are group affiliated. This reinforces the point made earlier about the importance of the business houses in the Indian business environment. The 2,042 group-affiliated firms are used to construct the group size and diversification measures as discussed below[20].

[19] The suitability of the Indian business houses structure to tests of business groups theories is consistent with Khanna and Palepu, (2000a) as discussed in Section 5.2.2

[20] Thus the initial data set relates to Indian Private Sector firms, and excludes firms from the Public Sector, the Foreign Sector, or any combination thereof.

The period studied is the year ending March 2000 which may be criticised as unrepresentative and arbitrary. However, group affiliation, which is at the centre of this study, is available on PROWESS only as a data variable at a given point in time. The use of one year is therefore rationalised by the wish to avoid making the assumption that group affiliation is stable over time[21]. The selection process involved dropping some firms as follows.

Firms, which were dropped from the initial sample of 6,548 Indian Private Sector firms, include unlisted firms, financial firms, firms without the required data, and firms with a year ending date other than March 2000. Also dropped were firms with non-positive PBDIT to ensure the dependent variable is always defined and positive. This procedure resulted in a sample of 1,412 firms, which is the basis for most of the empirical procedures. The sample includes 858 independent firms, of which 533 did not pay dividend in the year 2000 and 554 group-affiliated firms, of which 232 did not pay dividend[22]. Table 5.2 presents descriptive statistics for the sample.

[21] The choice of March as the year ending date is due to the fact that majority of Indian companies have a year ending date of March, which corresponds to the Indian tax year ending. It is also worth noting that, although as discussed in Section 5.2.2 the assumption that group affiliation is stable over time may be reasonable in the case of India, also Khanna and Palepu (2000a) use a single year. A list of the Indian business houses and their types is given in Appendix 5C.

[22]Appendix 5D presents further details on the sample selection procedure.

Table 5.2 Summary statistics for the dependent and independent variables for the year ending March 2000. Number of observations is 1412 Indian firms. Variable definitions are given in Appendix 5B

Panel A: Descriptive statistics

Variable	Mean	Standard Deviation	Minimum	Maximum	Coefficient of Variation
PAYOUT	0.0594	0.0929	0.000	0.831	1.565
GROW1	0.208	0.407	-0.750	4.185	1.958
GROW2	0.00184	0.00732	0.000	0.138	3.972
GROW3	10.303	65.818	-709.780	1440.000	6.388
GROW4	1.516	8.498	-32.280	237.850	5.606
REPUT1	4.071	1.579	-0.357	10.288	0.388
REPUT2	2.427	1.987	-2.813	11.743	0.819
REPUT3	3.021	0.620	1.792	4.890	0.205
FLOAT1	0.146	0.467	0.000	15.948	3.204
FLOAT2	0.402	0.356	0.000	1.000	0.886
FCF	0.0373	0.0714	-0.700	0.757	1.911

Panel B: Correlation matrix

	PAYOUT	GROW1	GROW2	GROW3	GROW4
PAYOUT	1.000				
GROW1	0.0243	1.000			
GROW2	0.0352	-0.0130	1.000		
GROW3	0.0293	0.0153	0.0683	1.000	
GROW4	0.0452	0.0732	0.0466	0.371	1.000
REPUT1	0.142	-0.0213	0.129	0.00144	0.111
REPUT2	0.332	0.0748	0.175	0.169	0.320
REPUT3	0.147	-0.320	0.0783	-0.0224	-0.00401
FLOAT1	-0.117	0.0239	-0.0401	-0.154	-0.0137
FLOAT2	-0.237	-0.0127	-0.165	-0.0329	-0.0858
FCF	0.295	0.0593	0.0415	0.0987	0.164
	REPUT1	**REPUT2**	**REPUT3**	**FLOAT1**	**FLOAT2**
REPUT1	1.000				
REPUT2	0.783	1.000			
REPUT3	0.374	0.237	1.000		
FLOAT1	-0.107	-0.0918	-0.0851	1.000	
FLOAT2	-0.605	-0.601	-0.124	0.171	1.000
FCF	0.0413	0.254	0.0262	-0.0502	-0.171

Panel C: Variance Inflation Factors (VIF) for the explanatory variables

Details on the VIF procedure are given in Appendix 5E, Note (1).

Note	GROW1	GROW2	GROW3	GROW4	REPUT1	REPUT2	REPUT3	FLOAT1	FLOAT2	FCF
(a)	1.150	1.045	1.227	1.315	3.574	3.704	1.352	1.066	1.801	1.168
(b)	1.138	1.037	1.201	1.209	1.898		1.350	1.063	1.721	1.072
(c)	1.072	1.072	1.072	1.295		1.967	1.227	1.066	1.658	1.082
(d)	1.082	1.036	1.036	1.196			1.145	1.063	1.103	1.103

(a) Auxiliary regressions include all the explanatory variables
(b) Auxiliary regressions exclude REPUT2
(c) Auxiliary regressions exclude REPUT1
(d) Auxiliary regressions exclude REPUT1 and REPUT2

Table 5.2 is divided into three Panels A to C. Panel A presents the mean, standard deviation minimum, maximum and coefficient of variation for the dependent and each of the independent variables. The coefficient of variation is the ratio of the standard deviation to the mean. A low value indicates that the variable in question does not vary much and might not exhibit any significance if used as an independent variable in the regression. However, as can be seen from Panel A of Table 5.2, the coefficient of variation is well over 5% for all the explanatory variables.

Panel B of Table 5.2 presents the correlation matrix. Excluding the growth variables, all the other explanatory variables bear the expected relationship with the payout ratio[23]. Correlation amongst the explanatory variables is generally low although the reputation variables, REPUT1 and REPUT2, measuring reputation in terms of log of assets and log of market capitalisation respectively, appear problematic. Specifically, the correlation between REPUT1 and REPUT2 is as high as 0.78. Similarly the correlation between FLOAT2, the inverse measure of liquidity, and both REPUT1 and REPUT2 are both above the absolute value of 0.60.

To assess the degree of multicollinearity present in the sample, the variance inflation factors (VIF) for each of the explanatory variables is given in Panel C of Table 5.2[24]. As can be seen from the Table, by dropping, either REPUT1, REPUT2, or both, the VIF values reduce to below two. As both REPUT1 and REPUT2 measure reputation

[23] Compare Table 5.2 with the predictions summarised in Table 5.1.

in terms of size, in the remaining empirical procedures, the former is excluded. Use of the variable REPUT1 is made later as the basis for the weights in the heteroskedastic Tobit.

However, before turning to the multivariate analysis, the nature of the business groups represented in the sample, in terms of their size and level of diversification, is addressed. This facilitates the subsequent comparative analysis of the variable of interest, the payout ratio, across the various groups.

5.4.2 Group size and diversification measures

The conclusions from the review of selective literature on business groups (Section 5.2.2) suggest that the level of group diversification is important. In particular in the context of India, Khanna and Palepu (2000a) find a quadratic relationship between firm performance and the diversification level of the group with which the firm is affiliated. In the spirit of Khanna and Palepu (2000a) four measures of group size and diversification across industries are constructed. These measures are based on the entire Indian Private Sector group-affiliated firms including both quoted and unquoted firms and totalling 2,042 firms[25]. The comparative analysis of the variable of interest, the payout ratio, across these measures is then assessed.

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[24] Appendix 5E, Note (1), presents details on the VIF procedure.

[25] Notes on sample constructions are given in Appendix 5D.

The first group measurement is SIZE which measures the size of the group with which a firm is affiliated in terms of the number of firms in the group. The other three group measures are diversification measures including COUNT, FOCUS and HERFIND. These diversification measures are based on 13 industries and 41 sub-industries as classified by CMIE and presented in Appendix 5F. COUNT measures diversification in terms of the number of industries represented in the group. FOCUS is an inverse measure of diversification, or a concentration measure. It is defined as the ratio of the group's sales from the industry with the highest sales to total group's sales. Similarly, HERFIND is also an inverse diversification measure or a concentration measure. It is based on the Herfindahl concentration value, defined as the ratio of the sum of the squares of each industry's sales, to the squared value of total group's sales. Appendix 5B gives more detailed definitions of each of the group size and diversification measures while Table 5.3 presents summary statistics for these four measures.

Table 5.3 is divided into three panels and presents statistics on the group size and diversification measures. Panel A presents summary statistics for group-affiliated firms in the sample, while Panel B presents the correlation matrix. Just as a check, Panel C presents the group size and diversification values for the 858 independent firms. As can be seen from Panel A of Table 5.3, the number of firms in the group varies from a low of only two firms to a maximum of 110 for the top business house[26]. In the rest of the empirical procedures, the count of industries represented in the group, COUNT, is selected to represent the nature of the group with which a firm is affiliated. This is for the reasons explained below.

Table 5.3 Size and diversification measures of Indian business houses, year 2000.

Panel A: Summary statistics for the sample of group-affiliated firms
(Missing values for series: FOCUS: 48, HERFIND: 48 Number of observations: 554 – 48 = 506)

	Mean	Std. Dev	Min	Max	Median	1st Qrt	3rd Qrt	IQ range
SIZE	22.445	32.339	2.000	110.000	8.000	4.000	20.000	16.000
COUNT	8.142	7.296	1.000	24.000	5.000	3.000	11.000	8.000
FOCUS	0.669	0.254	0.227	1.000	0.691	0.463	0.931	0.468
HERFIND	0.574	0.288	0.131	1.000	0.532	0.355	0.871	0.516

Panel B: Correlation Matrix between the group size and diversification measures for 506 group affiliated firms

	SIZE	COUNT	FOCUS	HERFIND
SIZE	1.000			
COUNT	0.935	1.000		
FOCUS	-0.702	-0.786	1.000	
HERFIND	-0.674	-0.780	0.983	1.000

Panel C: Descriptive statistics for group size and diversification measures. Values for non-group affiliated firms (Number of observations: 858)

	Mean	Std Dev	Minimum	Maximum
SIZE	1.000	0.000	1.000	1.000
COUNT	1.000	0.000	1.000	1.000
FOCUS	1.000	0.000	1.000	1.000
HERFIND	1.000	0.000	1.000	1.000

SIZE = Group size, measured in terms of the number of firms in the group.
COUNT = Group diversification, measured in terms of the number of industries represented in the group.
FOCUS = Group diversification, measured as the ratio of the sales generated from the industry with the highest sales to total group's sales.
HERFIND = Group diversification, measured as the ratio of the sum of squares of each industry's sales to the squared value of total group's sales.

COUNT is the measure selected in Khanna and Palepu (2000a), and as can be seen from the correlation matrix of Panel B of Table 5.3, it is highly correlated with all the other measures. COUNT is also a superior measure of diversification compared with

[26] The top business house is the Tata group. A list of all Indian business houses is given in Appendix 5C.

FOCUS and HERFIND because it is based on all member firms rather than only those with sales data and year ending March 2000. Further, the use of either FOCUS or HERFIND results in a loss of 48 group-affiliated firms due to lack of sufficient group sales data. With COUNT as a measure of firm diversification, the number of group affiliated firms in the sample is 554, and the next stage is a comparative analysis of the payout ratios across independent and group affiliated firms.

5.4.3 Comparative analysis of the payout ratios across groups

Based on the statistics of Table 5.3, two group affiliation dummies, DG and HD are derived from the diversification measure, COUNT, and are precisely defined in Appendix 5B. DG is a group affiliation dummy that indicates affiliation with a diversified group, which is diversified over more than 4 industries. HD is a group affiliation dummy that indicates affiliation with a highly diversified group, which is diversified over more than 11 industries.[27] Table 5.4 presents the comparative analysis of the payout ratio across independent and group-affiliated firms at various levels of diversification. Panel A of

[27] The classification of groups into diversified and highly diversified is based partly on the descriptive statistics of Panel A, Table 5.3, and partly on the classification in Khanna and Palepu (2000a). The threshold of 4 industries after which the group is classified as diversified is consistent both with the median of COUNT (5) reported in Panel A, Table 5.3, and with the intermediate diversified category in Khanna and Palepu (2000a) of groups with between 5 and 7 industries. The threshold of 11 industries after which the group is classified as highly diversified is consistent with the 3rd quartile value (11) for the distribution of COUNT as reported in Panel A, Table 5.3. It is also similar to the categorisation in Khanna and Palepu (2000a) of groups with over 7 industries as most diversified groups.

Table 5.4 presents the mean and median payout values across the sub-samples of firms affiliated with the various groups. Panel B and Panel C of Table 5.4 present parametric and non-parametric tests of the difference in payout ratios across the sub samples.

Table 5.4 Payout ratios across independent and group affiliated Indian firms.
Year ending March 2000

Panel A: Comparative analysis of the payout ratio, PAYOUT, across group-affiliation categories.

			Group-affiliated		
	Full sample	**Non-affiliated**	**All group affiliated**	**Diversified** (COUNT>4)	**Highly diversified** (COUNT>11)
Observations	1412	858	554	273	116
Mean	0.0594	0.0520	0.0707	0.0783	0.0934
Median	0.000	0.000	0.0447	0.0547	0.0828
Std. Dev.	0.0929	0.0892	0.0973	0.0951	0.0926
Variance	0.00863	0.00796	0.00946	0.00905	0.00857

COUNT = Group diversification, measured in terms of the number of industries represented in the group.

Panel B: Tests for the difference in payout ratios between non-group affiliated firms and group-affiliated firms. (Tests that assume that the samples have been drawn from a normal population)

	Non-affiliated firms (858 observations) versus firms affiliated with:		
	All groups [554 firms]	**Diversified** [273 firms]	**Highly diversified** [116 firms]
H_0: $\sigma^2_1=\sigma^2_2=\sigma^2$ H_1: $\sigma^2_1 \neq \sigma^2_2$	F (553,857)=1.188804** Upper tail area .01193	F (272,857)=1.137151 Upper tail area .09069	F (115,857)=1.076326 Upper tail area .28639
Assume: $\sigma^2_1=\sigma^2_2$ H_0: $\mu_1=\mu_2$ H_1: $\mu_1 \neq \mu_2$	t (1410)=3.708863*** Two-tailed area .00022	t (1129)=4.162722*** Two-tailed area .00003	t (972)=4.663449*** Two-tailed area .00000
Assume: $\sigma^2_1\neq\sigma^2_2$ H_0: $\mu_1=\mu_2$ H_1: $\mu_1 \neq \mu_2$	t (1108)=3.640564*** Two-tailed area .00028	t (436)=4.026642*** Two-tailed area .00007	t (146)=4.534498*** Two-tailed area .00001

Significance levels based on two tail tests: **-significant at 5% level, ***-significant at 1% level.
Degree of freedoms are given in parentheses.
Test details are given in Appendix 5E, note (2)
The subscript 1 denotes the group-affiliated sample while the subscript 2 denotes the non-group affiliated sample.

Panel C: Non-parametric tests for the difference in payout ratios between non-group affiliated firms and group-affiliated firms.

	Non-affiliated firms (858 observations) versus firms affiliated with:		
	All groups [554 observations[	**Diversified groups** (COUNT>4) **[273 observations]**	**Highly diversified** (COUNT>11) **[116 observations]**
Median test	χ^2 = 55.57***	χ^2 =48.60***	χ^2 =40.65***
Mann-Whitney	Standardised U=-5.5970***	Standardised U=-5.6275***	Standardised U=-5.5695***

***-significant at 1% level
Test details are given in Appendix 5E, note (2)
Median test: Critical value for $\chi^2_{(1)}$ with upper tail area of 1% is 6.63. Therefore in all cases can reject the null of no association between group-affiliation and payout ratios in favour of some association.
Mann-Whitney U test: The rank sum is calculated for the group-affiliated sample. Critical value for Z with two tailed area of 1% is |2.575829|. Therefore in all cases can reject the null of no difference in the payout ratios of group-affiliated and non group-affiliated firms at the 1% significance level in favour of the alternative of a difference.

Two important observations are noted when looking at Table 5.4. The first is that there appear to be a significant difference in the payout ratios of independent and group-affiliated firms. In particular, as can be seen from Panel A of Table 5.4, both the mean and the median payout ratios are higher for group-affiliated firms compared with independent firms. Further both the mean and median increase with the level of group-diversification. Panels B and C of Table 5.4 show these differences to be significant. This observation is consistent with the second hypothesis put forward at the end of Section 5.2.2. This is the hypothesis that group affiliation mitigates formal markets' imperfections thus creating a substantial difference between the dividend policies of independent and group-affiliated firms.

The second observation is that there is a high proportion of firms that did not pay any dividend during the year. Indeed the median payout ratio for the full sample is zero, which implies that about half of all firms did not pay dividend (as the payout ratio is never negative by construction). This is also evident from the sample description of Appendix 5D, where it is shown that over 62 percent of independent firms and nearly 42 percent of group-affiliated firms did not pay dividend. Further, because the overall median is zero, the median test of Table 5.4, Panel C is also a test for the association between group-affiliation and the decision of whether or not to pay dividends. The rejection of the test therefore also indicates that there is an association between this decision and whether or not the firm is group affiliated.

The implication of the observation, that high proportion of firms did not pay dividend during the year, is that the dividend decision may in practice consist of two separate decisions. The first decision being whether or not to pay dividend and, providing the decision was to pay, the second decision is regarding the payout level. Another implication of the observation that the probability of a zero payout is substantially greater than zero, is that the distribution that applies to the variable of interest is a mixture of discrete and continuous distributions. The dependent variable, PAYOUT, should therefore be treated as a limited random variable.

In light of the above, the empirical procedure in the next Section will proceed as follows. In the first stage a binary choice model for the decision of whether or not to pay dividend will be considered. In the second and third stages dividend models that allow for a limited dependent variable will be tested. In all stages, however, the underlying model is the transaction cost dividend model as presented in Equations (5.1) and (5.2) of Section 5.3.

5.5 Multivariate testing and results

The empirical procedure is divided into three sub sections. The first part consists of tests on the dividend decision using binary choice models, namely Probit and Logit models. The second and third parts address the payout level decision using limited dependent variable models. In the second sub section the censored regression model, the Tobit model, is utilised while in the last sub section a Sample Selection model is tested.

5.5.1 Binary choice models for the dividend decision

In the binary choice model the value of the dependent variable is limited to two values, 1 if the decision was to pay dividend and 0 if the decision was not to pay. Thus the dependent variable is the probability of the firm deciding to pay dividend conditional on the information set specified by the RHS variables.

In this study two binary choice models were experimented with, namely the Probit and the Logit model, to give the results presented in Table 5.5. The Probit model is appropriate when the error terms in the latent variable follow a normal distribution, while the Logit is the appropriate model when these errors follow a logistic distribution. In any case, as expected, once the Logit estimated coefficients are adjusted they give very similar results to the Probit model estimation. The full Logit models are therefore not reported, although Column (7) of Table 5.5 reports the estimated coefficients obtained from the Logit model and adjusted so that they are comparable with the Probit estimated coefficients. Furthermore, McFadden's R-squared for both the Probit and Logit models are calculated and reported in Table 5.5[28].

[28] The MaFadden's R-squared is defined as *1 – (Log Lunrestricted / Log Lrestricted)*. The unrestricted log likelihood (Log Lunrestricted) is the log likelihood from the regression reported. The restricted log likelihood (Log Lrestricted) is the log likelihood when the restriction that all of the β coefficients are zero, is imposed.

Table 5.5 Probit analysis for Private Sector Indian firms for the year ending March 2000

Panel A: The full sample

Probit Estimation: **All firms**
Dependent variable: PAYOUT
Number of observations = 1412
Number of positive obs. = 647
Mean of dep. var. =0 .458215
Sum of squared residuals = 202.989
Fraction of Correct Predictions = 0.790368

R-squared = 0.421031
Scaled R-squared = 0.457705
McFadden's R-squared = 0.35832 [For Logit = 0.36082]
Schwarz B.I.C. = 664.751
Log likelihood = -624.861
LR (zero slopes) = 697.852 [.000]
LR (omitted variables, χ^2_9)* = 5.921508 [.74775]

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Parameter	**Probit Estimate**	**Standard Error**	**t-statistic**	**P-Value**	**Standardised coefficients** **	**Scaled Logit estimates** (multiplied by 0.625)
C	-2.279	0.285	-8.006	[.000]	-0.571	-2.414
GROW1	0.399	0.114	3.497	[.000]	0.100	0.438
GROW2	-13.321	6.498	-2.050	[.040]	-3.338	-14.905
REPUT2	0.313	0.035	8.945	[.000]	0.078	0.331
REPUT3	0.643	0.083	7.714	[.000]	0.161	0.688
FLOAT1	-4.175	0.588	-7.095	[.000]	-1.046	-4.734
FLOAT2	-0.411	0.140	-2.935	[.003]	-0.103	-0.466
FCF	3.593	0.656	5.476	[.000]	0.900	4.430
GP GROW1	0.750	0.312	2.403	[.016]	0.188	0.887
GP GROW3	0.008	0.003	3.045	[.002]	0.002	0.009
GP REPUT3	-0.141	0.033	-4.320	[.000]	-0.035	-0.158

Standard Errors computed from analytic second derivatives (Newton). In TSP4.5 this is the default method of calculating standard errors for PROBIT, and LOGIT; * The omitted variables include: GROW3, GROW4, GP, and the interaction terms: (GP GROW2), (GP GROW3), (GP REPUT2), (GP FLOAT1), (GP FLOAT2), (GP FCF); **marginal effects

Panel B: Non group-affiliated firms

Probit estimation: **Independent firms**
Dependent variable: PAYOUT
Number of observations = 858
Number of positive obs. = 325
Mean of dep. var. = 0.378788
Sum of squared residuals = 121.502
Fraction of Correct Predictions = 0.780886

R-squared = 0.398278
Scaled R-squared = 0.429300
McFadden's R-squared = 0.34472 [For Logit = 0.34765]
Schwarz B.I.C. = 400.038
Log likelihood = -373.020
LR (zero slopes) = 392.471 [.000]
LR (omitted variables, χ^2_2) * = 2.248916 [.32483]

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Parameter	**Probit Estimate**	**Standard Error**	**t-statistic**	**P-value**	**Standardised coefficients** **	**Scaled Logit estimates** (multiplied by 0.625)
C	-2.264	0.359	-6.312	[.000]	-0.557	-2.421
GROW1	0.379	0.118	3.223	[.001]	0.093	0.418
GROW2	-17.451	8.422	-2.072	[.038]	-4.289	-19.444
REPUT2	0.316	0.048	6.643	[.000]	0.078	0.333
REPUT3	0.626	0.101	6.184	[.000]	0.154	0.667
FLOAT1	-3.760	0.675	-5.573	[.000]	-0.924	-4.156
FLOAT2	-0.449	0.169	-2.657	[.008]	-0.110	-0.493
FCF	4.078	0.930	4.383	[.000]	1.002	5.498

Standard Errors computed from analytic second derivatives (Newton). In TSP4.5 this is the default method of calculating standard errors for PROBIT, and LOGIT; * The omitted variables include: GROW3 and GROW4; **marginal effects

Panel C: Group-affiliated firms

Probit estimation: **Group affiliated firms**
Dependent variable: PAYOUT
Number of observations = 554
Number of positive obs. = 322
Mean of dep. var. = 0.581227
Sum of squared residuals = 80.8296
Fraction of Correct Predictions = 0.801444

R-squared = 0.400889
Scaled R-squared = 0. .424851
McFadden's R-squared = 0.33421 [For Logit = 0.33789]
Schwarz B.I.C. = 272.889
Log likelihood = -250.778
LR (zero slopes) = 251.764 [.000]
LR (omitted variables, χ^2_3) * =1.546920 [.67148]

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Parameter	**Probit Estimate**	**Standard Error**	**t-statistic**	**P-value**	**Standardised coefficients** **	**Scaled Logit estimates** (multiplied by 0.625)
C	-2.250	0.474	-4.752	[.000]	-0.579	-2.302
GROW1	1.096	0.329	3.329	[.001]	0.282	1.263
GROW3	0.008	0.003	2.970	[.003]	0.002	0.009
REPUT2	0.326	0.047	6.975	[.000]	0.084	0.345
REPUT3	0.475	0.121	3.913	[.000]	0.122	0.493
FLOAT1	-5.427	1.173	-4.627	[.000]	-1.395	-6.736
FCF	3.112	0.957	3.253	[.001]	0.800	3.418

Standard Errors computed from analytic second derivatives (Newton). In TSP4.5 this is the default method of calculating standard errors for PROBIT, and LOGIT; * The omitted variables include: GROW2, GROW4 and FLOAT2; **marginal effects

Thus Table 5.5 is devoted mainly to the results from the Probit estimation, and is split into three Panels. Panel A presents the results for the full sample of 1,412 non-affiliated and group-affiliated firms, where the underlying model is that presented in Equation (5.2). Specifically, the underlying model for the full sample is the transaction cost model of dividends that includes the group affiliation dummy and the interaction terms. Panel B of Table 5.5 presents the Probit results for the sample of 858 non-affiliated firms, while Panel C is devoted to the sample of 554 group-affiliated firms. Thus in Panels B and C, of Table 5.5, the underlying model is that presented in Equation (5.1), which excludes the group-affiliation dummy and the interaction terms.

The empirical approach to the analysis is the general to specific, where insignificant coefficients are dropped one by one to give the results presented in Table

5.5. It is noted that the estimated coefficients in column (2) of Table 5.5, reflect the impact of changes in the explanatory variables on the probability of the decision to pay dividend. However, for the Probit model they are not quite the marginal effects. Instead, the marginal effects, are given in column (6) of Table 5.5 while their derivation is given in Appendix 5E, Note (3).

A number of important points arise from Table 5.5. The probability of a dividend payment appears to be influenced by the variables suggested in the transaction cost model of Equation (5.1). Further, the direction of the relationship is, in general, consistent with the expectations of Table 5.1. For the full sample as well as for the independent and group-affiliated sub samples, the probability of a dividend payment increases with the level of free cash flow, FCF, and with ease of access to the capital market as represented by size (REPUT2) and by age (REPUT3). However, age appears to have a stronger affect for independent firms compared with group-affiliated firms. This is evident from the negative interaction term, (GP REPUT3), in the full sample of Panel A of Table 5.5. It is further apparent from the lower estimated coefficient on REPUT3 in the group-affiliated sample of Panel C (0.475) compared with that in the independent firms' sample of Panel B (0.626).

Similarly flotation costs enter all models with a negative estimated coefficients as predicted. There is also some evidence of difference between group-affiliated firms and non-affiliated firms with respect to the impact of flotation costs on the dividend payment decision. Indeed, the inverse liquidity measure, FLOAT2, drops out of the model fitted to the group-affiliation sample of Panel C, Table 5.5 while it is significant in the model fitted to the non-affiliated sample of Panel B, Table 5.5. However, this evidence is weakened by two observations. First, there is no evidence of difference between group and non-group firms with respect to flotation costs in the full sample of Panel A, Table 5.5. Indeed, the two interaction terms of the group dummy and flotation costs drop out of the model. Second, the absolute value of the estimated coefficient on the volatility of returns variable, FLOAT1, is higher in the group affiliated model of Panel C (-5.427) compared with the independent firms model of Panel B (-3.760).

The growth variable GROW2, which measures growth expectations in terms of R&D expenditure, enters the equations fitted to the full sample of Panel A, and to the independent firms' sample of Panel B, Table 5.5, with large and negative estimated coefficients (of -13.321 and -17.451 respectively). This is consistent with the predictions of Table 5.1. However, the past growth in sales measure, GROW1, enters all the models of Table 5.5 with positive estimated coefficients, which is contrary to expectations. Similarly, the price to earnings ratio, GROW3, has a positive affect on the probability that a group-affiliated firm will decide to pay dividend. This is apparent from the positive estimated coefficient on the interaction term, (GP GROW3), of Panel A, Table 5.5. It is also evident from the positive estimated coefficient on GROW3 in Panel C of Table 5.5. The positive impact of the rate of growth, GROW1 and GROW3, on the probability of a dividend payment is consistent with the prediction and findings in Redding (1997). Accordingly dividends signal unobservable financial strength by managers with superior information.

To summarise the binary choice model estimations, it seems that the decision to pay dividend in the case of both independent and group-affiliated firms is greatly influenced by transaction cost considerations. There is also evidence to support the view that signalling considerations enter the dividend payment decisions of Indian firms. It appears that for both independent and group-affiliated firms, similar influences impact the probability of payment and there is no apparent distinction between the two types of firms. The next question is, therefore, whether any difference does exists with regards the decision of the dividend level between independent and group-affiliated firms.

5.5.2 Tobit analysis for the payout level decision

The transaction cost representation of Equation (5.2) models the *desired* payout level as represented by the *actual* payout level. However, the actual payout ratio, PAYOUT, of Equation (5.2) is limited in its range to non-negative values while the desired payout level could, in theory, take any value. Thus only part of the distribution of the desired payout level is observed. The first stage is therefore to decide on the appropriate regression technique for this type of limited distribution. That is, to choose between a truncated regression model and a censored regression model.

The truncated regression is the appropriate model when the assumption is of a truncated distribution. This means that observations on the desired payout ratios are only available on part of the total distribution of desired payouts, which are (in this case) at or above the value of zero. In contrast the censored regression is the appropriate model when the assumption is that the desired payout level is observed when it is at or above the value of zero. When the desired payout level is below zero, the exact desired payout level is not observed and instead what is observed is an actual payout of zero.

Based on this difference between the truncated and censored regressions, the assumption in this study is of a censored distribution, which is justified as follows. If the underlying distribution of the desired payout level is assumed to be normal, there is no explanation for the observation of relatively high frequency of zero payouts[29]. This can only be explained by assuming that some of these zero actual payouts represent negative desired payout levels. This explanation is consistent with a censored distribution.

More formally, let PAYOUT* be the unobservable latent variable representing the desired payout ratio. The actual payout ratio, PAYOUT, which is observable, equals the latent variable, PAYOUT*, when the latter is greater than zero, and zero otherwise. This is the censored (Tobit) specification because some observations on the latent variable (typically when the desired payout ratio is non-positive) are not allowed in practice.

When the variable of interest is censored the Ordinary Least Squares (OLS) methodology is inappropriate because the error term is biased. The method used to

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[29] The relatively high frequency of actual zero payouts is evident from Appendix 5D, which gives details of the sample and the fraction of firms that did not pay dividends in the period studied. Also refer to the

estimate Equation (5.2) is therefore the maximum likelihood Tobit model under the alternative assumptions of homoskedastic and heteroskedastic normal disturbances. The results, after dropping insignificant variables one by one from Equation (5.2), are given in Table 5.6.

Table 5.6 Tobit analysis of the payout level decision for the full sample, year ending March 2000

Dependent variable: PAYOUT Number of positive obs. = 647
Number of observations = 1412 Fraction of positive obs. = 0.458215
LR test for heteroskedasticity (χ^2_1) = 191.7288, Upper tail area: .00000
LR test for omitted variables in the heteroskedastic Tobit (χ^2_6)* = 3.668022, Upper tail area: .72150

	Homoskedastic Tobit			**Heteroskedastic Tobit**		
Parameter	**Estimate**	**t-statistic**	**P-value**	**Estimate**	**t-statistic**	**P-value**
C	-0.146	-3.768	[.000]	-0.181	-4.547	[.000]
GROW1	0.029	2.366	[.018]	0.024	1.879	[.060]
GROW2	-2.039	-2.132	[.033]	-1.948	-2.278	[.023]
GROW4	-0.003	-2.932	[.003]	-0.003	-4.683	[.000]
REPUT2	0.021	4.397	[.000]	0.027	6.173	[.000]
REPUT3	0.052	4.633	[.000]	0.057	4.979	[.000]
FLOAT1	-0.690	-9.259	[.000]	-0.780	-9.782	[.000]
FLOAT2	-0.043	-2.622	[.009]	-0.040	-2.514	[.012]
FCF	0.518	8.010	[.000]	0.424	7.129	[.000]
GP	0.074	1.427	[.154]	0.162	3.639	[.000]
GP GROW2	1.986	1.267	[.205]	2.689	2.289	[.022]
GP GROW4	0.002	1.805	[.071]	0.002	3.285	[.001]
GP REPUT2	-0.001	-0.189	[.850]	-0.011	-2.406	[.016]
GP REPUT3	-0.033	-2.141	[.032]	-0.049	-3.672	[.000]
SIGMA	0.140	33.048	[.000]			
LN (σ)				-1.044	-12.985	[.000]
α				-0.225	-14.194	[.000]
Schwarz B.I.C.	41.1449			-47.4668		
Log likelihood	9.62446			105.489		

Standard Errors computed from analytic second derivatives (Newton). In TSP4.5 this is the default method of calculating standard errors for TOBIT; * Omitted variable include: GROW3, (GP GROW1), (GP GROW3), (GP FLOAT1), (GP FLOAT2), and (GP FCF)

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comparative analysis of the payout ratios across independent and group-affiliated firms of Section 5.4.3 and to Table 5.4 of that section.

The results presented in Table 5.6 require some clarification. For the heteroskedastic Tobit model, the nature of the heteroskedasticity is assumed to be of the form:

$$\sigma^2_i = \sigma^2 (FIRM\ SIZE)_i^{\gamma} \tag{5.3}$$

Where FIRM SIZE is measured in terms of total assets. Taking the square root of both sides of (5.3), the equation can be expressed as:

$$\sigma_i = \sigma(FIRM\ SIZE)_i^{\gamma/2} = \sigma(FIRM\ SIZE)_i^{\ \alpha} \tag{5.4}$$

The idea is to obtained starting values for σ and α and to replace the constant sigma in the log likelihood function with the RHS of Equation (5.4). For this end the natural logs of the absolute residuals from the OLS regression are regressed on a constant and the natural log of FIRM SIZE. (It is noted that the log of firm size, that is the log of total assets, is the variable REPUT1, described in Appendix 5B). From this auxiliary regression estimates of the natural log of σ and of α are obtained and these form the starting values for the heteroskedastic Tobit[30]. The starting values for the rest of the coefficients in the heteroskedastic Tobit are obtained from the homoskedastic Tobit.

Table 5.6 reports the LR test for heteroskedasticity. This test is based on the difference between the log likelihood from the homoskedastic Tobit (the restricted

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[30] Taking the natural logs from both sides of Equation (5.4): $LN(\sigma_i) = LN[\sigma\ (FIRM\ SIZE)_i^{\alpha}] = LN(\sigma) + \alpha LN(FIRM\ SIZE_i) = LN\sigma + \alpha\ REPUT1_i$. Replacing σ_i by the absolute value of the residual from the OLS regression and running the regression on a constant and REPUT1, generates estimated coefficients for $LN(\sigma)$ and for α. These provide the starting values for the heteroskedastic Tobit.

model) and the log likelihood from the heteroskedastic Tobit. The null is of homoskedasticity, which implies that α in Equation (5.4) is insignificantly different from zero. As can be seen from Table 5.6, the null can be rejected at the 1 percent significant level. This implies that the heteroskedastic Tobit should be preferred, which is also reinforced by the lower Schwarz criterion reported in Table 5.6. Thus the following analysis is based on the results of the heteroskedastic Tobit.

According to the results in Table 5.6, the estimate of σ in Equation (5.4) is 0.352 [exp(-1.044)], and the estimate of σ_i is given by 0.352 $(\text{FIRM SIZE})_i^{-0.225}$. As in the Probit analysis the sign on the estimated coefficient of GROW1, the past growth measured in terms of sales, is positive. This positive sign, which is contrary to the prediction of Table 5.1, is interpreted also here in terms of dividend signalling theory.

Also consistent with the results of the Probit analysis, free cash flow (FCF) and reputation (REPUT2 and REPUT3) are positively related to the payout level. Further, the flotation cost variables, FLOAT1 and FLOAT2, both enter the Tobit model with negative estimated coefficients. The growth expectation measures, GROW2, which represents R&D expenditure, and GROW4, which is the market to book ratio, are also shown to be negatively and significantly related to the payout level. All these signs match the predictions of Table 5.1, thus as hypothesised, dependency on external finance appears to be an important determinant of the dividend policy of firms. This is the case at least before the interaction terms are examined.

However, the Tobit analysis of Table 5.6 shows interesting results with regard group-affiliation. In particular, the estimated coefficients on all of the group-affiliation interaction terms are generally of the same magnitude but with the opposite sign of the estimated coefficients on the individual variables. This is supportive of the idea that while these explanatory variables are good in explaining the payout level in the case of independent firms, they do not enter the decision in the case of group-affiliated firms.

In particular, while the estimated coefficient on GROW2 is -1.948, that on the interaction term, (GP GROW2) is 2.689. For GROW4 the estimated coefficient is -0.003, while for the interaction term (GP GROW4) it is 0.002. For REPUT2 and REPUT3 the estimated coefficients are 0.027 and 0.057 respectively, while for the interaction terms (GP REPUT2) and (GP REPUT3) the estimates are -0.011 and -0.049 respectively. Even the constant, estimated at -0.181 is near enough cancelled by the group dummy variable, GP, estimated at 0.162. These results lend support to the idea that the group structure narrows the gap between the cost of external and internal finance thus making the payout level decision less sensitive to dependency on the former.

To summarise, a substantial difference between independent and group affiliated firms is evident from the Tobit analysis. While the payout level decision of independent firms appears to be sensitive to all the explanatory variables suggested in Equation (5.1), this is not the case for group-affiliated firms. Indeed, the payout level of group-affiliated firms appears insensitive to growth prospects, firm size and age, (GROW2, GROW4, REPUT2 and REPUT3). However, the dividend decision of group-affiliation firms still appears to be positively influenced by free cash flows (FCF), and negatively influenced by volatility of returns and lack of liquidity (FLOAT1 and FLOAT2)[31].

Finally, also worth noting is the signalling function of dividend as represented by the significant and positive estimated coefficient on the historic growth in sales measure, GROW1. To investigate the matter further, the next sub section generalises the Tobit model to allow for selectivity bias. This is the Sample Selection model.

5.5.3 The Sample Selection model for the payout level decision

The results from the Probit analysis show that firms follow a decision process that results in them either paying or not paying dividend, so that there is self-selection by the firms being investigated. This implies that the observability of the desired payout ratios is non-

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[31] The opposite signs on the interaction terms of the group-affiliation dummy and the variables representing growth expectations (GP GROW2, GP GROW4), and ease of access to the capital market (GP REPUT2, GP REPUT3) have been predicted in Section 5.3. The impact of the interaction term between the group-affiliation dummy and the free cash flow (GP FCF) was not predicted in Section 5.3. Thus the fact that this interaction term proved to be unimportant is not inconsistent with predictions. Group-affiliated firms were also predicted in Section 5.3 to be insensitive to flotation cost but this is not supported by the Tobit results of Table 5.6. However, as noted in footnote 17, the prediction of insensitivity of group-affiliation firms to flotation cost is based on two assumptions. These include the assumption that group-affiliated firms will opt for non-underwritten direct offering, and the assumption that these firms may enjoy lower flotation fees to government agencies through preferential access. Thus the fact that the interaction terms between the group-affiliation dummy and the flotation cost variables drop out of the Tobit model casts doubt on the validity of these assumptions.

random but is determined by factors that may be correlated with it[32]. Specifically, the desired payout ratio is observed only for firms for which the explanatory and unobserved variables in the binary choice model satisfy the threshold level. However, as shown in the previous sub section, the payout level of independent and to lesser extent group-affiliated firms is also determined by the same explanatory variables and possibly by the same unobserved characteristics. Thus there is correlation between the disturbance terms of the binary choice and payout level models, and this correlation is measured by rho (ρ).

When ρ is non-zero, estimation of the payout level equation in the selected sample where the desired payout ratio is observed would result in biased coefficients. The sample selection model connects the binary choice and payout level models by estimating the correlation between their disturbances, ρ. Thus in the sample selection model the binary choice model is referred to as the selection equation while the payout level model is termed the regression equation. The sample selection procedure also estimates sigma, σ, the standard deviation of the regression equation[33].

[32] The sample may also be non-random due to the decision to exclude firms with non-positive profit. However, as explained in Section 5.3, to reduce this selection bias, profit is defined before depreciation, interest and tax.

[33] The variance (and hence σ) from the selection equation is assumed to equal unity because only the sign of the latent variable is observed. The dependent is 1 if the decision is to pay dividend and 0 if the decision is not to pay.

Table 5.7 Sample Selection Estimation for Private Sector Indian firms for the year ending March 2000
(Probit Dependent variable: PAYOUT, Regression Dependent variable: PAYOUT)

Sample of non group-affiliated firms				**Sample of firms affiliated with diversified groups**			
Convergence achieved after 5 iterations				convergence achieved after 5 iterations			
Number of observations = 858				Number of observations = 273			
Number of positive obs. = 325				Number of positive obs. = 169			
Fraction of positive obs. = 0.378788				Fraction of positive obs. = 0.619048			
Schwarz B.I.C. = 85.1252				Schwarz B.I.C. = -42.8173			
Log likelihood = -31.0883				Log likelihood = 76.4741			
LR test for omitted variables (χ^2_5) = 5.992711 Upper tail area: .30693 LR test for heteroskedasticity (χ^2_{54}) = 61.42171 Upper tail area: .22743				LR test for omitted variables (χ^2_9) = 3.408465 Upper tail area: .94588 LR test for heteroskedasticity (χ^2_{54}) = 72.97816 Upper tail area: .04362			
Parameter	**Estimate**	**t-statistic**	**P-value**	**Parameter**	**Estimate**	**t-statistic**	**P-value**
Selection equation parameters:				Selection equation parameters:			
C	-1.595	-4.821	[.000]	**C**	-1.754	-3.555	[.000]
GROW1	0.284	2.929	[.003]				
GROW2	-11.325	-2.589	[.010]				
REPUT2	0.186	4.414	[.000]	**REPUT2**	0.213	3.727	[.000]
REPUT3	0.501	5.395	[.000]	**REPUT3**	0.429	3.951	[.000]
FLOAT1	-4.231	-6.639	[.000]	**FLOAT1**	-6.576	-3.425	[.001]
FLOAT2	-0.408	-2.691	[.007]				
FCF	2.901	3.815	[.000]	**FCF**	6.672	3.985	[.000]
Regression equation parameters:				Regression equation parameters:			
C	-0.033	-0.838	[.402]	**C**	0.047	1.811	[.070]
				GROW1	-0.098	-1.792	[.073]
GROW4	-0.002	-2.406	[.016]	**GROW4**	0.003	2.861	[.004]
REPUT2	0.012	2.541	[.011]	**REPUT2**	0.011	2.465	[.014]
REPUT3	0.025	2.266	[.023]				
FLOAT1	-0.494	-5.324	[.000]	**FLOAT1**	-0.872	-4.280	[.000]
FLOAT2	-0.034	-1.733	[.083]				
FCF	0.499	6.382	[.000]	**FCF**	0.872	5.541	[.000]
$\sigma_{\text{(regression equation)}}$ and $\rho_{\text{(disturbances of selection \& regression equations)}}$				$\sigma_{\text{(regression equation)}}$ and $\rho_{\text{(disturbances of selection \& regression equations)}}$			
SIGMA	0.127	20.079	[.000]	**SIGMA**	0.104	16.828	[.000]
RHO	0.981	99.563	[.000]	**RHO**	0.981	99.849	[.000]

Standard Errors computed from analytic second derivatives (Newton). In TSP4.5 this is the default method of calculating standard errors for SAMPSEL (Sample Selection command).

Table 5.7 presents the results of the sample selection estimation for the sub sample of independent firms and for the sub sample of firms affiliated with diversified groups. The selection and regression equations that enter the sample selection model are both based on the transaction cost specification of Equation (5.1). Insignificant explanatory variables are dropped one by one to give the tested down versions presented in Table 5.7[34].

As can be seen from the LHS of Table 5.7, the results for the sub sample of independent firms are consistent with the Probit, the Tobit and the first hypothesis of this study, namely the applicability of the transaction cost model of dividend to firms in India. Indeed, all the explanatory variables in the transaction cost model of Equation (5.1) enter both the selection and regression equations with the predicted signs. Further, the null hypothesis of homoskedasticity is not rejected, and selectivity bias appears to be present as represented by the estimated value of ρ. The logical next step is to apply the sample selection model to the sub-sample of group-affiliated firms.

The results from the application of the sample selection model to the sub sample of group-affiliated firms, however, are not reported because the sample selection model does not fit well to this sub sample of firms. For example, the heteroskedasticity test rejects the null of homoskedasticity. Further, the estimated correlation between the disturbances of the selection and regression equations, ρ, is given as 1, indicating that the selection equation is dominating the model. Indeed the tested down sample selection

[34] Although not reported, the sample selection model was also run on the sub sample of all 554 group-affiliated firms. Both the selection and regression equation in this case are given in Equation (5.1) with the addition of the two dummy variables for diversified groups (DG) and highly diversified groups (HD). As explained in the next footnote, both DG and HD drop out of the regression equation but remain in the selection equation.

model for the group-affiliated firms includes 10 explanatory variables for the selection equation but only 3 for the regression equation[35].

If more variables are added to the regression equation, this may improve the fit of the sample selection model to the sub sample of group-affiliated firms. However, consistent with the Tobit results and with the hypothesis put forward, transaction cost considerations are generally not important determinants of the payout ratios of group-affiliated firms. A search for other explanatory variables, that may explain the payout behaviour of group-affiliated firms, is required but this is left for another paper.

The RHS of Table 5.7 presents the results of fitting the sample selection model to the sub sample of firms affiliated with diversified groups. The LR test for the null hypothesis of homoskedasticity is rejected at the 10 percent significant level but not at the 5 percent level. The decision of firms affiliated with diversified groups of whether to pay dividend appears to be influenced positively by reputation and the availability of free cash and negatively by flotation cost. Further, the payout level decision of these firms appears to be influenced by all the explanatory variables in the transaction cost model of Equation (5.1). Indeed, the direction of influence is as predicted in Table 5.1.

[35] The variables that enter the selection equation include the following ten variables: the constant; the growth variables (GROW1, GROW3 and GROW4); the reputation variables (REPUT2 and REPUT3); the floatation cost variable (FLOAT1); the free cash flow variable (FCF); and the two group diversification dummies (DG and HD). The variables that enter the regression equation include the following three variables: the reputation variable (REPUT2); the floatation cost variable (FLOAT1); and the free cash flow variable (FCF).

The apparent good fit of the sample selection model to the sub sample of firms affiliated with diversified groups is puzzling. As discussed in the review of selective literature on business groups (Section 5.2.2) the results in a number of studies emphasise the importance of group-diversification in determining the value of group affiliation. Most relevant is the Khanna and Palepu (2000a) study, which concludes that group-affiliation initially has an adverse affect on firm's performance, until a certain threshold of group diversification level is achieved. If the value of the group is positively related to its diversification level, than the dividend decisions of firms affiliated with diversified groups should display less sensitivity to transaction cost considerations.

Alternatively it could be argued that the value of affiliation with diversified groups comes from their efficiency, for instance in terms of management skills. It is plausible therefore, that the mangers of diversified groups are more aware of the changing environment brought about by reform and liberalisation programmes. Thus, firms that are affiliated with diversified groups react to the changing business environment by becoming more responsive to market conditions as they are aware of the diminishing value of business groups. This explanation is in the spirit of Ghemawat and Khanna (1998) who study the reaction of two of India's largest business houses following the introduction of the 1991 policy reforms (see Section 5.2.2).

To summarise, implications of the results of the sample selection model are mixed. The results with respects to the sub samples of independent and group-affiliated firms appear consistent with expectations and with earlier models. However, the results for the sub sample of firms affiliated with diversified groups are somewhat puzzling although one plausible explanation is offered. The conclusions from this and the rest of the study are summarised next.

5.6 Conclusions and promising research ideas

This study begins with a brief review of two strands of the corporate finance literature. The first strand focuses on the dividend policy puzzle and the theory of dividend, which seeks to explain the dividend decision of firms. The emphasis here is on the transaction cost theory of dividend, which explains the dividend decision in terms of pecking order and the gap between internal and external finance. The idea put forward is that dependency on external finance and the transaction cost model of dividend should fit particularly well to data from an emerging market.

The second issue addressed is business groups and theories regarding their role, particularly in the context of emerging markets. A main school of thought here is the market failure theory pioneered by Leff (1976) which asserts that the role of business groups is to mitigate market imperfections. Another school of thought, which according to Ghemawat and Khanna (1998) appears to suit particularly well the Indian case, is the political economy theory of business groups. Based on these two business group theories it is hypothesised that the dividend decision of group-affiliated firms should display much less sensitivity to transaction cost considerations compared with non-affiliated firms. Instead the payout decision of group-affiliated firms is expected to be influenced by the preferences of the controlling entity and by group-wide considerations. Table 5.8 summarises the main conclusions from the empirical procedures.

Table 5.8 Summary conclusions from the empirical procedures

Test	**Conclusions**
Comparative analysis for difference in average payout ratios across group affiliations.	1. Both the mean and the median payout ratios are higher for group-affiliated firms compared with independent firms. 2. Both the mean and median payout ratios increase with the level of group-diversification as measured by, COUNT, the number of industries represented in the group.
Binary choice (Probit/Logit) models of the dividend payment decision. The model is applied to the full sample and to the sub samples of independent and group-affiliated firms.	The decision to pay dividend in the case of both independent and group-affiliated firms is influenced by transaction cost considerations. The probability of a dividend payment: 1. Decreases with growth expectations, GROW2 (R&D expenditure) 2. Increases with ease of access to the capital market as represented by size, REPUT2, and by age, REPUT3. 3. Decreases with flotation costs, FLOAT1 and FLOAT2. 4. Increases with the level of free cash flow, FCF. There is also evidence in support of signalling theory. The probability of a dividend payment increases with the historic growth in sales measure, GROW1, and in the case of group-affiliated firms, also with the price to earnings ratio, GROW3.
Heteroskedastic Tobit model for the payout level decision. The nature of heteroskedasticity is assumed to be a function of firm size as measured in terms of assets. The model is applied to the full sample with interaction terms.	For independent firms dependency on external finance appears to be an important determinant of the payout level. The payout ratio: 1. Decreases with growth expectation measures, GROW2 (R&D expenditure), and GROW4, (market to book ratio) 2. Increases with reputation, REPUT2 (size in terms of market value) and REPUT3 (age). 3. Decreases with flotation cost variables, FLOAT1 and FLAOT2. 4. Increases with free cash flow, FCF. For group-affiliated firms the estimated coefficients on the group-affiliation interaction terms cancel the effects of: 1. The growth variables, GROW2 and GROW4. 2. The reputation variables REPUT2 and REPUT3 However, the decision does seem to be influenced by free cash flows, volatility of returns and liquidity (FCF, FLOAT1 and FLOAT2) in the predicted direction. For all firms there is evidence in support of signalling theory as the payout ratio increases with the historic growth in sales measure, GROW1.
Sample selection model of the payout level decision with self-selection. Model is applied to the full sample and to the sub samples of independent firms, group-affiliated firms, and firms affiliated with diversified groups	1. For independent firms there is evident of selectivity with all the explanatory variables entering both the regression equation and the selection equation with the expected signs. (GROW1 enters the selection equation with a positive sign) 2. For group-affiliated firms the selection equation appear to dominate the regression equation (the estimate of ρ, is 1). 3. For firms affiliated with diversified groups there is evident of selectivity with all but the growth variables represented in the selection equation with the predicted signs. All variables are also represented in the regression equation with the predicted signs apart of GROW4, which enters with a positive sign. The good fitness of the sample selection model to the sample of firms affiliated with diversified firms is puzzling. According to the hypothesis of Section 5.3, the expectation is that firms affiliated with diversified groups are less sensitive to transaction cost considerations. Hence proxies for these considerations are not expected to be good at explaining the payout ratio of these firms.

As can be seen from Table 5.8, the comparative analysis points to a significant difference in the payout behaviour of independent and group-affiliated firms. Further, there appear to be a direct relationship between the level of diversification of the group and its payout decision. However, although the payout median test suggests that there is an association between the decision to pay dividend and whether the firm is group-affiliated, this is not supported in the binary choice models. Indeed, conclusions from the Probit analysis are that the decision to pay dividend in the case of both independent and group-affiliated firms is influenced by transaction cost considerations.

The conclusions from the regression models of the payout level decision are different to those from the binary choice models. In particular, the Tobit regression points to clear differences in the dividend behaviour of independent and group-affiliated firms. While the payout ratios of independent firms tend to decrease with growth prospects and increase with ease of access to the capital market, the payout ratios of group-affiliated firms appear insensitive to these factors. However, the payout ratios of all firms tend to decrease with flotation cost and increase with the availability of surplus cash. Similar conclusions also emerge from the sample selection model, although there the payout ratios of group-affiliated firms appear to increase with ease of access to the capital market as represented by firm size (REPUT2).

Overall, the study finds support for the hypothesis that group-affiliated firms enjoy smaller gap between the cost of external and internal finance and therefore their payout ratios are less responsive to dependency on the former. One puzzling result is the apparent good fit of the sample selection model to the sub sample of firms affiliated with diversified groups. It is possible that this is indicative of efficiency on behalf of diversified groups in their responsiveness to the changing Indian business environment. Another issue, which is left unanswered, is how should the dividend decisions of group-affiliated firms be modelled? These two issues are yet to be explored.

Appendix 5A: Notes on the empirical and estimation procedures of previous studies.

(1). Kumar and Tsetsekos (1999)

The study utilises IFC data from the 1994 Emerging Stock Markets Factbook. The sample includes 16 developed and 21 emerging markets. The period studied is the 13 years period from 1980 to 1992. The ratio of market capitalisation to GDP, (MVGDP), is a measure of the relative size of the capital market and is an indicator of financial sector development. The logarithm of the average real market capitalisation per firm, (RMVCO), is a measure of the size of the average firm and is an indicator of corporate sector development. Using comparative analysis the means of both MVGDP and RMVCO are found to be significantly lower (at the 1 percent significance level) for the emerging markets sample compared with the developing markets sample. The study proceeds to assess the hypothesis that the characteristics of emerging and developed markets are different by way of discriminant and Logit analyses. Indeed this proposition is supported by the results. Some of the results from the comparative analysis are as follows.

Variable	**Developed**	**Emerging**	**F test for difference in mean value**
MVGDP (financial sector)	***0.3729***	***0.1546***	***16.1800******
RMVCO (corporate sector)	***5.1568***	***2.7295***	***157.8000******

(2). Glen, Karmokolias, Miller and Shah (1995)

The study compares the payout ratio for a composite of 25 developing countries followed by the IFC with the payout ratio of a global composite index of developed countries. For the developing countries sample, the payout ratio for 1993 is 66 percent while for the emerging markets sample the payout ratio ranges from 30 to 40 percent for the period 1986-1994. The study proceeds to assess the payout rates in a group of 7 developing countries including Turkey, Thailand, Malaysia, India, Jordan, Zimbabwe and Pakistan. This comparison yields a positive relationship between the payout rates and the fraction of total investment that retained earnings represented. It is therefore suggested that in countries where firms have sufficient earnings to finance their investments and thus relatively low amounts of finance has to be raised externally, dividend rates are higher. This is consistent with pecking order considerations and with the notion that in emerging markets, firms that need capital for investment tend to adopt a conservative payout policy.

(3). <u>Guillen (2000)</u>

The study uses cross sectional Ordinary Least Squares (OLS) methodology and data on the top ten business groups from nine markets, for the year 1995. These countries include Argentina, Brazil, Colombia, India, Indonesia, South Korea, Mexico, Spain and Taiwan. The importance of business groups is regressed on a constant, on the five-year lagged proxies for the various theories to explain business groups, and on group ranking dummies. Results of one model are as follows with standard errors in parentheses and *, **, and *** indicating significance at 5, 1 and 0.1 percent respectively:

***Importance of business group = 15.84 + 0.03 financial market development* – 0.09 Power distance**

(3.33)** (0.01)** (0.02)***

- 5.27 State autonomy - 0.58 State size – 0.36 Law & order + 0.88 asymmetry in foreign investment

(1.75)** (0.16)** (0.25) (0.26)**

$R^2 = 0.67 \quad F = 9.94^{***}$

Importance of business group (relative to size of the economy) – The dependent variable. Measured as the ratio of total net sales of each group to the country's GDP.

Financial market development (-) – Proxy for market failure theory. Measured as the ratio of stock market capitalisation to the country's GDP.

Power distance (+) – Proxy for the social structure theory. Measuring the extent to which relationships in the society are based on autocratic and paternalistic assumptions.

State autonomy (+) – Proxy for the state autonomy theory.

State size (+) – Proxy for the state autonomy theory.

Law and order (-) – Inverse proxy for level of corruption. Business groups may benefit from the lack of sound political and legal institutions, a strong court system or an orderly succession of power.

Asymmetry in foreign direct investment (+) – Proxy for the resource based view. Measured as the absolute difference between z-scores for inward and outward stock of foreign direct investment.

Dummy variables – Included but not reported. Indicate the group's place in the ranking of the top 10 business groups (10^{th} place omitted).

(4). Chang and Choi (1988)

The study utilises data on 182 Korean manufacturing firms in the ten years period from 1975 to 1984. The data is subjected to a Weighted Least Squares (WLS) cross sectional regression analysis with firm size (measured in terms of average total assets) used as weights. The model is of the form:

profit = f(business group structure, control variables).

Profitability is measured alternatively as the ten-year average profit as a fraction of equity (PE) and as a fraction of total assets (PA). The group structure is represented by three dummy variables that reflect the affiliated group's level of diversification (D1, D2, D3). The control variables include proxies for firm's growth (GR), market power (CR, AD, DI), risk (VE) and size (LTA). Results show that D1, the dummy representing firms affiliated with the most diversified groups, has a significant and positive estimated coefficient with profit rate about 2 percent higher compared with other firms. D2 and D3, the dummies representing firms affiliated with less diversified groups, also have positive estimated coefficients but these are lower than in D1, and are not significant.

$$PA = 0.158^{**} - 0.004\,CR + 0.022\,GR + 0.402^{**}\,AD - 0.013^{**}\,LTA + 0.011\,DI + 0.0002\,VE + 0.018^{**}\,D1 + 0.003\,D2 + 0.001\,D3$$

$$\text{Adjusted } R^2=0.3569,\quad F=12.100$$

Where ** indicates significance at 5 percent level, and the explanatory variables are defined as follows.

PA (dependent) – Average annual rate of profit after taxes but before interest on total assets for the years 1975-1984.

CR – 3-firm concentration ratio, the percentage of value of shipment accounted for by the three largest firms in the company's principal industry as of 1977.

AD – Average advertising intensity, 10 year average ratio of advertising spending to total sales,1975-1984.

LTA – Log of the ten year average total assets between 1975-1984

GR – Average rate of growth of sales by the firm, 1975-1984

DI – Diversification index, one minus the ratio of value of shipment in the industry in which the firm has the highest value of shipment to the total value of shipment

VE – Coefficient of variation of PE where PE is the average annual rate of profit after taxes on owners' equity for the years 1975-1984

D1 – A dummy set to one when the firm is affiliated with a type 1 group. Type 1 group is completely vertically integrated and is also widely horizontally integrated. The top 4 business groups have this structure.

D2 - A dummy for type 2 group, which has a multidivisional structure (i.e. it is horizontally integrated).

D3 – A dummy for type 3 group, which does not have a multidivisional structure.

(5). Claessens, Djankov, Fan and Lang (1999)

The study uses data on 2,187 companies from nine Asian economies: Hong Kong, Indonesia, South Korea, Japan, Malaysia, Philippines, Singapore, Taiwan and Thailand. The time period is 1991 to 1996. The methodology is Ordinary Least Squares, Panel data with 9,326 firm-year observations controlling for fixed time effects. The results of one specification of the determinants of excess value, is as follows:

$$\begin{array}{l}
EXV = \underset{(0.2469)}{0.4328^{*}} + \underset{(0.0239)}{0.0388}\ HINCOME + \underset{(0.0336)}{0.1190^{***}} LINCOME \\
- \underset{(0.0163)}{0.0805^{***}}\ (GP\ DIVER\ HINCOME) - \underset{(0.0236)}{0.0093}\ (NGP\ DIVER\ HINCOME) \\
+ \underset{(0.0537)}{0.1689^{***}}\ (GP\ DIVER\ LINCOME) - \underset{(0.0678)}{0.0034}\ (NGP\ DIVER\ LINCOME) \\
- \underset{(0.0275)}{0.0272}\ OPINC + \underset{(0.0297)}{0.3874^{***}}\ LEV + \underset{(0.0037)}{0.0294^{***}}\ Log(ASSETS)
\end{array}$$

Adjusted $R^2 = 0.0331$

Standard errors are reported in parentheses, ***, ** and * denoting 1, 5 and 10 percent levels of significance respectively. Variable definitions are as follows.

EXV – The natural logarithm of the ratio of the firm's actual value to its imputed value. Actual value is the market value of common equity plus the book value of debt. The imputed value is the sum of the products of the sales in each segment of a firm by the median market-to-sales ratio for each industry in each country.

HIINCOME – The high-income-country dummy variable equals one if the firm is from Hong Kong, Singapore, Taiwan, or Japan, and zero otherwise.

LINCOME – The lower-middle-income-country dummy variable equals one if the firm is from Indonesia, Philippines, or Thailand, and zero otherwise.

GP – A dummy variable equals one if the firm is a member of a corporate group, and zero otherwise.

NGP – A dummy variable equals one is the firm is non-group-affiliated, and zero otherwise.

DIVER – A dummy variable, which equals one if the firm has multiple segments, and zero otherwise.

OPINC – A control variable for the effects of short-term profitability. Measured as operating income over sales.

LEV – A control variable for leverage. Measured as total debt to assets.

Log(ASSETS) – A control variable for firm size. Measured as the natural logarithm of firm assets.

(6). Khanna and Palepu (2000b)

The data set includes 114 public firms in Chile for the period 1988 to 1996. 34 of the firms are group affiliated while 80 are unaffiliated. Year by year as well as panel analyses were undertaken where Return On Assets (ROA) is regressed on firm size, group membership, group diversification and group diversification squared. The dependent variable, ROA is measured as *ROA = [net income + interest X (1-tax rate)] / total assets.* Results for the years 1988 and 1996, using OLS and including industry dummies, are as follows with t-ratios that are based on heteroskedasticy-consistent standard errors in parentheses. (****, ***, ** and * denoting 0.1, 1, 5 and 10 percent levels of significance respectively):

ROA (1988) = 0.010 (log of sales) + 0.138** (group membership dummy)***
(3.093) (2.082)
– 0.010 (group size in terms of number of firms)
(-0.874)
- 0.034* (group diversification in terms of number of industries)
(-1.775)
+ 0.003 (group diversification squared) – 0.126*****
(2.965) (-2.350)

*F = 13.69****, R-Squred = 0.275,*

Threshold above which group diversification creates value = 10.2 industries

ROA (1996) = 0.009* (log of sales) + 0.041 (group membership dummy)***
(3.386) (1.032)
+ 0.004 (group size in terms of number of firms)
(1.344)
- 0.034** (group diversification in terms of number of industries)
(-2.614)
+ 0.002* (group diversification squared) – 0.066***
(3.401) (-1.582)

*F = 13.26****, R-Squred = 0.292,*

Threshold above which group diversification creates value = 18.9 industries

(7). Maman (1999)

Maman (1999) investigates the role of common directors across group affiliated firms by looking at four of the most dominant business groups in Israel. The study carries a comparative analysis that spans the fourteen-year period from 1974 to 1987, and includes 33 group-affiliated firms and 30 independent firms. Common to all 63 firms, however, is that each has at least one director that is also a board member in at least one other firm in the sample in every year of the study. Directorship ties within a group are measured as the proportion of internal ties out of all of the group's ties with other firms in the sample. Maman (1999) finds that substantial proportion of directorship ties is within business groups. In particular in the case of the industrial groups, Koor and ICI, on average 84 and 75 percent respectively of total directorship ties were within the group. In the case of the cross sector groups, IDB and Clal, internal directorship ties within the group were lower although still substantial at an average of 56 and 49 percent respectively. The study concludes that common directorship is one of the means to co-ordinate and control firms in the group.

(8). Khanna and Palepu (2000a)

The study utilises data on 1,308 Indian private sector firms traded on the Bombay Stock Exchange for the year 1993. The empirical methodology is an OLS regression analysis of firm performance on group affiliation and control variables. Proxies for performance include Tobin's Q and Return On Assets. The standard errors, reported in parentheses, are corrected for heteroskedasticity and allow for correlation among firms from the same group. Results for one specification for the Tobin's Q regression are as follows with ***, **, * denoting significance at 1, 5 and 10 percent levels respectively:

$$\underset{}{\textit{Tobin's Q}} = \underset{(0.0797)}{1.2863^{***}} + \underset{(0.0219)}{0.0210}\,\textit{Log of sales} - \underset{(0.0016)}{0.0050^{***}}\,\textit{Age} + \underset{(0.0674)}{0.0062}\,\textbf{Least diversified group dummy}$$

$$- \underset{(0.1010)}{0.1491}\,\textit{Intermediate diversified group dummy} + \underset{(0.1104)}{0.2941^{***}}\,\textit{Most diversified group dummy} + \textit{Industry dummies}$$

*R-squared = 0.0560, F-statistic = 5.0100****

Tobin's Q – (market value of equity + book value of preferred stock + book value of debt) / (book value of assets)

Group diversification dummies – group diversification is measured in terms of the number of industries in the group. The least diversified group dummy captures membership of groups with 1-4 industries. The intermediate diversified group dummy captures membership of groups with 5-7 industries. The most diversified group dummy captures membership of groups with over 7 industries.

(9). Dewenter and Warther (1998)

As addition to the main procedures the study also estimates the Lintner's (1956) partial adjustment model (without the constant term). The model is estimated for each of 313 US firms and 180 Japanese firms with at least five years of non-zero dividend and earnings, in the period 1982 to 1993. The Japanese sample is divided into independent firms, hybrid structure firms and group-affiliated (Keiretsu) firms. The prediction is that the speed of adjustment coefficient for the Keiretsu sample should be higher compared with the US and independent Japanese samples. This prediction is rationalised by assuming less information problems in the case of Keiretsu members. Indeed, it is found that the median speed of adjustment for the Keiretsu sample, (0.117), is significantly higher than the medians for both the US sample (0.055) and the independent Japanese sample (0.021).

Appendix 5B: Variable definitions

PAYOUT - The ratio of dividends to Profit Before Depreciation, Interest and Tax (PBDIT).

GROW – A measure of the rate of expansion. Alternative measures include the following:

(1). GROW1 – A historic measures of growth. Defined as the average annual growth in sales over the previous five-year period. GROW1 = $(Sales_{2000} / Sales_{1995})^{1/5} - 1$

(2). GROW2 – Measures growth expectations as the ratio of R&D expense to sales.

(3). GROW3 – Measures growth expectations as the price to earnings (PE) ratio. GROW3 = Closing price to Earnings Per Share (EPS).

(4). GROW4 – Measures growth expectations as the market to book ratio, which is defined as closing price to book value per share. Book value per share is book equity divided by the number of outstanding equity shares.

REPUT – A measure of the ease of access to the capital market achieved through reputation. Alternative measures include the following:

(1). REPUT1 – The size of the firm, measured as the log of the book value of total assets.

(2). REPUT2 – The size of the firm, measured as the log of the market capitalisation.

(3). REPUT3 – The age of the firm measured as log of the number of years since incorporation.

FLOAT – The flotation cost faced by a firm when raising capital in the capital market. Alternative proxies include:

(1). FLOAT1 - Flotation costs as measured by the standard deviation of the stock's daily rate of return over the year. In line with Crutchley and Hansen (1989) firms with larger standard deviation of returns are assumed to pay higher flotation cost due to higher underwriting risk premiums. The rate of return on day t is defined as: $r_t = (p_t + g) / p_{t-1.}$ Where p_t is the closing price on day t, and g is the gains arising out of dividends or a bonus issue or a rights issue.

(2). FLOAT2 – A proxy for flotation costs which is based on the relative trading days during the year ending 31 March 2000. Measured as 1 minus the ratio of the days the company's stock traded on the Bombay Stock Exchange (BSE) to the number of days that trading took place on the BSE in the period.

FCF – The Free Cash Flow is the net cash flow available for dividends after paying for future investment. FCF = (Closing cash balance + Cash outflow on account of dividend paid) / Total assets

GROUP AFFILIATION DUMMIES – The following three measures are used to capture the nature of the business group with which a firm is affiliated. Most of the empirical analysis is based on the first measure, while the second and third measures were constructed based on group diversification measures as detailed below:

(1). GP – Group affiliation dummy that is set to one if the firm is a member of a business group and zero otherwise. The classification of firms into groups is based on the classification system of the Centre for Monitoring the Indian Economy (CMIE). The CMIE classification system is based on a continuous monitoring of the company's announcements and on qualitative understanding Indian business environment. Appendix 5C lists the name of all the Private Indian Business Houses (business groups) and their types.

(2). DG – Group affiliation dummy that indicates affiliation with a diversified group. A diversified group is defined as a group with above sample median diversification value. The diversification measure is the number of product lines represented in the group, COUNT. DG is set to 1 when the firm is affiliated with a group that is diversified over more than 4 product lines and 0 otherwise.

(3). HD - Group affiliation dummy that indicates affiliation with a highly diversified group. A highly diversified group is defined as a group that falls in the 4^{th} quartile of the sample diversification distribution. The diversification measure is the number of product lines represented in the group, COUNT. HD is set to 1 when the firm is affiliated with a group that is diversified over more than 11 product lines and 0 otherwise.

GROUP SIZE AND DIVERSIFICATION MEASURES - The following variables measure the size and diversification levels of the group with which a firm is associated. For non-affiliated firm each of the four following measures is set to unity. While the first measure is in terms of group's size, the remaining three measures are based on the level of group's diversification. The industry classification system, which determines the latter three variables, is based on CMIE industry classification system and is given in Appendix 4F.

(1). SIZE – Group size in terms of number of member firms in the group. All firms that are listed on PROWESS as associated with the group are counted regardless of whether they are listed on the Bombay Stock Exchange.

(2). COUNT – Group diversification in terms of number of industries represented in the group. All firms that are listed on PROWESS as associated with the group are counted regardless of whether they are listed on the Bombay Stock Exchange.

(3). FOCUS – Group concentration level. Calculated as the ratio of group's sales from the industry with the highest sales to total group's sales. Thus FOCUS is defined as: MAX S_{jg} / S_g**.** Where S_{jg} = Sales generated by group g from industry j; and S_g is total sales generated by group g. Only firms with year ending March 2000 and available sales data are included in the calculation. However, for groups where less than two such observations are available, FOCUS is set to a missing value.

(4). HERFIND – The Herfindahl concentration value calculated as the ratio of the sum of the squares of each industry's sales to the squared value of total group's sales. Thus HERFIND is defined as: ΣS^2_{jg} / S^2_g**.** Where S_{jg} = Sales generated by group g from industry j; and S_g is total sales generated by group g. Only firms with year ending March 2000 and available sales data are included in the calculation. However, for groups where less than two such observations are available, HERFIND is set to a missing value.

Appendix 5C: List of Indian business houses and their type

Code	Group type	Group name
0	Independent	Private (Indian)
1	Top 50 BH	Tata Group
2	Top 50 BH	Birla Group
3	Top 50 BH	Reliance Group [Ambani]
4	Top 50 BH	Thapar Group
5	Top 50 BH	J.K. Singhania Group
6	Top 50 BH	RPG Enterprises Group
7	Top 50 BH	Bajaj Group
8	Top 50 BH	Modi Group
9	Top 50 BH	Larsen & Toubro Group
10	Top 50 BH	T.V.S. Iyengar Group
11	Top 50 BH	Mafatlal Group
12	Top 50 BH	Shriram Group
13	Top 50 BH	Mahindra & Mahindra Group
14	Top 50 BH	Chidambaram M.A. Group
15	Top 50 BH	Kirloskar Group
16	Top 50 BH	UB Group
17	Top 50 BH	Escorts Group
18	Top 50 BH	Om Prakash Jindal Group
19	Top 50 BH	Murugappa Chettiar Group
20	Top 50 BH	Wadia (Bombay Dyeing) Group
21	Top 50 BH	Essar (Ruia) Group
22	Top 50 BH	Bangur Group
23	Top 50 BH	Goenka G.P. (Duncans) Group
24	Top 50 BH	Videocon Group
25	Top 50 BH	Piramal Group
26	Top 50 BH	MRF Group
27	Top 50 BH	Walchand Group
28	Top 50 BH	B P L Group
29	Top 50 BH	Lalbhai Group
30	Top 50 BH	Usha Rectifier Group
31	Top 50 BH	Amalgamation Group
32	Top 50 BH	Hero (Munjals) Group
33	Top 50 BH	Williamson Magor Group
34	Top 50 BH	BSES Group
35	Top 50 BH	Nagarjuna Group
36	Top 50 BH	Lakshmi Group [Naidu G.V.]
37	Top 50 BH	Dalmia Group
38	Top 50 BH	Firodia Group
39	Top 50 BH	Kalyani (Bharat Forge) Group
40	Top 50 BH	HCL Group
41	Top 50 BH	Raunaq Singh Group
42	Top 50 BH	Godrej Group
43	Top 50 BH	Ruchi Group
44	Top 50 BH	WIPRO Group
45	Top 50 BH	Balaji (Reddy) Group
46	Top 50 BH	Vardhman Group
47	Top 50 BH	Finolex (Chhabria P.P.) Group
48	Top 50 BH	Lloyd Steel Group
49	Top 50 BH	Ranbaxy Group
50	Top 50 BH	LNJ Bhilwara Group

Code	Group type	Group name
51	Large BH	Adani Group
52	Large BH	Ador Group (Advani Oerlikon)
53	Large BH	Alembic Group
54	Large BH	Allana Group
55	Large BH	Alpine Group
56	Large BH	Amrit Banaspati Group
57	Large BH	Andhra Sugar Group
58	Large BH	Apple Inds. Group
59	Large BH	Asian Paints Group
60	Large BH	Atlas Cycle Group
61	Large BH	Batliboi Group
62	Large BH	Bharat Modi Group
63	Large BH	Bharatia Group
64	Large BH	Chowgule Group
65	Large BH	CIPLA Group
66	Large BH	Dabur Group
67	Large BH	DCL Group
68	Large BH	Dewan Group
69	Large BH	Dr. Reddy's Group
70	Large BH	Eicher Group
71	Large BH	Elgi Group
72	Large BH	Enkay Group
73	Large BH	Excel Industries Group
74	Large BH	FACOR Group
75	Large BH	Flex Group
76	Large BH	Garden Vareli Group
77	Large BH	Garware Group
78	Large BH	GE Shipping Group
79	Large BH	Ghia Group
80	Large BH	Goenka S.P. Group
81	Large BH	Gujarat Ambuja Cement Group
82	Large BH	HAMCO Group
83	Large BH	Hindusthan Devl. Group
84	Large BH	IFB Group
85	Large BH	India Cement Group
86	Large BH	Indian Seamless Tubes Group
87	Large BH	Jain Shudh Group
88	Large BH	Jaiprakash Group
89	Large BH	Jatia Group
90	Large BH	Kanoria Group
91	Large BH	KCP Group
92	Large BH	Khatau Group
93	Large BH	Kilachand Group
94	Large BH	Krishna Group
95	Large BH	Lakhanpal Group
96	Large BH	Lala Vidyasagar Oswal
97	Large BH	Lohia Machines Group
98	Large BH	Lupin Group
99	Large BH	Maharashtra Seamless [Jindal B.]
100	Large BH	Mardia Rasiklal Group
101	Large BH	Mehta C.K. Group
102	Large BH	Mesco Group
103	Large BH	MGF Group

Code	Group type	Group name
104	Large BH	Modern Group
105	Large BH	Nava Bharat Group
106	Large BH	NEPC Group
107	Large BH	NICCO Group
108	Large BH	Nirma Group
109	Large BH	Oberoi M.S. Group
110	Large BH	Onida Group
111	Large BH	Oswal Agro Group
112	Large BH	OWM Group
113	Large BH	Pai (Manipal) Group
114	Large BH	Parasrampuria Group
115	Large BH	Parekh Group
116	Large BH	Parijat Group
117	Large BH	Pentafour Group
118	Large BH	Pertech Computers Group
119	Large BH	Prakash (Surya Roshni) Group
120	Large BH	Priyadarshini Group
121	Large BH	Punjab Tractor Group
122	Large BH	R.M. Gokuldas Group
123	Large BH	Raasi Group
124	Large BH	Raheja Rajan Group
125	Large BH	Rajju Shroff Group
126	Large BH	Ramco Group [Madras Cements]
127	Large BH	Rane Group
128	Large BH	Sahu Jain (Times of India) Group
129	Large BH	Sakthi Group
130	Large BH	Samtel Group
131	Large BH	Sanghi Polyester Group
132	Large BH	Sanmar Group [Chemplast Group]
133	Large BH	Sarabhai Group
134	Large BH	Saraswati Indl. Syndicate Group
135	Large BH	Shapoorji Pallonji Group
136	Large BH	Shri Ishar [Indore Steel Group]
137	Large BH	Shriyans Prasad Jain Group
138	Large BH	Siyaram Poddar Group
139	Large BH	SM Dyechem Group
140	Large BH	Somany Enterprises Group
141	Large BH	Sterlite Inds. Group
142	Large BH	Taparia Group
143	Large BH	TCI-Bhoruka Group
144	Large BH	Thapar Agro (Ludhiana) Group
145	Large BH	Thermax Group
146	Large BH	Torrent Group
147	Large BH	Triveni Group
148	Large BH	Usha Martin Group

Code	Group type	Group name
149	Other BH	A.V. Thomas Group
150	Other BH	Adhunik Group
151	Other BH	Agarwal D.N. (Triveni Sheet) Group
152	Other BH	Ajmera Group
153	Other BH	Alchemie Group
154	Other BH	Alsa Marine Group
155	Other BH	Ambuja (Bihar) Group
156	Other BH	Amforge Group
157	Other BH	Amtek Group
158	Other BH	Anand D.C. Group
159	Other BH	Ansal Group
160	Other BH	Apar Group
161	Other BH	Apeejay Group
162	Other BH	Apollo Earthmovers Group
163	Other BH	Apollo Hospitals Group
164	Other BH	Apte Group
165	Other BH	Arihant Group
166	Other BH	Aruna Sugars Group
167	Other BH	Arya (Blue Blends) Group
168	Other BH	Ashok (Kadakia) Group
169	Other BH	Aspinwall Group
170	Other BH	Atul Glass Group
171	Other BH	ATV Group
172	Other BH	Autoriders Group
173	Other BH	AVI Group
174	Other BH	Bajoria B.P./K.K. Group
175	Other BH	Bajoria U.S. Group
176	Other BH	Bala Techno Group
178	Other BH	Balsara Group
179	Other BH	Banswara Group
180	Other BH	BEC Group
181	Other BH	Berlia Group
182	Other BH	Bhai Mohan Singh Group
183	Other BH	Bharat Vijay Mills Group
184	Other BH	Bharti Telecom Group
185	Other BH	Bhupendra Group
186	Other BH	Bhuva Group
187	Other BH	Binani Group
188	Other BH	Borosil Group (Kheruka) Group
189	Other BH	Butterfly Group
190	Other BH	Capital Trust Group
191	Other BH	CDR Group
192	Other BH	Chemfab Alkalies Group
193	Other BH	Chemox Chemicals Group
194	Other BH	Chokhani Group
195	Other BH	CIFFCO Group
196	Other BH	Continental Group
197	Other BH	Core Lab. Group
199	Other BH	Credit Capital Venture Group
200	Other BH	Dalal Street Journal Group
201	Other BH	Daudayal Group
202	Other BH	Delhi Flour Mills Group
203	Other BH	Dempo V.S. Group

Code	Group type	Group name
204	Other BH	Dera Group
205	Other BH	Devidayal Group
206	Other BH	Dhanuka P.L. Group
207	Other BH	Dhanuka S.L./C.K. Group
208	Other BH	Dharani Group
209	Other BH	Dhillon Group
210	Other BH	DLF Group
211	Other BH	Dugar Group
212	Other BH	Dugar Tarachand Group
213	Other BH	Easun Group
214	Other BH	Elecon Group
215	Other BH	Esquire Group
216	Other BH	Essel Packaging Group
217	Other BH	Fedders Lloyd Group
218	Other BH	Gadgil Western Group
219	Other BH	Gajra Group
220	Other BH	Ganesh Benzoplast Group
221	Other BH	Gannon Dunkerly Group
222	Other BH	Goenka J.P. Group
223	Other BH	Goldstar Group
224	Other BH	Grauer & Weil Group
225	Other BH	GTN Group
226	Other BH	Gujarat Ambuja Proteins Group
227	Other BH	Gujarat Inject Group
228	Other BH	Gujarat Steel Tubes Group
229	Other BH	Gupta Carpet Group
230	Other BH	GVK Reddy (Novopan) Group
231	Other BH	Hada Group
232	Other BH	HB Group
233	Other BH	Himadri Group
234	Other BH	Himatsingka Group
235	Other BH	Hitkari Group
236	Other BH	IMFA Group
237	Other BH	Inox Group
238	Other BH	Ipca Laboratories Group
239	Other BH	J.M. Financial Group
240	Other BH	Jagsonpal Group
241	Other BH	Jain Pipe Group
242	Other BH	Jalan M.L. Group
243	Other BH	Jalan Sushil Group
244	Other BH	Jardine Henderson Group
245	Other BH	Jayant Dalal Group
246	Other BH	Jaysynth Group
247	Other BH	Jenson & Nicholson Group
247	Other BH	Jenson & Nicholson Group
248	Other BH	Jindal (Ahmedabad) Group
249	Other BH	Jiwrajka Group
250	Other BH	Jyoti Group
251	Other BH	K.G. Group
252	Other BH	Kajaria Ceramics Group
253	Other BH	Kalpataru Group
254	Other BH	Kedia V. Group
255	Other BH	Khaitan Fans Group

Code	Group type	Group name
256	Other BH	Khandelwal Group
257	Other BH	Khoday Group
258	Other BH	Killick Nixon Group
259	Other BH	Kongarar Group
260	Other BH	Kothari D.C./Pradeep Group
261	Other BH	Kothari H.C./Bhadrashyam Group
262	Other BH	Kothari M.M (Guwahati) Group
263	Other BH	Kothari Products Group
264	Other BH	Krystal Group
265	Other BH	KT Group (Keshavlal Talakchand)
266	Other BH	Lahoti Group
267	Other BH	Lamina Group
268	Other BH	Lan Eseda Group
269	Other BH	Libra Group
270	Other BH	Mahendra Khatau Group
271	Other BH	Malhotra Steel Group
272	Other BH	Mardia Extrusions Group
273	Other BH	Marson's Group
274	Other BH	Maxworth Orchards Group
275	Other BH	Menon (Kolhapur) Group
276	Other BH	Metrochem Group
277	Other BH	Mikado Textile Group
278	Other BH	Mohan Meakin Group
279	Other BH	Monnet Group
280	Other BH	Motwani Group
281	Other BH	Nachammai Group
282	Other BH	Namaste Exports Group
283	Other BH	Nath Group
284	Other BH	NCL Group
285	Other BH	NECO Group
286	Other BH	Neterwala Group
287	Other BH	OEN Group
288	Other BH	Orind Group
289	Other BH	Oswal Spg. Group
290	Other BH	Paam Pharmaceuticals Group
291	Other BH	Parekh Platinum Group
292	Other BH	Parle Products Group
293	Other BH	Partap Group
294	Other BH	Patel J.V. Group [New Std. Engg.]
295	Other BH	Patel Roadways Group
296	Other BH	Patodia D.N. Group
297	Other BH	Patodia Eurotex [PBM Polytex Group]
298	Other BH	Pearl Pet Group
299	Other BH	Peerless Group
300	Other BH	Pennar Group
301	Other BH	Pioneer Group
302	Other BH	Poddar Bros. (Calcutta) Group
303	Other BH	Poddar S K Group
304	Other BH	Polar Group
305	Other BH	Prabhu Steel Group
306	Other BH	Pressman Group
307	Other BH	Prudential Capital Markets Group
308	Other BH	Radico (Gajanan Khaitan) Group

Code	Group type	Group name
309	Other BH	Raghu Mody Group [Rasoi Group]
310	Other BH	Rajgarhia Group
311	Other BH	Ram Jhunjhunwala Group
312	Other BH	Rama Group
313	Other BH	Ramgopal Group
314	Other BH	Rathi P.C./R.C. Group
315	Other BH	Reddy Obul Group
316	Other BH	Remi Group
317	Other BH	Rinki Group
318	Other BH	Rohit Group
319	Other BH	S. Kumars Group
320	Other BH	Samsons Group
321	Other BH	Sandur Manganese Group
322	Other BH	Santogen Group
323	Other BH	Satya Group
324	Other BH	Savita Chemicals Group
325	Other BH	Sayaji Hotels Group
326	Other BH	Seshasayee Group
327	Other BH	Shreyans Group
328	Other BH	Shri Dinesh Mills Group
329	Other BH	Shriram Transport Group
330	Other BH	Simplex (Mundhra) Group
331	Other BH	Singhal Swaroop Ispat Group
332	Other BH	SOL Group
333	Other BH	Somani B.D. Group
334	Other BH	Sona Group
335	Other BH	Spartek Ceramics Group
336	Other BH	Square D Group
337	Other BH	Star Group
338	Other BH	Steel Strips Group
339	Other BH	Steel Tubes of India Group
340	Other BH	Sterling Holiday Resorts Group
341	Other BH	Stovec Industries Group
342	Other BH	Sujana Group
343	Other BH	Sun Pharmaceutical Group
344	Other BH	Suraj Vanaspati Group
345	Other BH	Suresh Sharma Group
346	Other BH	Suryalakshmi Group
347	Other BH	T.T.K. Group
348	Other BH	Tai Group
349	Other BH	Tainwala Group
350	Other BH	Talwar Brothers Group
351	Other BH	Tanna Group
352	Other BH	Tatia Group
352	Other BH	Tatia Group
353	Other BH	Thackersey Group
354	Other BH	Thiagaraja Group
355	Other BH	Tinna Group
356	Other BH	Toshniwal Group
357	Other BH	Trident Group
358	Other BH	Turner Morrison Group
359	Other BH	Ucal Fuel Group
360	Other BH	Udyar Group

Code	Group type	Group name
361	Other BH	Uniplas India Group
362	Other BH	Unipon (H.N. Patel) Group
363	Other BH	Unitech Group
364	Other BH	United Group
365	Other BH	V G P Group
366	Other BH	Vadilal Group
367	Other BH	Valecha Group
368	Other BH	VBC Group
369	Other BH	Venkateshwara Hatcheries [Venky] Gro
370	Other BH	Weizmann Group
371	Other BH	Welspun Group
372	Other BH	Winsome Group
373	Other BH	Wockhardt Group
374	Other BH	WS Industries Group
375	Other BH	XLO Group
376	Other BH	Zydus Group

Appendix 5D: Sample selection procedure

Initial Sample of Indian Private Sector group affiliated firms			
Full Sample (Indian Private Sector, BSE quoted and unquoted)[1]			6548
Less: Independent firms			(4506)
Group affiliated firms used to construct group size and diversification variables	2042		
Distribution of affiliated firms across business group types:			
Firms affiliated with Top business houses (50 groups)		921	
Firms affiliated with large business houses (98 groups)		458	
Firms affiliated with other business houses (227 groups)		663	
Total firms affiliated with Indian Private business houses (375 groups listed in Appendix 5C)			2042
Narrow Sample			
Indian Private Sector, non-financial, quoted firms with all required data	1412		
Distribution of narrow sample across listing flags[2]:			
Flag A	61		
Flag B1	320		
Flag B2	992		
Flag Z	39		
			1412
Distribution of narrow sample across group affiliated and independent firms:			
Independent firms that paid dividends	325		
Independent firms that did not pay dividends	533		
Total independent firms			858
Group-affiliated firms that paid dividends	322		
Group-affiliated firms that did not paid dividends	232		
Total group-affiliated firms			554
			1412

[1] There are 2369 unquoted firms and 4179 quoted firms. Of the quoted firms 79 are in the Listing Flag A group, 586 in the B1 group, 2813 in the B2 group and 701 in the Z group. For listing flags definitions see footnote (2).

[2] The classification of a firm into listing flag groups is decided by the Bombay Stock Exchange. The listing flag denotes the volatility of the stock of the company on the Exchange. Stock in the A group has carry forward deals and weekly settlements. Those in B1 and B2 trade with weekly settlement without carry forward facility. Z is a relatively new category that denotes companies who have not complied with and are in breach of provisions of the Listing Agreement.

Appendix 5E: Notes to Tables

(1). Table 5.2 Panel C: Variance inflation factors

High degree of multicollinearity can lead to large standard errors and thus imprecise estimates of coefficients. Further, small t ratios imply that the true importance of explanatory variables may be obscured. To assess the degree of multicollinearity present in the sample, the variance inflation factor (VIF) is defined as:

$$VIF\ (\beta_j) = 1/\ (1 - R^2{}_j)$$

Where $R^2{}_j$ is the coefficient of determination from a regression of the explanatory variable, X_j, on a constant and the rest of the explanatory variables. The VIF represents the ratio of the actual variance of the estimated coefficient, β_j, to what it would have been in the absence of multicollinearity, where $R^2{}_j$ is equal to zero. Hence the higher is the VIF value, the higher the degree of multicollinearity.

(2). Table 5.4: Panels B and C. Tests for comparison of two samples

Panel B – Assuming that samples have been drawn from a normal population

Test 1: F-test for the null hypothesis that the samples came from populations with the same variances, $\sigma^2{}_1=\sigma^2{}_2=\sigma^2$, (or $\sigma^2{}_1/\sigma^2{}_2=1$) against the alternative hypothesis of $\sigma^2{}_1 \neq \sigma^2{}_2$. The ratio of two independent χ^2 variables, each divided by their degrees of freedom, forms a random variable, which follows an F distribution with degrees of freedom associated with each χ^2 variable. Therefore it can be shown that:

If $\chi_1^2 = (N_1\text{-}1)S_1^2/\sigma^2_1$

Then $\chi_1^2/(N_1\text{-}1) = S_1^2/\sigma^2_1$

And if $\chi_2^2 = (N_2\text{-}1)S_2^2/\sigma^2_2$

Then $\chi_2^2/(N_2\text{-}1) = S_2^2/\sigma^2_2$

Therefore if $\sigma^2_1 = \sigma^2_2$

Then $F_{(n1-1),(n2-1)} = [\chi_1^2/(N_1\text{-}1)]/[\chi_2^2/(N_2\text{-}1)] = S_1^2/S_2^2$

Putting the large sample variance in the numerator of the test statistic guarantees that it will not fall into the left-hand critical region. The test statistic therefore needs only be compared with the right-hand critical value, and the left-hand one can be ignored. Thus if the F-statistic is greater than the critical value associated with an upper-tail area of 2.5%, the null hypothesis of equal variances can be rejected at the 5% significant level in favour of the alternative of unequal variances.

<u>Test 2:</u> Testing the hypothesis about equality of the means ($\mu_1=\mu_2$ against the alternative $\mu_1\neq\mu_2$) when σ^2_1 and σ^2_2 (the population variances) are unknown but presumed equal. Under the null hypothesis $\mu_1\text{-}\mu_2=0$ and the formula for t becomes:

$$t_{(N1+N2-2)} = [E(X_1)\text{-}E(X_2)]/\{S^2[(N_1+N_2)/N_1N_2]\}^{1/2}$$

Where the pooled sample variance, S^2, is an estimate of the common population variance and is defined as:

$$S^2 = [(N_1\text{-}1)S_1^{\,2} + (N_2\text{-}1)S_2^{\,2}] \;/\; (N_1+N_2\text{-}2)$$

For a two-tailed test at the 1% significance level, the null hypothesis is rejected if the absolute value of the test statistics is greater than the critical value associated with an upper-tailed area of 0.5% (= ½ of 1%).

<u>Test 3:</u> Testing the hypothesis about equality of the means ($\mu_1=\mu_2$ against the alternative $\mu_1\neq\mu_2$) when σ^2_1 and σ^2_2 (the population variances) are unknown and presumed unequal. The standard error of the mean difference may be computed as:

$$S^2_{E(X1)\text{-}E(X2)} = S_1^{\,2}/N_1 + S_2^{\,2}/N_2$$

Then $$t = [E(X_1)\text{-}E(X_2)] / \{S_1^{\,2}/N_1 + S_2^{\,2}/N_2\}^{1/2}$$

If the samples are large the t-statistic may be referred to a table of normal probability because the statistic has a distribution approximating the normal. However, if exact sampling theory is to be used than the student's t distribution needs to be consulted. In this case, the degree of freedom is obtained by using the nearest integer from the formula:

$$d.f. = -2 + [S_1^{\,2}/N_1 + S_2^{\,2}/N_2]^2 \;/\; [(S_1^{\,2}/N_1)^2\,(1/(N_1+1)) + (S_2^{\,2}/N_2)^2\,(1/(N_2+1))]$$

<u>Panel C – Non parametric/ distribution free tests</u>

<u>Median test for two samples</u>: The null hypothesis is that there is no association between group affiliation and payout ratios, while the alternative is of some association. The procedure starts by classifying all scores as being above or not above the median of the combined samples. A contingency table is then set up where the two columns represent the two samples and the two rows represent observation above or not above the median. The significance of the table is assessed by computing the χ^2:

$$\chi^2_{df} = \Sigma (O\text{-}E)^2/E$$

where O is the observed value in each cell and E is the expected value of each cell and is given by its row total times its column total divided by n, the number of total observations. The degree of freedom, df, is calculated as:

$$df = (r\text{-}1)(c\text{-}1)$$

where r is the number of rows (2), and c is the number of columns(2). The calculated χ^2 statistic must be greater than the critical value associated with the upper tail area selected (e.g. 1%) to reject the null hypothesis that the row variable is unrelated to the column variable.

The Mann-Whitney U test: The null hypothesis is that the two independent samples of group and non-group affiliated firms come from the same underlying population distribution. In order to calculate the U test the two samples are combined and ranked from the smallest to the largest. If two or more values are identical (i.e. there are tie scores) the rank assigned to each of the ties is the mean of the ranks that would be otherwise assigned. The sum of the ranks for each sample is calculated and denoted by R_1 (for the smaller size sample which is the group-affiliated sample) and R_2 (for the larger size sample which is the non-group affiliated sample). A significant difference between the rank sums, R_1 and R_2, implies a significant difference between the samples and a rejection of the null hypothesis. To test the difference between the rank sums, the following statistics is used:

$$U = N_1N_2 + [N_1\,(N_1+1)]/2 - R_1$$

The statistic U is the rank sum for the smaller sample of group-affiliated firms, (1). It represents the total number of times that sample (1) values precede sample (2) values when all sample values are arranged in increasing order of size. The sampling distribution of U is symmetrical and has a mean and variance given by the formulas:

$$\mu_u = N_1N_2/2 \ \ and \ \ \sigma^2_u = N_1N_2(N_1+N_2+1)/12$$

If the sample sizes are at least equal to 8, then the distribution of U is nearly normal, so:

$$Z_u = Standardised\ U = (U-\mu_u)/\sigma_u$$

is normally distributed with mean 0 and variance 1. For a two-sided test the Z statistic would be significant if its absolute value is greater than the critical value associated with an upper-tail area of half α where α is the level of significance. (i.e. a critical value of 2.576 is associated with an upper-tail area of 0.5% and thus with 1% significance level).

(3). Table 5.5: Computing marginal effects for the Probit model

The marginal effect in the Probit model can be expressed as:

$$dF(\beta'X)/dX = [dF(\beta'X)/d(\beta'X)]\ \beta = f(\beta'X)\ \beta$$

where $f(\beta'X)$ is the density function that corresponds to the cumulative distribution $F(\beta'X)$. Thus the probability derivatives, $f(\beta'X)\ \beta$, will vary with the value of X, and for interpretation purposes the marginal effects are given by their means. In other words the density function, $f(\beta'X)$, is evaluated at every observation and the sample average is then used to compute the marginal effects. As the mean density function, [the average of $f(\beta'X)$] is a constant it is termed the scale factor.

Appendix 5F: List of Industry codes

	Industry/ product lines	Code	Dummies for chapter 5	Dummies for chapter 6
	Food & Beverages	**1**		**I1**
1	Food products	1.1	INDS1	
2	Beverages & tobacco	1.2	INDS2	
	Textiles	**2**		**I2**
3	Cotton textiles	2.1	INDS3	
4	Synthetic textiles	2.2	INDS4	
5	Other textiles	2.3	INDS5	
	Chemicals	**3**		**I3**
6	Chemicals & plastics	3.1	INDS6	
7	Petroleum products	3.2	INDS7	
8	Tyres & tubes	3.3	INDS8	
9	Rubber & rubber products	3.4	INDS9	
	Non-Metallic Mineral Products	**4**		**I4**
10	Cement	4.1	INDS10	
11	Other non-metallic mineral products	4.2	INDS11	
	Metals & Metal Products	**5**		**I5**
12	Ferrous metals	5.1	INDS12	
13	Non-ferrous metals	5.2	INDS13	
	Machinery	**6**		**I6**
14	Non-electrical machinery	6.1	INDS14	
15	Electrical machinery	6.2	INDS15	
16	Electronics	6.3	INDS16	
	Transport Equipment	**7**		**I7**
17	Automobile	7.1	INDS17	
18	Automobile ancillaries	7.2	INDS18	
	Miscellaneous Manufacturing	**8**		**I8**
19	Paper & paper products	8.1	INDS19	
20	Leather products	8.2	INDS20	
21	Miscellaneous products	8.3	INDS21	
	Diversified Manufacturing	**9**		**I9**
22	Diversified	9.1	INDS22	
	Mining	**10**		**I10**
23	Coal & lignite	10.1	INDS23	
24	Crude oil & natural gas	10.2	INDS24	
25	Minerals	10.3	INDS25	
	Electricity	**11**		**I11**
26	Electricity generation	11.1	INDS26	
27	Electricity distribution	11.2	INDS27	
	Financial Services	**12**		
28	Banking services	12.1	INDS28	
29	Financial institutions	12.2	INDS29	
30	Non-banking financial companies	12.3	INDS30	
31	Housing finance services	12.4	INDS31	
32	Investment services	12.5	INDS32	
33	Other financial services	12.6	INDS33	
	Non-financial Services	**13**		
34	Hotels & tourism	13.1	INDS34	
35	Recreational services	13.2	INDS35	
36	Health services	13.3	INDS36	
37	Construction & offshore drilling	13.4	INDS37	
38	Trading	13.5	INDS38	
39	Transport services	13.6	INDS39	
40	Communication services	13.7	INDS40	
41	Miscellaneous services	13.8	INDS41	

CHAPTER 6: BUSINESS GROUPS AND CAPITAL STRUCTURE - EVIDENCE ON INDIAN FIRMS

6.1 Introduction

Singular among the common distinct features of the business environment in most emerging markets in general, and India in particular, is that companies tend to naturally structure themselves into business-groups. This structure has been hypothesised to serve various functions in these markets.

First, the business group can create reputation for quality that is common to all group members and which relates to goods, services and practice. Second, through group reputation, skill, or the ability to distort policy, the group structure provides access to scare resources such as capital, expertise, foreign technology or other knowledge. Third, not only does the group structure provide access to external markets, but it can also replace poorly functioning external markets such as capital or labour markets by creating internal equivalents. For example groups can create in-house training centres or in-house lending facilities. Fourth, preferential access to scare resources, internally created markets as well as funds from existing operations, give groups an edge in seizing investment opportunities in new and existing lines of businesses[1].

[1] The fourth benefit of the group structure, namely the ability of the group to enter new lines of business, implies that groups should become diversified, which, in turn, lead to further two benefits to group affiliation. First, group diversification can be a valuable form of portfolio diversification where financial

The benefits mentioned above, and in particular the first three benefits, imply that group-affiliated firms should be relatively less dependent on formal capital markets. In this context, the capital structure decision of these firms is likely to display different sensitivities to firm factors compared with independent firms. Furthermore, group-wide factors, such as the capital needs of other firms in the group, or investment opportunities that arise in lines outside the firm's current involvement, are also likely to play a role in determining the capital structure of group-affiliated firms. Based on these observations, this chapter seeks to understand the impact of group affiliation on the capital structure decisions of firms that operate in an emerging market, namely India.

In a similar approach to existing studies, also here the choice of variables to explain the leverage decision is based on the literature on information asymmetries, agency conflicts and the trade off theory. For example, the pecking order hypothesis is inspired by the prevalence of information asymmetry and predicts that firms prefer internal over external finance. This implies that profitable firms should resort to debt financing less often compared with unprofitable firms. Thus like in many previous models of capital structure, also here profitability is included as an explanatory variable that proxy for pecking order theory and which is therefore expected to enter with a negative sign. However, profitability may enhance the use of debt financing because it is

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markets do not provide opportunities for diversification. Second, through vertical integration the group can overcome problems that arise from bilateral or statutory monopolies. (Bilateral monopoly means that there is only one buyer as well as only one seller in the market, while statutory monopoly exists when the entry of competitors is forbidden by law.)

a valuable signal to lenders regarding the security of their lending. This should lead to cheaper access to debt and as per the trade off theory to a positive relationship between debt and profitability. These contradicting predictions regarding the nature of the relationship between debt and profitability illustrate how a given variable, in this case profitability, can distinguish between competing theories.

However, not all proxies display such a desirable characteristic. In fact, often the sign on a given explanatory variable is consistent with more than one theory. For instance, and continuing with the profitability example, agency theory like the pecking order also supports a negative relationship between profitability and debt. Accordingly, managers prefer to use internal profits to finance investments rather than debt, because the former gives them greater discretion while the latter exposes them to lenders' scrutiny. Thus in common to most previous work, also here the empirical approach is lacking in some ways. Still, the approach in this chapter seeks to contribute to existing literature in three ways that are similar to the innovations suggested in the previous chapter.

First, just as empirical work on dividend policy in the context of business groups is rare, so is work that examines the impact of business groups on the capital structure decision. Thus this chapter seeks to innovate by synthesising the theory on business groups with the orthodox corporate finance theories of capital structure. Second, the chapter adds empirical evidence to the capital structure literature. In particular evidence is added to the literature on the pecking order, agency conflicts, and the trade off theories in the context of an emerging market. This may be a valuable contribution because most empirical studies of these issues are from developed markets, and because market imperfections, that underlie these theories, are often more severe in emerging markets. Third, the study contributes to the business group literature in emerging markets by looking at business groups in India. Understanding the important role that business groups play in India as in many other emerging markets is important, particularly given the changes that these markets are undergoing.

The structure of the paper is as follows. Section 6.2 reviews some of the relevant literature on both capital structure and business groups. Based on the literature review, the impact of group-affiliation on the capital structure decision is discussed in Section 6.3, and the models to be estimated and tested are presented. Section 6.4 describes the sample, while empirical procedures and results are presented in Section 6.5. Section 6.6 concludes.

6.2 Selective review of the literature

A selective review of studies on business groups was undertaken in Chapter 5, and is therefore not repeated here. Instead, Table 6.1 summarises the business group studies that were mentioned in that chapter, and some additional studies that are referred to in this chapter[2].

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[2] Refer to Section 5.2.2

Table 6.1 Key findings and conclusions from previous theoretical and empirical studies on business groups

Study	Idea	Data	Methodology	Findings	Comments
Chang and Cohi (1988)	The impact of business groups' ability to utilise economies of scale and scope through diversification, on the firm's economic performance	182 Korean manufacturing firms, 1975-1984	Cross sectional, weighted least squares	Firms that are affiliated with the top Korean business groups that are integrated both horizontally and vertically show superior economic performance. This is because such group structure overcomes market imperfections.	Further details in Appendix 5A Note (4)
Chang and Hong (2000)	The impact of group-wide resource sharing and internal business transactions, on the firm's economic performance	1248 non-financial Korean firms, 1985-1996	Panel data, weighted least squares	▪ Firms benefit from group affiliation through internal sharing of intangible and financial resources ▪ Firms in business groups cross-subsidise each other through internal business transactions such as debt guarantee, equity investment, and internal trade	Further details in Appendix 6A Note (1)
Claessens, Djankov, Fan and Lang (1999)	The joint effect of group affiliation and firm-level diversification on firm's value	Firms from 9 East Asian economies, 1991-1996	Panel data, Ordinary least squares	▪ In less developed economies, group-affiliation is used to complement firm-level diversification in the creation of internal markets to enhance performance ▪ Group affiliated firms are more likely than independent firms to benefit from diversification in less developed countries.	Further details in Appendix 5A Note (5)
Dewenter, Novaes and Pettway (2001)	The trade off between group visibility in controlling conflicts in large business groups and between the complexity of these groups, which can limit the ability of group visibility to control conflicts.	159 Tokyo Stock Exchange IPOs, 1981-1994	Multivariate regressions	Group membership can affect the cost of issuing new capital: The complex nature of horizontal keiretsu groups outweigh their high visibility. As a result, potential for agency conflicts between firms affiliated with these business groups, and outside investors is significant and the cost of issuing new capital is higher for these firms.	Further details in Appendix 6A Note (3)
Dewenter and Warther (1998)	The contribution of keiretsu membership to reduction in information asymmetries and agency conflicts	313 US firms and 180 Japanese firms, 1982-1993	Event studies, Logit analysis, Lintner's model	Keiretsu-membership reduces information asymmetries and agency conflicts. Therefore Keiretsu-member firms experience smaller stock price reaction to dividend omissions and initiations, and their dividends are more responsive to earnings changes.	Further details in Appendix 5A Note (9)
Ghemawat and Khanna (1998)	Reaction of business groups to competitive shocks can be used to identify the rationale for their existence	India, post 1991 economic reforms	Case study of 2 large business houses	Following the competitive shock caused by the 1991 reforms, Indian groups engaged in restructuring that is consistent with the policy distortion explanation for the emergence of groups.	
Granovetter (1995)	Define business groups and speculate on their role in economic development		Theoretical	Identify 6 dimensions along which business groups vary. Including axes of solidarity, ownership relations, authority structure, moral standards, the role of banks, and the role of the state	
Guillen (2000)	Comparing the validity of four alternative theories that seek to explain the economic rationale for the emergence of business groups	Top 10 groups from 9 emerging markets, 1990 and 1995	Cross sectional Ordinary least squares	Theories that focus on market imperfections, authority structure, or state autonomy, do not accurately explain the importance of business groups across emerging markets and over time. However, the resource base view appears important.	Further details in Appendix 5A Note (3)

Source: Compiled by author from a selective review of the literature

Table 6.1 (concluded) Key findings and conclusions from previous theoretical and empirical studies on business groups

Study	Idea	Data	Methodology	Findings	Comments
Khanna and Palepu (1999)	The diminishing value of business groups in substituting for poorly functioning institutions due to the emergence of well-functioning markets	Emerging markets	Theoretical	Put forward a number of practical approaches to how business groups in emerging markets should restructure as response to market liberalisation and reform programmes.	
Khanna (2000)	Review the theoretical and empirical literature on the welfare consequences of being affiliated with a business group	Japan and emerging markets in Asia and Latin America	Review of empirical and theoretical work	▪ Evidence of welfare-enhancing impact of business groups that is due to the role of groups in substituting for missing institutions. ▪ Evidence of welfare-reducing impact of business groups that is due to minority shareholder exploitation.	
Khanna and Palepu (2000a)	Evaluate the performance of firms affiliated with diversified business groups relative to unaffiliated firms	1309 Indian firms, 1993	Cross sectional, Ordinary least squares	Accounting and stock market measures of firm performance initially decline with group affiliation but start to increase once group diversification exceeds a certain level.	Further details in Appendix 5A Note (8)
Khanna and Palepu (2000b)	The benefits from group affiliation. Distinguishing between benefits that relate to group diversification and non-diversification related benefits	114 Chilean firms, 1988-1996	Year by year and panel data with random effects, Generalised least squares	Market developments reduces the value-creating potential of business groups although the process is slow: ▪ Affiliation with a diversified group is beneficial once group diversification exceeds a threshold level. But this threshold increases with time. ▪ There are also benefits to group-affiliation that are not related to group diversification but also these benefits diminish over time	Further details in Appendix 5A Note (6)
Khanna and Rivkin (2001)	Assess the effects of group affiliation on firm profitability	14 emerging markets, 1990-1997	Panel data, Ordinary least squares	▪ Group affiliation has a profound effect on profitability ▪ Profits rates of firms that are affiliated with the same group are more similar compared with outside firms. ▪ No support for either market failure theory of groups or the view that groups are rent seeking devices.	Further details in Appendix 6A Note (6)
Leff (1976)	The role of the business group in less developed countries	Less developed countries	Theoretical	The group structure has evolved in less developed countries to mitigate distortion in capital, products and labour markets	

Source: Compiled by author from a selective review of the literature

Thus Table 6.1 summarises important findings from studies on business groups, and saves duplicating the discussion of Chapter 5. Likewise a selective review of capital structure studies was undertaken in Section 4.2 of Chapter 4, as summarised in Table 4.1, and it is thus also not repeated here. Rather, this section is devoted to a review of a selection of recent studies that provide possible link between the capital structure decision and business group-affiliation. Specifically, the discussion is organised under three factors that have been suggested as determinants of capital structure on one hand, and of the behaviour and characteristics of business groups on the other. These factors include asset structure, agency conflicts and cultural-based control considerations, each of which is now reviewed.

6.2.1 Asset structure

The market failure theory of business groups as proposed by Leff (1976) and discussed in some detail in Section 5.2.2 of Chapter 5, suggests that business groups engage in pooling resources and sharing assets among themselves. If this is indeed the case, then the asset structure of group affiliated firms may be important in determining the performance of other member firms and of the group as a whole. Chang and Hong (2000) note that intangible assets such as R&D, advertising, and good reputation lend themselves particularly well to group sharing because their value does not depreciate with increased use. This means that the group total level of these assets should impact the performance and opportunities of individual members. For example, the higher the reputation of other firms in the group, the more easily the firm can access finance. But the same argument also applies to other assets, such as the amount of liquid net assets of other firms in the group. In general such sharing implies dependency across members of a group, which Chang and Hong (2000) suggest may be evident, for instance, form the typical complex structure of debt guarantees within groups. This complex structure means that the bankruptcy of one member firm increases the bankruptcy risk of other member firms.

Based on this argument, Chang and Hong (2000) assess how the sharing and transferring of resources within Korean business groups impact the performance of member firms. They find that both firm-level and group-level resources are important determinants of firm performance. Furthermore, evidence is also presented to show that group-affiliated firms transfer assets amongst themselves for the purpose of cross subsidisation. In particular the study illustrates that debt guarantees, equity investments and internal trade, tend to be used to support poorly performing affiliates at the expense of profitable members. The study concludes that the asset structure of the firm is important to the group as a whole as value is created through the sharing of financial and intangible resources such as technology, advertising and reputation. It is further concluded that groups tend to pool assets for the purpose of achieving group-wide goals, often at a cost to individual members[3].

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[3] Cross substitution among members of business groups implies the existence of agency conflicts. This is dealt with in the next section, while details of the Chang and Hong (2000) study are given in Appendix 6A, Note (1).

While Chang and Hong (2000) stress the importance of intangible and financial assets of group affiliated firms to the performance of other group members, the relevance of the firm's asset structure to its capital structure has also received much attention. The relationship between asset structure and the capital structure of the firm begins with the premise that in the case of liquidation, intangible assets are not expected to have high salvage value. Therefore an increase in the fraction of such assets reduces the expected payoff to claim holders in the event of bankruptcy. Further, the probability of bankruptcy increases with the amount of debt in the capital structure, so when assets are intangible the trade off theory predicts that equity financing should be preferred to debt. Vilasuso and Minkler (2001) propose that the same argument holds when asset structure is defined in terms of the specificity of assets. Thus they measure asset structure in terms of specificity rather than intangibility, and test for the importance of asset structure to the capital structure decision in the context of US firms.

Particularly, Vilasuso and Minkler (2001) argue that a project that requires highly specific assets will initially be financed by equity. However, as the debt to equity ratio decreases, the agency cost of debt falls while the agency cost of equity rises. These agency cost effects become increasingly more important, until debt finance becomes the preferred form of financing. A crucial point in Vilasuso and Minkler (2001) is that when assets are highly specialised, it takes longer for agency cost considerations to dominate. Thus while minimisation of total agency costs ensures that in the long term firms will move towards their optimal financing mix, for those with highly specific assets this optimal mix contains more equity. The findings from the empirical procedure are consistent with the study's propositions. In particular, the sign on the estimated coefficient on the degree of asset specificity indicates that equity levels increase with asset specificity[4].

Thus asset structure appears to enter the capital structure decision with intangibility or specificity of assets increasing the present value of the costs of financial distress, and are therefore expected to be associated with less debt. Alternatively, if the use of intangible assets is more difficult to monitor then this should also lead to a negative relationship between asset intangibility and debt. Furthermore, based on Chang and Hong (2000) it could be argued that this negative relationship between asset intangibility and debt should be particularly strong in the case of group affiliated firms. Indeed it was noted that intangible assets lend themselves to sharing thus firms with, for instance, high R&D expenditure, are likely to build closer relationship with other group members. Particularly other members in the group are likely to become dependent on the knowledge generated by the firm, which invest highly in R&D. This implies that the consequences of failure by the high R&D spending firm will extend beyond the firm itself, and such firms should be particularly careful to avoid risk and should display less debt in their capital structure.

[4] Vilasuso and Minkler (2001) also present evidence to support the idea that balancing agency costs leads the capital structure of the firm to converge to its optimal level. The impact of agency costs on the capital

Both, Vilasuso and Minkler (2001) for the capital structure discussion and Chang and Hong (2000) for the business group discussion, present evidence to support the relevance of asset structure. However, as noted in footnotes (3) and (4), both studies also point to the importance of agency conflicts to the capital structure decision and to business groups' operation. It is thus this issue which is discussed next.

6.2.2 Agency costs

Dewenter, Novaes and Pettway (2001) stress the potential for conflicts of interest that business groups create. Conflicts of interest include internal conflicts among member firms as well as conflicts between member firms and outside investors. The study focuses on the latter and in particular on conflicts between firms and investors, when the group decides to float one of its members[5]. It is proposed that the extent to which opportunistic behaviour by managers of group-affiliated firms, is more or less severe than in the case of independent firms, is a trade off between group visibility and complexity. This is explained as follows.

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structure decision is dealt with in the next section, while details of the empirical procedures in Vilasuso and Minkler (2001) are given in Appendix 6A, Note (2).

[5] Dewenter, Novaes and Pettway (2001) note that a potential conflict of interest surrounding initial public offers (IPOs) is related to market timing. This refers to the tendency by managers to take advantage of temporary mis-pricing in the market in order to get a particularly high price for the IPO shares. Indeed, the study focuses on IPOs because of the established link between the level of initial returns in IPOs and the degree of uncertainty about the value of the issuing firm. In particular the higher the uncertainty about the issuing firm, the greater the potential loss to uninformed participants, thus the higher their expected return.

Managers tend to avoid acting opportunistically because sooner or later this behaviour is detected and firms are penalised. However, opportunistic behaviour can only be controlled in this way if the market indeed detects it. Thus the impact of business groups on agency behaviour boils down to how group-affiliation influences the ability of the market to detect opportunistic behaviour. On the one hand there is the argument that because information about large groups and their member firms is widely available, this increases the ability of the market to detect and control agency behaviour. Thus visibility reduces agency costs of firms affiliated with large business groups. On the other hand the typically complex structure of groups makes it difficult for the market to infer opportunistic behaviour even when visibility is high. Thus complexity of large business groups makes agency costs in affiliated firms more severe.

Testing data on Japanese firms, Dewenter, Novaes and Pettway (2001) conclude that affiliation with one of the largest keiretsu industrial grouping increases asymmetric problems, uncertainty, and the opportunity for agency behaviour by management. In particular due to greater complexity, group membership increases the cost of capital, and the magnitude of the impact depends on the level of information asymmetries that are built into the market structure[6].

[6] In relation to information asymmetries, Dewenter, Novaes and Pettway (2001) note that the impact of group affiliation is larger when shares are sold with fixed prices compared with when they are set by an auction. This is consistent with the idea that market structure is important for market efficiency and that because the auction system reveals more information to investors, it reduces uncertainty. Details of the

Similar to Dewenter, Novaes and Pettway (2001), the study by Gul (1999) also focuses on the Japanese keiretsu. However, in contrast to the former, the conclusions are that group membership reduces agency conflicts. Furthermore, Gul (1999) makes the link between group-affiliation and capital structure. In particular, it is shown that keiretsu-affiliated firms are likely to have more debt in their capital structure. The reason given for this is that conflicts between debt and equity holders in these firms are less severe because the main bank around which the group centres is also likely to be the main shareholder[7]. However, although this explanation may be applicable to the Japanese case it may not necessarily apply to business groups in other countries where the group is not formed around a main bank. For instance, one of the features that distinguish the Indian business houses from the Japanese keiretsu is the absence, in the case of the former, of a main bank. An alternative link between business groups and the capital structure decision in the case of countries such as India may be cultural factors. This is the subject in the next section.

6.2.3 Culture and control considerations

The relevance of culture to the capital structure decision is the subject of Gleason, Mathur, and Mathur (2000). The study draws from the organisational behaviour theory

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empirical procedures and results in Dewenter, Novaes and Pettway (2001) are presented in Appendix 6A, Note (3).

[7] Details of the empirical procedures and results in Gul (1999) are presented in Appendix 6A, Note (4).

proposed by Hofstede (1984) and suggests that the capital structure decision may be influenced by culture. Hofstede (1984) suggests that business organisation is influenced by cultural characteristics such as power distance, masculinity, individualism and uncertainty avoidance. Gleason, Mathur, and Mathur (2000) find that some of these characteristics influence the amount of debt in a firm's capital structure.[8] But cultural factors have also been suggested as a plausible alternative to economic oriented explanations to the prevalence of business groups in developing countries. Thus, the link between capital structure and business group affiliation may be explained in term of agency theory as in Gul (1999), or alternatively by cultural factors.

Cultural factors to explain the importance of business groups have been suggested by a number of researches, often due to failure of economic rationales to explain this phenomenon. An example is Khanna and Rivkin (2001) who study the association between group-affiliation and firm's profitability in fourteen emerging markets. It is found that in most markets group-affiliated firms tend to be more profitable compared

[8] Based on survey results collected from IBM subsidiaries in 40 countries, Hofstede (1984) identifies four dimensions of culture: power distance, masculinity, individualism and uncertainty avoidance. Power distance is defined as relating to the degree of inequality in society, where a culture with small power distance is more concerned with equality and less with authoritative manner. Masculinity is explained as the extent to which a culture can be characterised by traits such as competitiveness and assertiveness, while individualism describes the degree to which the society is individualistic or collectivist. Finally uncertainty avoidance describes attitude towards uncertainty. Gleason, Mathur, and Mathur (2000) test whether debt levels are determined by cultural differences including power distance, masculinity and uncertainty avoidance. Their results are given in Note (5) of Appendix 6A.

with non-affiliated firms. Further, it is concluded that due to member firms sharing the cost and benefits of being affiliated with a particular group, the profit rates within groups are more similar than profit rates between groups. The authors, however, find it difficult to explain these results in terms of either groups as responses to capital market imperfections or groups as rent-seeking devices. Particularly, if groups alleviate market imperfections and substitute for missing institutions, than there should be a direct association between the positive effects of business groups and the level of imperfections in the capital market. Similarly, if groups fulfil the role of rent seeking devices than they should enable member firms to obtain favours from the political system and a strong association should be observed between group effects and the level of corruption and distortions in the economy.

Thus in the final part of their paper, Khanna and Rivkin (2001) investigate the correlation between the importance of group-affiliation and proxies for market conditions in the countries studied. However, the correlation between the importance of groups and the conditions in the markets studied do not support the notion that group effects are related to market inefficiencies in a way that is consistent with various economic explanations. In particular the study fails to find support for either the market failure or rent seeking predictions. The authors suggest that this may be due to variation across countries in the way business groups are defined, or is indicative of the weakness of economic factors in explaining the group phenomenon. It is thus suggested that perhaps cultural and sociological factors can better explain the business group phenomenon. This view corresponds to the social structure theory on business groups, which is tested in Guillen (2000). [9]

Guillen (2000) notes that consistent with social structure theory, high distance power cultures, whose social order is based on inheritance rules, lend themselves particularly well to the business group structure. This may explain the prevalence of the family controlled groups in less developed countries, which Hofstede (1984) notes are typically authoritarian[10]. Furthermore, the patrimonial social structure in these markets implies that maintaining family control is seen as vital. Indeed, Khanna and Palepu (1999) note that family controlled business groups in many developing countries have traditionally focused on growth rather than profitability. (It is also noted that this practice has often been driven and encouraged by government intervention policies aimed at creating jobs.) However, because debt allows family control to be maintained, group-affiliated firms have preferred to finance growth by external debt rather than by external equity.[11]

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[9] Empirical procedures and results for the study by Khanna and Rivkin (2001) are given in Appendix 6A, Note (6).

[10] In particular, Hofstede (1984, page 216) chooses to describe the implicit model for the Indian organisation as the family.

[11] It may, however, be appropriate to mention that the results in Guillen (2000) do not support the social structure view. Specifically, the hypothesis that the higher the power distance in a society, the greater the importance of business groups is rejected by the empirical investigation. Details of this study are given in Appendix 5A, Note (3).

To conclude, cultural-driven control considerations may be particularly important to business groups leading to preference for debt over external equity. Other factors that have been suggested to differentiate the capital structure decision of group-affiliated firms from that of non-affiliated firms include agency costs, and asset sharing. Specifically, the business group structure may result in more or less agency conflicts or extra sensitivity to trade off considerations and to the risk of default due to intra-group dependency. The next stage is to build a model that captures these differences.

6.3 The model

The empirical model is a cross-sectional regression of leverage on variables that are predicted to be important in explaining the capital structure decision. In the first stage the explanatory variables include only characteristics at the firm level. The idea is to assess whether a single model is good at explaining the capital structure decision of both group-affiliated and non-affiliated firms. Alternatively debt ratios of group-affiliated and non-affiliated firms may differ because capital structure determinants of these two categories of firms are either not the same or do not behave the same. If this is the case, it is expected that the null hypothesis of stable coefficients in a pooled model should be rejected.

In the second stage of the multivariate analysis, explanatory variables at the group-level as well as interaction terms between firm-level variables and group affiliation dummies are added to the model. The idea is to assess whether the capital structure decision of group-affiliated firms may be explained in terms of the various business group theories. Starting with the model that includes firm-level characteristics only, these two models are outlined below.

6.3.1 The multivariate model at the firm level

The firm level explanatory variables are drawn from the capital structure literature, and in the spirit Booth Aivazian, Demirguc-Kunt and Maksimovic (2001), attempt to incorporate variables representing the trade off, agency, and pecking order theories. The general model is of the following form.

$$LEVERAGE_i = \alpha + \beta_1 \text{ (NON-DEBT TAX SHIELD)}_i + \beta_2 \text{ (LIQUIDITY)}_i + \beta_3 \text{ (INTANGIBILITY)}_i + \beta_4 \text{ (FIRM SIZE)}_i + \beta_5 \text{ (AGE)}_i + \beta_6 \text{ (STOCK ILLIQUIDITY)}_i + \beta_7 \text{ (GROWTH)}_i + \beta_8 \text{ (PROFITABILITY)}_i + \Sigma_{(j=1 \text{ to } 11)} \gamma_j \text{ (INDUSTRY}_j)_i + \varepsilon_I \tag{6.1}$$

Where LEVERAGE is the debt ratio, measured as total debt to quasi market value of total assets (LEV2). Other measures of leverage were also experimented with as will be noted in the empirical sections. Definitions for LEV2 and for the alternative measures of leverage are given in Panel A of Table 6.2. Definition and prediction for each of the RHS variables are explained below, while detailed definitions for all variables are given in Panel B of Table 6.2.

Table 6.2: Variable definitions

Panel A: Debt measures

Variable name	Variable definition	Correlation with group affiliation
LEV1	Total liabilities / Quasi market value of total assets	(+)
LEV2	Total debt / Quasi market value of total assets	(+)
LEV3	Total debt / Quasi market value of net assets	(+)
LEV4	Total debt / Quasi market value of capital	(+)
L_DEBT	Long-term debt / Quasi market value of capital	(+)
S_DEBT	Short-term debt / Quasi market value of capital	(-)
B_DEBT	Bank loans / Quasi market value of capital	(-)
GOV	Loans from government / Total borrowings	(+)
FOREIGN	Direct foreign borrowings / Total borrowings	(+)
INTERNAL	Loans from group companies / Loans from corporate bodies	Not applicable

Total liabilities = preference capital + total borrowings + current liabilities & provisions;
Total debt = preference capital + total borrowings;
Short term debt = short term bank borrowings + commercial paper + current portion of long term debt;
Long term debt = preference capital + total borrowings – short term debt;
Quasi market value of total assets = book value of total assets – equity capital – reserves + market capitalisation;
Quasi market value of net assets = total assets – current liabilities;
Quasi market value of capital =preference capital + total borrowings + market capitalisation

Panel B: Definition and predicted signs of the firm-level explanatory variables

Trade-off theory: benefits of debt	
NON-DEBT TAX SHIELD = Log (depreciation)	(-)
Trade-off theory: financial distress costs	
LIQUIDITY = Current assets / Current liabilities	(+)
INTANGIBILITY = (R&D plus advertising) / Sales	(-)
FIRM SIZE = Log (sales)	(+)
Agency theory	
AGE = Log (firm age since incorporation)	(+/-)
STOCK ILLIQUIDITY = 1- (No. of days stock traded on BSE / Total no. of trading days)	(+)
GROWTH = Market to Book ratio	(-)
Pecking order	
PROFITABILITY = Profit before tax / Book value of total assets	(-)
Industry dummies	
Ij = A set of 11 industry dummies. Ij is set to 1 if the firm is affiliated with industry j.	(?)

Panel C: Definition and predicted signs of the group-level explanatory variables

GROUP PROFITABILITY = $\Sigma_{j\neq i}$ (profitability)$_j$ W_j. [W_j = Total assets$_j$ / $\Sigma_{j\neq i}$ (Total assets)$_j$]	(-/+)
GROUP LIQUIDITY = $\Sigma_{j\neq i}$ (liquidity)$_j$ W_j. [W_j = Current liabilities$_j$ / $\Sigma_{j\neq i}$ (Current liabilities)$_j$]	(+)
GROUP DEBT = $\Sigma_{j\neq i}$ (Debt / Equity)$_j$ W_j. [W_j = Equity$_j$ / $\Sigma_{j\neq i}$ (Equity)$_j$]	(-)
GROUP DIVERSITY = Logarithm of number of industries represented in the group.	(-/+)
GROUP SIZE = Logarithm of total sales of all firms in the group.	(-/+)
Group dummies	
GP = Equal to 1 if the firm is group-affiliated and 0 otherwise	(+)
HD = Equal to 1 if the firm is affiliated with a highly diversified group with over 11 product lines	(+)

The subscript *j* relates to all the firms in the group excluding the firm of interest, firm *i*; The debt to equity ratio is measured as the ratio of long term debt plus preference capital to the market value of equity at the year-end; GP and HD are defined more specifically in Appendix 5F of Chapter 5.

The first variable on the RHS of Equation (6.1), namely NON-DEBT TAX SHIELD, is included as a proxy for the trade off theory, and in particular as an inverse proxy for the benefit of debt in shielding income from tax liability. This may be compared with Booth Aivazian, Demirguc-Kunt and Maksimovic (2001), who use a direct measure of the tax advantage of debt, namely the average tax rate. It is measured as the log of depreciation and is expected to enter the model with a negative coefficient, because depreciation is a substitute for interest payments in shielding profits from tax liabilities. However, the impact of depreciation as a tax shield may differ for group-affiliated firms. The reason is that these firms may be able to utilise alternative non-debt tax shields that are not available to non-affiliated firms. For instance, profitable firms that are group-affiliated may shield their profits from tax liabilities by engaging in intra-group trading, as suggested in Chang and Hong (2000), thus transferring profits to less profitable members that are not in a tax paying position.

The next three explanatory variables, namely LIQUIDITY, INTANGIBILITY, and SIZE are also included as proxies for the trade off theory. However, unlike tax shield, which represents the benefits of debt, these variables measure financial distress costs, the present value of which increases with debt. First is LIQUIDITY, which is defined as the ratio of current assets to current liabilities. It stands for an inverse measure for the present value of the cost of financial distress instead of the business risk measure in Booth Aivazian, Demirguc-Kunt and Maksimovic (2001). Thus LIQUIDITY is expected to enter the model with a positive coefficient because the ability to meet obligations increases the firm's debt capacity.

The second proxy for financial distress costs is INTANGIBILITY, which is defined as the ratio of R&D plus advertising expenditure to sales. It is expected to enter with a negative coefficient, because intangible assets are expected to have less value in the case of liquidation. An alternative measure of tangibility would be the ratio of fixed to total assets as in Booth Aivazian, Demirguc-Kunt and Maksimovic (2001). However, because the non-debt tax shield is measured in terms of depreciation, using fixed assets as measure of the asset structure could have introduced multicollinearity to the model.

The third proxy for financial distress costs is SIZE, which measure the size of the firm. SIZE is measured as the log of sales as in Booth Aivazian, Demirguc-Kunt and Maksimovic (2001). It is expected to have a positive impact on debt because the risk of bankruptcy is lower for large firms due to diversification.[12]

Thus NON DEBT TAX SHIELD, LIQUIDITY and SIZE are proxies for the trade off theory and represent financial distress costs. However, due to intra-group dependency, the capital structure decision of group-affiliated firms may respond differently to these factors compared with non-affiliated firms. Intra-group dependency may be due, for instance, to internal trading at transfer pricing or debt guarantee structure

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[12] However, association between firm size and diversification may be less applicable in the Indian context because Indian firms are typically focused (Khanna and Palepu, 2000). Thus size may play a less important role in reducing financial distress costs.

within the group, both of which imply that failure of one group member may cause a chain reaction within the group. Thus the general state of the group is expected to impact the financial distress costs faced by each member firm. An affiliated firm whose other group-members are in good (poor) financial position may be less (more) sensitive to factors such as its own liquidity, size, or asset structure.

The next three explanatory variables, namely, AGE, STOCK ILLIQUIDITY, and GROWTH, are included as proxies for agency theory. The first two variables are not included in Booth Aivazian, Demirguc-Kunt and Maksimovic (2001), while the latter is included. AGE is the log of the age of the firm since incorporation, representing firm reputation. It is expected to enter the model with a positive coefficient because reputation is an asset that managers may not be willing to destroy by behaving as predicted by the agency theory of debt. However, like debt holders, equity holders are also exposed to agency behaviour by managers. This implies a negative association between age and debt ratio, because mature and reputable firms should face lower cost of equity capital. In light of this ambiguity, STOCK ILLIQUIDITY and GROWTH are also included to measure more directly the agency cost of equity and the agency cost of debt respectively.

STOCK ILLIQUIDITY is included to represent agency cost of equity and is defined as one minus the ratio of the number of days the firm's equity traded on the Bombay Stock Exchange to the total number of trading days in the period. STOCK ILLIQUIDITY is expected to enter the model with a positive estimated coefficient. This is because highly traded stock is taken to indicate confidence on the part of investors that the firm is relatively free of agency costs of equity and hence can support more equity.

GROWTH is included to represent agency cost of debt and is defined as the price to book ratio. Growth gives managers greater opportunities to engage in risk shifting and thus GROWTH is expected to enter with a negative coefficient. Furthermore, consistent with under investment agency cost of debt, highly levered firms tend to pass up profitable investments thus growing firms prefer equity to debt.

Thus AGE represent agency cost in general while STOCK ILLIQUIDITY is a proxy for agency cost of equity and GROWTH is a proxy for agency cost of debt. However, group visibility and complexity may respectively reduce or increase agency conflicts within groups as suggested in Dewenter, Novaes and Pettway (2001). Therefore the net impact of group affiliation on agency conflicts is likely to be large in either direction. This means that the three agency costs proxies, namely AGE, STOCK ILLIQUIDITY, and GROWTH, may be substantially less or more important in determining the capital structure decisions of group-affiliated firms.

The next firm level explanatory variable is the return on assets, PROFITABILITY, which is included as a proxy for pecking order theory, similar to Booth Aivazian, Demirguc-Kunt and Maksimovic (2001). It is defined as the ratio of profit before tax to the total book value of assets, and is expected to enter the model with a negative coefficient. This is because profitable firms can rely on internal funds, which are higher up the preference order. If, however, groups can create internal markets than the debt ratios of group-affiliated firms should display less sensitivity to pecking order considerations[13]. In contrast it could be argued that groups are particularly sensitive to external exposure due to agency behaviour and because the agendas of the controlling entity are not always that of maximising shareholder wealth. Instead the controlling entity may, for instance, pursue the objective of supporting other member firms or providing jobs to family members. In that case internal finance should be relatively more important to group-affiliated compared with non-affiliated firms. In any event profitability, like the other variables of Equation (6.1) is expected to be unstable across independent and group affiliated firms.

Finally, INDUSTRY is a set of 11 industry dummies, which measure the change in the constant due to affiliation with industry *j*. More specifically the dummy variable measures the difference of industry j from the non-financial services. The list of industry dummies is given in Appendix 5F of Chapter 5.

6.3.2 The multivariate model incorporating group level variables and interaction terms

The interaction terms between group affiliation and firm level characteristics are included to measure the change attributed to group-affiliation. The group level explanatory

[13] Group affiliation may reduce pecking order related dependency of a firm on its profitability as a source of finance by creating internal capital markets. This can take the form of paying dividends when there are cross shareholding within the group or by passing profits within the group by other means such as transfer pricing or advancing loans at favourable terms.

variables are chosen to represent the various business group theories and are based in particular on Chang and Hong (2000). The model is specified as follows:

$$LEVERAGE_i = \alpha_1 + \alpha_2\ GP_i + \alpha_3\ HD_i + \beta_1\ (NON\text{-}DEBT\ TAX\ SHIELD)_i + \beta_2\ (LIQUIDITY)_i + \beta_3\ (INTANGIBILITY)_i + \beta_4\ (FIRM\ SIZE)_i + \beta_5\ (AGE)_i + \beta_6\ (STOCK\ ILLIQUIDITY)_i + \beta_7\ (GROWTH)_i + \beta_8\ (PROFITABILITY)_i + \delta_1\ (NON\text{-}DEBT\ TAX\ SHIELD_i)\ GP_i + \delta_2\ (LIQUIDITY_i)\ GP_i + \delta_3\ (INTANGIBILITY_i)\ GP_i + \delta_4\ (FIRM\ SIZE_i)\ GP_i + \delta_5\ (AGE_i)\ GP_i + \delta_6\ (STOCK\ ILLIQUIDITY_i)\ GP_i + \delta_7\ (GROWTH_i)\ GP_i + \delta_8\ (PROFITABILITY_i)\ GP_i + \Omega_1\ (NON\text{-}DEBT\ TAX\ SHIELD_i)\ HD_i + \Omega_2\ (LIQUIDITY_i)\ HD_i + \Omega_3\ (INTANGIBILITY_i)\ HD_i + \Omega_4\ (FIRM\ SIZE_i)\ HD_i + \Omega_5\ (AGE_i)\ HD_i + \Omega_6\ (STOCK\ ILLIQUIDITY_i)\ HD_i + \Omega_7\ (GROWTH_i)\ HD_i + \Omega_8\ (PROFITABILITY_i)\ HD_i + \psi_1\ (GROUP\ PROFITABILITY)_i + \psi_2\ (GROUP\ LIQUIDITY)_i + \psi_3\ (GROUP\ DEBT)_i + \psi_4\ (GROUP\ DIVERSITY)_i + \psi_5\ (GROUP\ SIZE)_I + \Sigma_{(j\ =\ 1\ to\ 11)}\gamma_j\ (INDUSTRY_j)_i + \varepsilon_i \tag{6.2}$$

Where LEVERAGE, the RHS variables with β coefficients and INDUSTRY are as defined for Equation (6.1) and summarised in Panels A and B of Table 6.2. Definition and prediction for the rest of the RHS variables are explained below and summarised in Panel C of Table 6.2.

GP and HD are group-affiliation dummies that are included to measure the change in the constant when the firm is affiliated with a business group and their inclusion is in the spirit of the study by Khanna and Palepu (2000a). GP is set to one if the firm is a member of a business group and zero otherwise. HD is set to one if the firm is affiliated with a group that is diversified over more than 11 product lines and zero otherwise. Thus HD measures the extra change in the constant in additional to the change reflected in GP, if the firm is affiliated with a highly diversified group. GP and HD are predicted to enter the model with positive estimated coefficients. This prediction is based on control considerations, due to which external debt is preferred to external equity and which are expected to be particularly important for group-affiliated firms. Further, a positive impact of GP and HD on the constant is also consistent with the market failure and political economy theories of business groups. Accordingly, group affiliation increases access to external funds through the sharing of group-wide reputation and policy distortions. Thus group-affiliated firms have better access to external funds, and debt is preferred to equity because of control and pecking order considerations[14].

The two set of interaction terms with the coefficients donated by δ and Ω are included to measure the change in the slopes of the firm level characteristics (as represented by β) when the firm is group-affiliated. The δ coefficients measure the change in the slopes of the firm level characteristics *(β)* when the firm is group-affiliated. The Ω coefficients measure the extra change in β, in addition to the change measured by

[14] However, to the extent that groups (particularly diversified groups) add complexity in the Dewenter, Novaes and Pettway (2001) sense, agency costs of debt should be higher for group-affiliated firms. This implies negative coefficients on the group dummy variables, GP and HD.

δ, when the firm is affiliated with a highly diversified group. If group affiliation impacts the sensitivity of the leverage decision to firm factors, than δ and Ω should be significantly different from zero.

The set of variables, which are preceded by ψ as coefficients are the group-level explanatory variables. These variables measure various characteristics of the group with which a firm is affiliated and are set to zero for non-affiliated firms. They are included to test how group-wide reputation influences the ability of the firm to access external debt. Consistent with Chang and Hong (2000) the idea is that a firm can access external debt more easily and at lower cost if it is associated with a reputable group. This is due to complex structure of debt guarantees within groups, which means that the bankruptcy of one member firm may result in a series of bankruptcies across the group.

GROUP PROFITABILITY, GROUP LIQUIDITY, and GROUP DEBT are selected and measured in line with the approach in Chang and Hong (2000). Particularly these variables are based on the weighted averages for the relevant values of other firms in the group for which the required data is available. GROUP PROFITABILITY is measured as the weighted average of the returns on assets of other firms in the group where the weighting series is total assets. GROUP LIQUIDITY is measured as the weighted average of the current ratios of other firms in the group, where the weighting series is current liabilities. GROUP DEBT is measured as the weighted average of the long-term debt to equity ratios of other firms in the group where the weighting series is the equity base.

GROUP PROFITABILITY and GROUP LIQUIDITY are expected to be positively related to firm debt, because profitable and liquid groups should enhance the reputation and debt capacity of member firms. In contrast, GROUP DEBT is predicted to have a negative impact on firm debt because the higher the debt levels of other firms in the group the lower the debt capacity of the firm. It could also, however be argued that firms that are affiliated with profitable groups need to rely less on external finance due to internal transfers. Hence theoretically GROUP PROFITABILITY like GROUP DEBT may enter the model with a negative coefficient.

GROUP DIVERSITY is measured as the log of the number of industries represented in the group with which the firm is affiliated. Group diversification is assumed to reduce the probability of bankruptcy and thus the present value of the costs of financial distress. Therefore, if group affiliation is important, and the group has created reputation for establishing internal markets and for support for member firms, than GROUP DIVERSITY should enter the model with a positive estimated coefficient. In contrast it could be argued that diversified groups typically have complex structure, which makes management behaviour more difficult to monitor. This suggests more opportunities for risk shifting and under investment, which should have a negative impact on access to debt. Thus the association between GROUP DIVERSITY and firm debt could be either positive or negative[15].

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[15] GROUP DIVERSITY is closely related to the HD dummy and to the extent that HD captures group diversity, GROUP DIVERSITY may appear insignificant.

Finally, GROUP SIZE is measured as the log of total sales of all the firms in the group. Consistent with Dewenter, Novaes and Pettway (2001) a large group implies high visibility, which ensures that information about the group activities is widely available thus reducing the opportunities for managers to engage in risk shifting, under investment, or other agency behaviour. If group-affiliation is important and visibility reduces the agency costs of debt than GROUP SIZE should enter the model with significant and positive estimated coefficient. However, if the impact of visibility on reducing the agency costs of equity is stronger than its impact on reducing the agency costs of debt, than GROUP SIZE should enter the model with a negative coefficient. Furthermore, if complexity increases with size than the positive impact of visibility on reducing agency costs can be offset by the adverse effect of complexity. This may lead to GROUP SIZE appearing unimportant in determining the debt level of the affiliated firm, or its impact may turn out small in magnitude.

6.4 Data and measurement

This section begins with a brief description of the corporate financial environment underlying the capital structure decisions of the population from which the sample is extracted, namely India. This is followed by description of the sample and finally with a description of various debt measures and prediction of how these should vary across group-affiliated and non-affiliated firms.

6.4.1 Corporate capital structure in India and sources of external funds for investment

Prior to the economic reforms the capital structure of Indian firms was mainly imposed upon managers through state control and regulations, and thus the capital structure choice and the puzzle that surrounds it, were irrelevant for that economy. However since 1991 the freedom of firms to select their capital mix has gradually increased, and with it the importance of the question, of how firms in India decide on their capital structure.

Ganesh-Kumar, Sen and Vaidya (2001) note that external sources are the most important sources of funds for firms in India. For their sample of 714 firms, about 70 percent of funds during each of the years 1993 to 1998 are reported to come from external sources. This is consistent with the findings in Singh (1995) but inconsistent with pecking order and with the practices of firms in developed countries. Ganesh-Kumar, Sen and Vaidya (2001) suggest that the reliance on external sources may be due to underdeveloped infrastructure. In particular this may force firms to make large investments in plant and machinery for which internal funds are insufficient.

Thus Indian firms rely heavily on external finance to fund their operations, and these funds come from principally three sources including banks, non-bank financial institutions and capital markets. The first of these three sources, namely the banking sector, is the main provider of short-term working capital. Banks in India are characterised by having widely spread branches, which may be traced back to the late 1960s when social objectives led the authorities to encourage banks to expand into rural areas. Another important feature of the Indian banking sector is that following nationalisation of banks in 1969 and 1980, and in spite of the reforms-led relaxation of entry restrictions of new private banks, the banking sector is still principally in public ownership. Thus, as noted in Joshi and Little (1997), the wide spread of bank branches has facilitated adequate resource mobilisation although government intervention led to inefficient resource allocation.

However, while prior to 1991 banks were operating under interest rate controls, directed credit programmes to priority sectors, and mandatory reserve requirements, substantial changes have taken place since then. Specifically by 1994, most regulations on interest rates were removed, reserve requirements eased, and public sector banks were allowed to use the capital markets to issue new capital. Thus since 1991 India has gone some way towards increasing the efficiency of the banking sector.

The second source of external funds to Indian firms, are non-bank financial institutions, of which the development financial institutions are the traditional source of long-term borrowings. Indeed development finance institutions were set up with the aim of providing long-term and medium-term finance for investment and for this purpose were provided with subsidised credit. Similar to banks, the operations of the development financial institutions were highly controlled including the direction of credit at predetermined rates to firms that obtained licenses. However, as in the case of banks, the financial liberalisation introduced substantial changes to the environment in which the development finance institutions operate. These included interest rate deregulation, abolition of licenses and reduction in government subsidies, which have forced these institutions to compete for funds in the capital markets.

The third source of external funds to Indian firms is the capital market. Stock markets in India are relatively liquid when compared with other developing countries[16]. However, before the financial reforms, equity issues were heavily regulated by the Office of the Controller of Capital including restrictions on the quantity, pricing and timing of new issues. Likewise the pricing of corporate debentures were subject to interest rates ceilings. In 1991 interest rates restrictions were lifted and a year later the Office of the Controller of Capital was abolished. Further, the National Stock Exchange was set up to compete with the Bombay Stock Exchange. Other reforms included increasing the supply of finance by allowing foreign institutional investors to enter the Indian capital markets as well as allowing Indian companies to raise funds directly from offshore markets. As consequences, Ganesh-Kumar, Sen and Vaidya (2001) show that between 1993 and 1995 the share of capital markets as a source of funds has increased to between 30 and 40 percent of total sources of funds.[17]

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[16] Demirguc-Kunt and Maksimovic (1995) compare three stock market development indicators across thirty developed and developing countries for the period 1980 to 1991. Liquidity is measured in terms of the turnover ratio which is defined as the ratio of total value of shares traded during the period to market capitalisation. Indeed, the turnover ratio reported for India, at a value of 59 percent, is higher than most of the developing and developed countries in the sample. The turnover ratio for 1999 is even higher at 84.4 percent as reported by the emerging stock markets factbook, 2000.

[17] Ganesh-Kumar, Sen and Vaidya (2001) also show, however, that this trend did not last and between 1996 and 1998 the use share of capital market as a source of funds has dropped to between 15 and 20 percent.

Thus by the year 2000, which is the period investigated here, it can be assumed that the selected sample of Indian firms are generally free to select how much external finance to raise and in what form. A description of this sample of Indian firms is the subject of the next section.

6.4.2 Data

The data are retrieved from PROWESS database provided by the Centre for Monitoring the Indian Economy (CMIE) and updated to 22 March 2001. The initial data set includes the universe of all quoted and unquoted Indian Private Sector firms available on PROWESS, totalling 6,548 firms, and comprising 4,506 independent firms and 2,042 group affiliated firms. The 2,042 group-affiliated firms are associated with 375 business houses as listed in Appendix 5C, and comprise the sample used to construct the group level variables[18].

The period studied is the year ending March 2000 which may be criticised as unrepresentative and arbitrary. However, as noted in Section 5.4.1 of Chapter 5, group affiliation, which is at the centre of this study, is available on PROWESS only as a data variable at a given point in time. The use of one year is thus rationalised by the wish to

[18] For further information on the characteristics of the initial sample and the distribution of group-affiliated firms across various types of groups, refer to the top part of Appendix 5D.

avoid making the assumption that group affiliation is stable over time.[19] Furthermore, Green, Murinde and Suppakitjarak (2001) who study the financial structure of Indian firms in the period 1991 to 1996, observe significant year-to-year changes, particularly for quoted companies. To the extent that such variations are assumed to continue into the latter part of the 1990s this should weaken the argument for using averages. The selection process involved dropping some firms as follows.

Firms, which were dropped, include unlisted firms, financial firms, firms without the required raw data, and firms with a year ending date other than March 2000. This procedure resulted in a sample of 1,811 firms, which is the basis for the comparison analysis of the next section. The sample includes 1,146 independent firms and 665 group-affiliated firms of which 314 firms are affiliated with groups classified as diversified. Of the 314 firms that are affiliated with diversified groups a total of 131 firms are affiliated with highly diversified groups.[20] In the process of constructing the variables further observations were dropped leading to samples of 1,472 and 1,384 for the models specified in (6.1) and (6.2), respectively. Table 6.2 gives variable definitions while Table 6.3 presents the descriptive statistics for the sample.

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[19] For rationale for choosing March as the year ending date and for the reason for focusing on a single year, refer to footnote 21 of Chapter 5.

[20] The group dummies GP and HD are based on a count of the number of product lines represented in the group. A total of 41 product lines are identified and these are listed in Appendix 5F of Chapter 5, while derivation of GP and HD is given in Appendix 5B of the same chapter.

Table 6.3. Descriptive statistics and correlation matrix
1,472 Non-financial BSE listed firms in the Indian Private Sector with year end March 2000

PANEL A: Explanatory variables at the firm level

	Mean	Standard Deviation	LEV2	NON-DEBT TAX SHIELD	LIQUIDITY	INTANGIBILITY	FIRM SIZE	AGE	STOCK ILLIQUIDITY	GROWTH
LEV2 (Debt/Assets)	0.419	0.235	1							
NON-DEBT TAX SHIELD	0.404	1.766	0.270	1						
LIQUIDITY (CA/CL)	5.762	16.726	-0.143	-0.128	1					
INTANGIBILITY	0.008	0.022	-0.179	0.038	0.015	1				
FIRM SIZE	3.807	1.745	0.145	0.840	-0.102	0.075	1			
AGE	2.983	0.633	-0.008	0.329	-0.104	0.099	0.377	1		
STOCK ILLIQUIDITY	0.407	0.357	0.049	-0.575	-0.001	-0.129	-0.547	-0.131	1	
GROWTH (P/B)	1.508	8.332	-0.186	0.096	0.033	0.062	0.099	-0.001	-0.085	1
PROFITABILITY	0.032	0.093	-0.396	0.017	0.124	0.110	0.151	0.023	-0.210	0.181

Variables are defined in Table 6.2

PANEL B: Firm level variables obtained from auxiliary regressions and group-level variables

	Firm level variables obtained from auxiliary regressions (Number of Observations: 1472)			Group-level variables (Number of Observations: 472 group-affiliated firms that are included in Table 6.6)				
	RESIDUAL TAX SHIELD	RESIDUAL SIZE	RESIDUAL AGE	PROFITABILITY	LIQUIDITY	DEBT	DIVERSITY	SIZE
Mean	-0.006	-0.010	0.002	0.011	3.079	0.895	1.775	7.369
Standard deviation	0.891	0.893	0.579	0.082	1.651	2.720	0.902	1.689

The three variables listed on the right hand side of the table are the residuals obtained from the auxiliary regressions. These are the regressions of NON-DEBT TAX SHIELD, FIRM SIZE and AGE, on a constant and the rest of the firm level explanatory variables
All variables are defined in Table 6.2.

As is evident from Panel A of Table 6.3 some of the firm level explanatory variables are correlated in a way that may cause multicollinearity problems. The principle culprits include NON-DEBT TAX SHIELD, FIRM SIZE and AGE. For instance the correlation between NON-DEBT TAX SHIELD and STOCK ILLIQUIDITY is –0.58 and between NON-DEBT TAX SHIELD and FIRM SIZE it is 0.84. SIZE has a correlation coefficient of –0.55 with STOCK ILLIQUIDITY while its correlation with AGE is 0.38. Similarly, AGE has a correlation coefficient of 0.33 with NON-DEBT TAX SHIELD.

To overcome possible multicollinearity problems the three variables suspected of causing difficulties are replaced by their residuals from auxiliary regressions. Specifically NON-DEBT TAX SHIELD is regressed on a constant and the rest of the firm level explanatory variables. The series of residuals obtained, RESIDUAL TAX SHIELD, provides an alternative measure to the NON-DEBT TAX SHIELD. Similar procedures resulted in alternative measures for FIRM SIZE (namely, RESIDUAL SIZE) and AGE (namely RESIDUAL AGE). Panel B of Table 6.3 presents the descriptive statistics for these alternative variables, as well as the descriptive statistics for the five group level explanatory variables that are included in Equation (6.2).

6.4.3 Debt measurements and comparison of group-affiliated and non-affiliated firms

One of the main implications that arise from the conclusions in a number of studies reviewed above is that the capital structure of group-affiliated firms could be different to that of non-affiliated firms. For example, Gul (1999) and Dewenter, Novaes and Pettway (2001) note that group-affiliation can impact agency conflicts, which is an important determinant of the capital structure decision. Similarly, Khanna and Palepu (1999) argue that control considerations within groups have often led to the capital structure of group-affiliated firms to be incompatible with their asset structures. Thus as an initial testing method and before carrying out the multivariate analysis, a simple comparison of debt ratios across group affiliation categories is conducted.

The bivariate analysis compares nine measures of borrowing ratios across group-affiliated and non-affiliated firms as well as across firms that are affiliated with groups at various levels of diversification. These include four alternative measures of leverage, long-term and short-term debt measures, as well as measures of bank borrowings, loans from government and foreign borrowings. In addition a comparison of intra-group loans are compared across firms affiliated with groups at various levels of diversification. Definition and prediction for each of these debt ratios are summarised in Panel A of Table 6.2, while the rationale for this prediction is detailed below.

The first four debt-ratios to be compared across group-affiliated and non-affiliated firms are alternative stock measures, based on market value of equity, as suggested in Rajan and Zingales (1995). These include the ratios of total liabilities to total assets (LEV1), total debt to total assets (LEV2), total debt to net assets (LEV3), and total debt to capital (LEV4). The prediction is that group-affiliated firms are more highly levered compared with non-affiliated firms. This prediction is based on control considerations as argued in Khanna and Palepu (1999) and on the group visibility argument put forward in Dewenter, Novaes and Pettway (2001). Alternatively, in the spirit of Dewenter, Novaes and Pettway (2001), it could be argued that due to group complexity, detecting opportunistic behaviour by group-affiliated firms is difficult. Thus group complexity reduces the ability of lenders to monitor the firm and as a result debt levels in group-affiliated firms should be lower compared with non-affiliated firms.

The fifth and sixth debt measures to be compared across group-affiliated and non-affiliated firms are the constitute parts of the forth leverage measure, namely total debt to capital (LEV4). Specifically, the ratio of total debt to capital is split into long-term debt (L_DEBT) and short-term debt (S_DEBT) measures. The prediction is that group-affiliated firms tend to use more long-term debt compared with non-affiliated firms, but that the latter tend to use relatively more short-term debt. Group-affiliated firms can save on issuing costs by using long-term debt and reducing the issuance frequency. In contrast for non-affiliated firms the issuance costs saved by using long-term debt tend not to offset the additional insolvency risk premiums that is due to low visibility and information problems. Thus finding that long-term (short-term) debt is statistically higher (lower) for group-affiliated firms compared with non-affiliated firms indicates that group affiliation adds to the creditworthiness of the firm and gives it better access to finance.

The seventh debt measure is bank borrowing to capital (B_DEBT), where bank borrowings is the total of loans sourced from banks. Similar to the argument that non-group affiliated firms should rely more on short-term debt, it is also predicted that these firms use relatively more bank loans. Indeed, it has been mentioned in Section 6.4.1 that Indian firms have traditionally relied on banks for short-term borrowings. Furthermore, group-affiliated firms have greater access to capital markets due to greater visibility, reduced information problems and the sharing of group-wide reputation. Thus B_DEBT is expected to be significantly lower for group-affiliated firms compared with non-affiliated firms.

The eighth debt measure to be compared across group-affiliated firms and non-affiliated firms is the ratio of loans from government to total borrowings (GOV). Loans from government include loans received from central government, state government, and state government owned development institutions[21]. Ghemawat and Khanna (1998) suggest that groups may be able to create favourable distortions in the allocation of capital from the state financial system. Consistent with this argument, the prediction is that loans from government will constitute a greater fraction of total debt of group-affiliated firms compared with non-affiliated firms.

The ninth debt measure is the ratio of foreign borrowings to total debt (FOREIGN), where foreign borrowing is the amount raised directly from foreign institutions. The prediction is that group visibility gives affiliated firms relatively better access to foreign borrowings. Hence the amount of foreign loans in the total amount of borrowings of group-affiliated firms should be higher compared with non-affiliated firms.

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[21] A loan such as sales tax deferred credit is treated as loans form government.

Another debt measure that is unique to group-affiliated firms is the ratio of loans from group companies to total loans from corporate bodies (INTERNAL). The prediction is that intra-group loans should constitute a major part of total loans sourced from companies for the following reasons. Consistent with the market failure theory, business groups typically pool funds from member firms, and reallocate these funds in order of priority. This internal capital market is a substitute for inefficient external capital markets, and it allows for the re-negotiation of debt in cases of financial distress. Further, Chang and Hong (2000) find evidence of cross subsidisation within groups, which may include firms selling capital to other member firms at below market prices.

6.5 Estimation and testing results

6.5.1 Results of the comparative analysis

The results from the comparison analysis are given in Table 6.4, which is split into 10 panels for each of the debt ratios as defined in Panel A of Table 6.2. The information given in Table 6.4 includes the number of observations, variance, mean and median for the full sample of all non-financial, BSE listed firms with year ending March 2000. The sample is also split into non-affiliated and group-affiliated firms, and the group-affiliated sample is further sub divided into diversified and highly diversified groups.

Table 6.4 Comparative analysis of debt ratios across group and non-group affiliated firms
Non-financial BSE listed firms in the Indian Private Sector with y/e March 2000

1. LEV1 = TOTAL LIABILITIES / TOTAL ASSETS

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.067**	**0.072**	**0.054**		**0.053**		**0.063**	
F Statistic (equality of variances)			1.329	*0.000*	1.352	*0.001*	1.133	*0.184*
Mean	**0.698**	**0.671**	**0.746**		**0.730**		**0.676**	
NORMAL Statistic (unequal variances)			6.238	*0.000*	3.863	*0.000*	0.215	*0.830*
T Statistic (equal variances)			6.008	*0.000*	3.546	*0.000*	0.205	*0.838*
Median	**0.784**	**0.760**	**0.826**		**0.812**		**0.776**	
Median test [CHI SQR (1)]			27.394	*0.000*	10.135	*0.001*	0.373	*0.542*
Mann-Whitney test			-6.114	*0.000*	-3.257	*0.001*	0.135	*0.893*

2. LEV2 = TOTAL DEBT / TOTAL ASSETS

	All firms	Non-affiliated	Group-Affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.056**	**0.058**	**0.051**		**0.048**		**0.047**	
F Statistic (equality of variances)			1.140	*0.030*	1.208	*0.021*	1.230	*0.067*
Mean	**0.434**	**0.414**	**0.466**		**0.449**		**0.416**	
NORMAL Statistic (unequal variances)			4.625	*0.000*	2.404	*0.016*	0.066	*0.948*
T Statistic (equal variances)			4.545	*0.000*	2.279	*0.023*	0.060	*0.952*
Median	**0.458**	**0.425**	**0.488**		**0.478**		**0.458**	
Median test [CHI SQR (1)]			18.139	*0.000*	4.875	*0.027*	1.174	*0.279*
Mann-Whitney test			-4.353	*0.000*	-2.162	*0.031*	-0.010	*0.992*

3. LEV3 = TOTAL DEBT / NET ASSETS

	All firms	Non-affiliated	Group-Affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.088**	**0.091**	**0.079**		**0.077**		**0.081**	
F Statistic (equality of variances)			1.159	*0.017*	1.181	*0.036*	1.128	*0.193*
Mean	**0.584**	**0.555**	**0.635**		**0.613**		**0.559**	
NORMAL Statistic (unequal variances)			5.674	*0.000*	3.241	*0.001*	0.172	*0.863*
T Statistic (equal variances)			5.564	*0.000*	3.091	*0.002*	0.164	*0.870*
Median	**0.661**	**0.627**	**0.705**		**0.693**		**0.638**	
Median test [CHI SQR (1)]			17.318	*0.000*	5.200	*0.023*	0.069	*0.792*
Mann-Whitney test			-5.537	*0.000*	-2.883	*0.004*	0.057	*0.955*

4. LEV4 = TOTAL DEBT / CAPITAL

	All firms	Non-affiliated	Group-Affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.089**	**0.093**	**0.078**		**0.077**		**0.082**	
F Statistic (equality of variances)			1.183	*0.008*	1.201	*0.024*	1.134	*0.182*
Mean	**0.602**	**0.570**	**0.658**		**0.637**		**0.581**	
NORMAL Statistic (unequal variances)			6.207	*0.000*	3.676	*0.000*	0.401	*0.689*
T Statistic (equal variances)			6.070	*0.000*	3.490	*0.001*	0.381	*0.703*
Median	**0.693**	**0.651**	**0.747**		**0.730**		**0.666**	
Median test [CHI SQR (1)]			26.383	*0.000*	10.600	*0.001*	0.009	*0.926*
Mann-Whitney test			-6.131	*0.000*	-3.314	*0.001*	-0.108	*0.914*

- Debt measures are defined in Table 6.2
- Test statistics give the difference from the non-affiliated category
- Figures in italic are the probabilities attached to the test statistics
- For description of the tests refer to Note (2) of Appendix 5E, Chapter 5

5. L_DEBT = (LONG TERM DEBT+PREF CAP) / CAPITAL

	All firms	Non-affiliated	Group-Affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.065**	**0.062**	**0.064**		**0.063**		**0.063**	
F Statistic (equality of variances)			0.972	*0.662*	0.983	*0.581*	0.980	*0.576*
Mean	**0.347**	**0.309**	**0.412**		**0.400**		**0.364**	
NORMAL Statistic (unequal variances)			8.396	*0.000*	5.692	*0.000*	2.376	*0.017*
T Statistic (equal variances)			8.428	*0.000*	5.719	*0.000*	2.396	*0.017*
Median	**0.338**	**0.272**	**0.428**		**0.409**		**0.374**	
Median test [CHI SQR (1)]			57.363	*0.000*	28.596	*0.000*	5.769	*0.016*
Mann-Whitney test			-8.416	*0.000*	-5.793	*0.000*	-2.581	*0.010*

6. S_DEBT = SHORT TERM DEBT / CAPITAL

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.045**	**0.048**	**0.040**		**0.040**		**0.038**	
F Statistic (equality of variances)			1.204	*0.004*	1.179	*0.038*	1.265	*0.044*
Mean	**0.256**	**0.261**	**0.246**		**0.237**		**0.217**	
NORMAL Statistic (unequal variances)			-1.514	*0.130*	-1.863	*0.062*	-2.445	*0.014*
T Statistic (equal variances)			-1.478	*0.140*	-1.778	*0.076*	-2.228	*0.026*
Median	**0.225**	**0.233**	**0.216**		**0.200**		**0.186**	
Median test [CHI SQR (1)]			2.230	*0.135*	5.813	*0.016*	8.120	*0.004*
Mann-Whitney test			0.770	*0.441*	1.422	*0.155*	1.972	*0.049*

7. B_DEBT = BANK LOANS / CAPITAL

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.048**	**0.053**	**0.038**		**0.033**		**0.032**	
F Statistic (equality of variances)			1.374	*0.000*	1.577	*0.000*	1.636	*0.000*
Mean	**0.281**	**0.294**	**0.260**		**0.236**		**0.220**	
NORMAL Statistic (unequal variances)			-3.289	*0.001*	-4.685	*0.000*	-4.278	*0.000*
T Statistic (equal variances)			-3.154	*0.002*	-4.121	*0.000*	-3.522	*0.000*
Median	**0.252**	**0.267**	**0.233**		**0.210**		**0.198**	
Median test [CHI SQR (1)]			7.093	*0.008*	9.858	*0.002*	8.478	*0.004*
Mann-Whitney test			2.244	*0.025*	3.424	*0.001*	3.151	*0.002*

- Debt measures are defined in Table 6.2
- Test statistics give the difference from the non-affiliated category
- Figures in italic are the probabilities attached to the test statistics
- For description of the tests refer to Note (2) of Appendix 5E, Chapter 5

8. GOV = GOVERNMENT LOANS / TOTAL BORROWINGS

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**2060**	**1362**	**698**		**321**		**130**	
Variance	**0.015**	**0.013**	**0.018**		**0.024**		**0.029**	
F Statistic (equality of variances)			1.352	*0.000*	1.813	*0.000*	2.217	*0.000*
Mean	**0.038**	**0.034**	**0.045**		**0.054**		**0.065**	
NORMAL Statistic (unequal variances)			1.879	*0.060*	2.251	*0.024*	2.026	*0.043*
T Statistic (equal variances)			1.973	*0.049*	2.697	*0.007*	2.800	*0.005*
Median	**0.000**	**0.000**	**0.000**		**0.000**		**0.000**	
Median test [CHI SQR (1)]			70.912	*0.000*	58.825	*0.000*	50.819	*0.000*
Mann-Whitney test			-5.812	*0.000*	-5.230	*0.000*	-4.803	*0.000*

9. FOREIGN = FOREIGN LOANS / TOTAL BORROWINGS

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**2060**	**1362**	**698**		**321**		**130**	
Variance	**0.005**	**0.002**	**0.010**		**0.015**		**0.018**	
F Statistic (equality of variances)			5.791	*0.000*	8.619	*0.000*	9.950	*0.000*
Mean	**0.010**	**0.004**	**0.021**		**0.031**		**0.032**	
NORMAL Statistic (unequal variances)			4.190	*0.000*	3.756	*0.000*	2.388	*0.017*
T Statistic (equal variances)			5.281	*0.000*	6.424	*0.000*	5.427	*0.000*
Median	**0.000**	**0.000**	**0.000**		**0.000**		**0.000**	
Median test [CHI SQR (1)]			55.102	*0.000*	64.172	*0.000*	44.557	*0.000*
Mann-Whitney test			-2.541	*0.011*	-2.555	*0.011*	-1.845	*0.065*

10. INTERNAL = GROUP LOANS / TOTAL CORPORATE LOANS

	All groups	Non-diversified	Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**255**	**130**	**125**		**41**	
Variance	**0.108**	**0.097**	**0.120**		**0.159**	
F Statistic (equality of variances)			1.235	*0.118*	1.645	*0.020*
Mean	**0.127**	**0.108**	**0.148**		**0.201**	
NORMAL Statistic (unequal variances)			0.968	*0.333*	1.367	*0.172*
T Statistic (equal variances)			0.970	*0.333*	1.555	*0.122*
Median	**0.000**	**0.000**	**0.000**		**0.000**	
Median test [CHI SQR (1)]			2.991	*0.084*	6.441	*0.011*
Mann-Whitney test			-0.970	*0.332*	-1.473	*0.141*

- Debt measures are defined in Table 6.2
- Test statistics give the difference from the non-affiliated category apart from debt measure 10 (INTERNAL)
- In the case of INTERNAL the test statistics give the difference from the non-diversified group category
- Figures in italic are the probabilities attached to the test statistics
- For description of the tests refer to Note (2) of Appendix 5E, Chapter 5

The petition in Table 6.4 of the group-affiliated sample according to the level of group diversification is based on Khanna and Palepu (2000a). Particularly, firms in the sub sample of diversified groups include firms that are affiliated with groups with more than four product lines. The firms in the sub sample of highly diversified groups include firms that are affiliated with groups with more than eleven product lines.[22] Further, to facilitate the discussion of how group-affiliation impact the capital structure decision, a number of tests for the difference between the various group-affiliated samples and the non-affiliated sample are presented in Table 6.4. It is to this discussion that attention is now turned[23].

The four total debt measures of Table 6.4 (LEV1-LEV4), show results that are consistent with Booth Aivazian Demirguc-Kunt and Maksimovic (2001) and with their conclusions that Indian companies tend to be highly geared. Indeed, the mean total liabilities measure (LEV1) for the full sample is reported in Table 6.4 at 69 percent. This

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[22] Firms in the diversified groups category are those for which the dummy variable GP is set to 1. Similarly, firms in the highly diversified groups category are those for which the dummy variable HD is set to 1. For description of GP and HD see Appendix 5B of Chapter 5.

[23] The tests include both parametric and non-parametric tests and are similar to those undertaken in Chapter 5, as explained in Note (2) of Appendix 5E. The following discussion is based on the general uniformity of the results from the various tests. In particular the tests of the difference in means as well as the non-parametric tests, namely the median and Mann-Whitney tests, give similar results across all debt measures. However, it should be noted that the Mann-Whitney test is a test based on ranking of the observations in order of size, and in the case of short-term debt, bank loans, government loans, foreign borrowings and intra-group loans, the number of ties is very high. Specifically, the number of observations of zero ratios is high and this may have implications for the validity of the Mann-Whitney test for these debt measures.

is close to the 0.67 percent recorded by Booth Aivazian Demirguc-Kunt and Maksimovic (2001) for the period 1980 to 1990. Likewise, excluding current liabilities and provisions, the total debt to total assets (LEV2) is reported in Table 6.4 to have a mean of 43 percent for the full sample of firms. This is similar to the approximately 35 percent reported in Booth Aivazian Demirguc-Kunt and Maksimovic (2001). This high reliance on debt could be a tradition that dates back to the pre-reforms period when interest rates ceilings, and issue price controls on equity, were imposed by the government[24].

Furthermore, the four total debt measures (LEV1-LEV4) are shown in Table 6.4 to be significantly higher for group-affiliated firms compared with non-affiliated firms. Specifically, the means are significantly higher at the 1 percent significant levels, for the sample of group-affiliated firms compared with the sample of non-affiliated firms. However, although the mean debt ratios are always higher compared with the sample of non-affiliated firms, this difference becomes smaller with the level of group diversification. In fact, for the sample of firms affiliated with highly diversified groups, the difference in the mean debt ratios from that for the non-affiliated firms is no longer statistically significant. Similar results are also evident for the median debt ratios.

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[24] As noted in Section 6.4.1, until 1992, when it was abolished, the Controller of Capital Issues (an agency of the Department of Company Affairs) regulated access to the equity markets. Also since 1992, reforms in interest rates policy have allowed institutions to increasingly determine the structure of their interest rates.

The long-term debt ratios (L_DEBT) follow a pattern similar to that of the total debt measures (LEV1-LEV4). Both the mean and the median are statistically higher for the sample of group-affiliated firms compared with the sample of non-affiliated firms, but the difference becomes smaller with the level of group-diversification. However, unlike the results for the total debt measures, for the long-term debt the difference remains significant at the 1 percent significant level, even for the sample of firms affiliated with highly diversified groups.

Short term debt (S_DEBT) and bank debt (B_DEBT) are reported in Table 6.4 to be essentially the same with means of 26 and 28 percent respectively for the full sample. This ties in with the observation in Ganesh-Kumar, Sen and Vaidya (2001) that commercial banks in India are the dominant providers of short-term credit, while non-bank financial institutions are the dominant providers of long-term credit. Furthermore, similar to the results discussed so far, the results for the short-term debt (S_DEBT) and bank debt (B_DEBT) also point to a systematic difference between the capital mix of group-affiliated and non-affiliated firms. However, in contrast to the results for the total debt and long-term debt measures, the mean and median short-term debt and bank loan ratios are lower for group-affiliated firms compared with non-affiliated firms. These differences become stronger with the level of group diversification. For the short-term debt ratio the difference is not statistically significant for the category of all groups but it is significant for the category of highly diversified groups. For the bank debt ratio, the difference between group-affiliated and non-affiliated firms is always highly significant.

The ratios for the government loans (GOV) and foreign borrowings (FOREIGN), like the general results discussed above are consistent with the predictions outlined above and summarised in Table 1. In particular the mean government and foreign debt ratios are higher for group-affiliated firms compared with non-affiliated firms. The difference becomes stronger with the level of group diversification, and is always statistically significant at the 10 percent level or higher.

For the internal debt ratio (INTERNAL), the mean for the full sample is around 13 percent of total corporate loans. This relatively low value for intra-group borrowings is consistent with the results in Green, Murinde and Suppakitjarak (2001) and with their observation that the link between firms in Indian groups is not through direct financial relationship. The mean of INTERNAL increases with the level of group diversification but the difference between the sample of firms affiliated with non-diversified groups and firms affiliated with diversified or highly diversified groups is not significant.[25]

[25] The medians for government, foreign and intra-group debt ratios are consistently zero regardless of group-affiliation status. In spite of this the median tests are consistent with the results for the parametric tests of the mean. The reason for this is that the median test compares the fraction of observations at or below the median in each category. A significant test statistics indicates that these fractions are different across the categories. For instance, in the case of government loans, the fractions of observations at or below the overall median (observations at or below the median / total observations) are as follow. 79% for the sample of non-affiliated firms, 61% for the sample of group-affiliated firms, 58% for the sample of firms affiliated with diversified groups, and 51% for firms affiliated with highly diversified groups. Similarly for the foreign borrowing ratio the fraction of observations at or below the overall median are 98%, 91%, 89% and 88% for non-groups, all groups, diversified groups and highly diversified groups respectively. For the intra-group loan measure, the fraction of observations at or below zero are 89% for

6.5.2 *Results from the multivariate analysis*

As noted in Section 6.3, the empirical procedure includes two stages, both using Ordinary Least Squares (OLS). The approach is the general to specific where the general models are as specified in Equation (6.1) and Equation (6.2) for the firm level and group level stages respectively. The dependent variable in all the regressions reported in the body of the text is the ratio of total debt to the quasi market value of total assets (LEV2), as defined in Panel A of Table 6.2. However, the regressions were also run on the other three leverage measures (LEV1, LEV3, and LEV4) and on the ratio of long-term debt to capital (L_DEBT), as defined in Panel A of Table 6.2. These additional regressions gave results similar to those for the LEV2 regressions, although the diagnostic tests appear to consistently favour the LEV2 models[26].

Furthermore, each equation is also run by replacing some of the firm level explanatory variables with the residuals obtained from auxiliary regressions, the descriptive statistics of which, are presented in Panel B of Table 6.3. This procedure is designed to mitigate the impact of multicollinearity among the explanatory variables as discussed in Section 6.4.2. Specifically, the three variables NON-DEBT TAX SHIELD, FIRM SIZE, and AGE, are replaced by the residuals obtained by regressing each of these

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the non-diversified sample, 82% for the diversified groups sample and 73% for the highly diversified groups sample. These results suggest a positive association between group-affiliation and group level diversification and between the use of government, foreign and internal loans.

[26] The additional regressions for the model of Equation (6.1) are presented in Appendix 6B, while those for the model of Equation (6.2) are given in Appendix 6C.

variables in turn on a constant and the remaining seven firm level explanatory variables. The results obtained are similar to those from the original regressions and are reported along side the original regressions.

6.5.2.1 Results from the multivariate analysis at the firm-level

The general model is defined in Equation (6.1) where the explanatory variables include only characteristics of the firm. The hypothesis to be tested is that group-affiliated firms behave fundamentally different from non-affiliated firms in taking capital structure decisions. The specified model of Equation (6.1) is applied to the pooled sample and then separately to the sub samples of non-affiliated and group-affiliated firms, followed by a Chow test for stability. The results are presented in Table 6.5 for both the original variables (Panel A) and when some of these are replaced by their residuals (Panel B).

In studying Table 6.5, it is important to note that the testing down procedure was carried out with the aim of optimising the model fitted to the pooled sample of all firms. Indeed, the Wald tests reported at the bottom of both Panel A and Panel B of Table 6.5 do not reject the null hypothesis that jointly the coefficients dropped from the general models are unimportant. This testing down approach is aimed to avoid biasing the results towards one or another categories of firms. Nonetheless, some bias towards a good fit for the sub sample of non-affiliated firms may be still present because over 60 percent of the firms in the pooled sample are non-affiliated firms.

Table 6.5 Ordinary Least Squares regressions of LEV2 (Debt /Assets) on firm-level characteristics. 1,472 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000.

Panel A: Original explanatory variables

	All firms (General model)			**All firms (Specific model)**			**Non-affiliated firms**			**Group-affiliated firms**		
Regression	1			2			3			4		
Mean of dep. var.	0.419			0.419			0.402			0.448		
Std. dev. of dep.	0.235			0.235			0.238			0.226		
Sum of squared residuals	52.758			52.944			34.178			16.682		
Variance of residuals	0.036			0.036			0.038			0.030		
Std. error of regression	0.191			0.190			0.195			0.175		
R-squared	0.348			0.346			0.338			0.417		
Adj R-squared	0.340			0.341			0.329			0.404		
LM het. Test	6.831 [0.009]			5.017 [0.025]			1.392 [0.238]			2.914 [0.088]		
Jarque-Bera test	0.876 [0.645]			0.482 [0.786]			6.686 [0.035]			6.687 [0.035]		
Ramsey's RESET2	0.284 [0.594]			0.762 [0.383]			0.030 [0.863]			13.170 [0.000]		
F (zero slopes)	40.874 [0.000]			64.371 [0.000]			38.231 [0.000]			32.593 [0.000]		
Schwarz B.I.C.	-288.279			-311.209			-159.153			-148.077		
Log likelihood	361.223			358.622			203.454			189.208		
Number observations	1472			1472			912			560		
Variable	**Coeff**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.468	12.793	0.000	0.454	15.714	0.000	0.444	11.628	0.000	0.500	11.894	0.000
NON-DEBT TAX	0.055	8.481	0.000	0.051	12.507	0.000	0.068	11.372	0.000	0.030	5.211	0.000
LIQUIDITY	-0.001	-2.063	0.039	-0.001	-2.035	0.042	-0.001	-2.017	0.044	0.002	0.813	0.417
INTANGIBILITY	-1.128	-4.323	0.000	-1.153	-4.414	0.000	-0.855	-2.722	0.007	-1.509	-2.947	0.003
FIRM SIZE	-0.007	-1.116	0.264									
AGE	-0.031	-3.423	0.001	-0.033	-3.749	0.000	-0.034	-2.700	0.007	-0.031	-2.621	0.009
STOCK ILLIQUIDITY	0.086	4.410	0.000	0.091	4.638	0.000	0.123	5.116	0.000	0.045	1.291	0.197
GROWTH	-0.003	-1.879	0.060	-0.004	-1.914	0.056	-0.007	-4.335	0.000	-0.002	-0.777	0.437
PROFITABILITY	-0.739	-6.807	0.000	-0.759	-7.204	0.000	-0.553	-4.363	0.000	-1.133	-5.304	0.000
I1 (food & beverages)	0.093	3.918	0.000	0.084	4.194	0.000	0.102	4.060	0.000	0.030	0.944	0.346
I2 (Textiles)	0.149	6.849	0.000	0.142	8.317	0.000	0.121	5.375	0.000	0.162	6.403	0.000
I3 (Chemicals)	0.071	3.861	0.000	0.065	5.032	0.000	0.067	3.953	0.000	0.051	2.652	0.008
I4 (Mineral products)	0.027	1.040	0.298									
I5 (Metals)	0.062	2.748	0.006	0.052	2.919	0.004	0.050	2.059	0.040	0.037	1.402	0.162
I6 (Machinery)	-0.004	-0.210	0.834									
I7 (transport equipment)	0.019	0.714	0.476									
I8 (Misc. manufacturing)	0.074	2.756	0.006	0.069	2.941	0.003	0.061	2.015	0.044	0.079	2.327	0.020
I9 (Diver. Manufacturing)	0.034	0.708	0.479									
I10 (Mining)	0.039	0.555	0.579									
I11 (Electricity)	-0.051	-0.685	0.494									

Standard Errors are heteroskedastic-consistent (HCTYPE=2).
The dependent variable is defined in Panel A of Table 6.2.
The explanatory variables are defined in Panel B of Table 6.2

WALD TEST - TESTING SEVERAL COEFFICIENTS JOINTLY [Equation (1) versus Equation (2)]:
F(7 1453) Test Statistic: 0.735 Upper tail area: 0.642

CHOW TEST FOR STABILITY [Equation (2) Versus Equations (3) and (4) separately]:
F(12 1448) Test Statistic: 4.945 Upper tail area: 0.000

Panel B: Residuals from auxiliary regressions replace the explanatory variables: NON-DEBT TAX SHIELD, FIRM SIZE and AGE.

	All firms (General model)			**All firms (Specific model)**			**Non-affiliated firms**			**Group-affiliated firms**		
Regression	5			6			7			8		
Mean of dep. Var.	0.419			0.419			0.402			0.448		
Std. Dev. Of dep. Var.	0.235			0.235			0.238			0.226		
Sum of squared residuals	52.758			52.896			34.220			16.586		
Variance of residuals	0.036			0.036			0.038			0.030		
Std. Error of regression	0.191			0.190			0.195			0.174		
R-squared	0.348			0.347			0.337			0.420		
Adjusted R-squared	0.340			0.341			0.328			0.408		
LM het. Test	6.831 [0.009]			6.272 [0.012]			0.938 [0.333]			2.574 [0.109]		
Jarque-Bera test	0.876 [0.645]			1.012 [0.603]			7.188 [0.027]			7.729 [0.021]		
Ramsey's RESET2	0.284 [0.594]			0.410 [0.522]			0.000 [0.992]			11.275 [0.001]		
F (zero slopes)	40.874 [0.000]			64.540 [0.000]			38.095 [0.000]			33.046 [0.000]		
Schwarz B.I.C.	-288.279			-311.878			-158.603			-149.693		
Log likelihood	361.223			359.291			202.904			190.825		
Number observations	1472			1472			912			560		
Variable	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.436	23.714	0.000	0.443	39.066	0.000	0.457	25.915	0.000	0.455	26.734	0.000
RESIDUAL TAX SHLD	0.114	11.481	0.000	0.116	12.512	0.000	0.154	11.356	0.000	0.071	5.264	0.000
LIQUIDITY	-0.001	-3.540	0.000	-0.001	-3.598	0.000	-0.001	-4.188	0.000	0.002	0.594	0.553
INTANGIBILITY	-1.322	-5.087	0.000	-1.337	-5.157	0.000	-1.095	-3.444	0.001	-1.567	-3.132	0.002
RESIDUAL FIRM SIZE	0.078	7.726	0.000	0.080	8.681	0.000	0.117	9.126	0.000	0.035	2.141	0.033
RESIDUAL AGE	0.001	0.119	0.905									
STOCK ILLIQUIDITY	-0.051	-3.317	0.001	-0.052	-3.361	0.001	-0.068	-3.237	0.001	-0.043	-1.509	0.132
GROWTH	-0.003	-1.472	0.141	-0.003	-1.497	0.135	-0.006	-3.663	0.000	-0.002	-0.613	0.540
PROFITABILITY	-0.855	-8.222	0.000	-0.860	-8.307	0.000	-0.687	-5.445	0.000	-1.197	-5.817	0.000
I1 (food & beverages)	0.093	3.918	0.000	0.086	4.369	0.000	0.101	4.071	0.000	0.039	1.224	0.221
I2 (Textiles)	0.149	6.849	0.000	0.142	8.391	0.000	0.121	5.406	0.000	0.165	6.492	0.000
I3 (Chemicals)	0.071	3.861	0.000	0.065	5.083	0.000	0.065	3.878	0.000	0.052	2.777	0.006
I4 (Mineral products)	0.027	1.040	0.298									
I5 (Metals)	0.062	2.748	0.006	0.055	3.089	0.002	0.051	2.128	0.034	0.040	1.538	0.125
I6 (Machinery)	-0.004	-0.210	0.834									
I7 (transport equipment)	0.019	0.714	0.476									
I8 (Misc. manufacturing)	0.074	2.756	0.006	0.068	2.902	0.004	0.060	1.985	0.047	0.074	2.106	0.036
I9 (Diver. Manufacturing)	0.034	0.708	0.479									
I10 (Mining)	0.039	0.555	0.579									
I11 (Electricity)	-0.051	-0.685	0.494									

Standard Errors are heteroskedastic-consistent (HCTYPE=2).

The dependent variable is defined in Panel A of Table 6.2.

The explanatory variables are defined in Panel B of Table 6.2, excluding the following three: RESIDUAL TAX SHIELD, RESIDUAL FIRM SIZE, and RESIDUAL AGE. These are obtained from regressing respectively NON DEBT TAX SHIELD, FIRM SIZE and AGE on a constant and the rest of the non-dummy explanatory variables. The residuals from these regressions then replace the original variables.

WALD TEST - TESTING SEVERAL COEFFICIENTS JOINTLY [Equation (5) versus Equation (6)]:

F(7 1453) Test Statistic: 0.546 Upper tail area: 0.800

CHOW TEST FOR STABILITY [Equation (6) versus Equations (7) and (8) separately]:

F(12 1448) Test Statistic: 4.966 Upper tail area: 0.000

However, bearing the above-mentioned bias, the idea of the first stage of the empirical procedure is to assess the stability of the coefficients across group-affiliated and non-affiliated firms. If a structural break is found to be present, than the next stage is to design a model that takes these differences into account. Indeed, the results of Table 6.5 indicate that there is a structural break in fitting the capital structure model to the pooled sample of group-affiliated and non-affiliated firms.

In particular the results from Chow tests of both Panel A and Panel B of Table 6.5 reject the null hypothesis of stability. These results persist when other leverage measures replace LEV2 (the total debt to total capital measure) as reported in Appendix 6B. Rejection of stability is consistent with the hypothesis put forward in Section 6.3. Explicitly, the sensitivity of the leverage decision to firm factors seems different for group-affiliated firms compared to non-affiliated firms. It thus appears more appropriate to discuss the results for the separate models, rather than for the model fitted to the full sample. This is done below.

The fit of the specified model of Equation (6.1) to the sample of non group-affiliated firms appears good. This is reflected by the results of Regression (3) for the original variables and by the results for Regression (7) where some of the original variables are replaced by their residuals. Particularly, both Regression (3) of Panel A and Regression (7) of Panel B of Table 6.5 easily pass the LM heteroskedasticity test at the 10 percent significance level. Indeed, the probability values attached to the Chi-squared test statistics are 0.24 and 0.33 for Regression (3) and Regression (7), respectively. Thus it is difficult to reject the null of homoskedasticity. Further, the Jarque-Bera tests for normality of the disturbances can not be rejected at the 1 percent significance level, and the RESET2 tests for no omitted second power terms also pass with very high probabilities.

Evidence of good fit, of the specified model of Equation (6.1) to the sample of group-affiliated firms is weaker as can be seen from Table 6.5. This is reflected in the results for Regression (4) for the original variables and in the results for Regression (8) where some of the variables are replaced by their residuals. In particular, although the Jarque-Bera tests for normality give similar results to those for the non group-affiliated sample, the LM heteroskedasticity tests give weaker results. Indeed the probability values attached to the Chi-squared test statistics are 0.09 and 0.11 for Regressions (4) and (8), respectively. Thus the null of homoskedasticity is easier to reject compared with the results for the non group-affiliated sample. Further, the RESET2 test for no omitted second power terms is strongly rejected for the sample of group-affiliated firms as is shown in Regression (4) and Regression (8) of Table 6.5.

Table 6.5 also indicates that the estimated coefficients for both the non-affiliated and group-affiliated samples generally enter the model with the predicted signs. Furthermore, as expected there appear to be differences in the magnitudes of the coefficients of the two categories of firms.

NON-DEBT TAX SHIELD as measured by the log of depreciation is important for the capital structure decision of both non-affiliated and group affiliated firms.

However, in contrast to the prediction of Table 6.2, it enters the models with positively signed coefficients, which may be due to depreciation reflecting tangibility of assets. In both Panel A and Panel B of Table 6.5, however, the magnitude of the coefficients for the sample of group-affiliated firms is about half that of non-affiliated firms. This indicates that the capital structure decision of group-affiliated firms tend to be less sensitive to this variable compared with non-affiliated firms.

The magnitudes of the estimated coefficients on the LIQUIDITY variables are relatively small for both non-affiliated and group-affiliated firms. In the case of the group-affiliated sample this variable enters with the expected positive coefficient which is, however, insignificant. In the case of the non-affiliated firms LIQUIDITY enters with negatively signed estimated coefficients, which is contradictory to expectations. These differences between group-affiliated and non-affiliated firms serve to emphasis the difference between these two categories of firms. Thus LIQUIDITY, which is an inverse proxy for financial distress, tend to have a small positive effect on the leverage decision of group-affiliated firms but near enough no effect in the case of non-affiliated firms.

Asset structure appears important for both non-affiliated and group-affiliated firms. In particular the INTANGIBILITY is always highly significant and enters the specified models of both group and non-group firms with negatively signed estimated coefficients as predicted. Group-affiliated firms appear more sensitive to asset structure[27]. In Panel A of Table 6.5, the estimated coefficients on INTANGIBILITY are –0.9 and –1.5 for the non-affiliated and group-affiliated samples respectively. Similar results are also presented in Panel B of the same table.

Larger firms can support more debt as evidence from the positive and significant estimated coefficients on RESIDUAL FIRM SIZE as shown in Panel B of Table 6.5. FIRM SIZE drops out of the specified model of Panel A of Table 6.5, but this may be due to multicollinearity problems that are controlled for in Panel B. Similar to the results for NON-DEBT TAX SHIELD and INTANGIBILITY there appears to be a substantial difference between non-affiliated and group-affiliated firms. In particular in Panel B of Table 6.5, the magnitude of the estimated coefficient on RESIDUAL FIRM SIZE is 0.12 for non-affiliated firms but only 0.04 for group-affiliated. This suggests that while firm size, is important for the leverage decision of non-affiliated firms it has much weaker impact in the case of group-affiliated firms. This is consistent with the market failure theory of business groups, where affiliated firms share group-wide reputation for stability and thus rely less on factors at the firm level.

No definite prediction regarding the sign of the coefficient on AGE is specified in Table 6.2. However, AGE enters Panel A of Table 6.5 with negative coefficients, which is in line with agency cost of equity considerations and the notion that due to greater reputation, mature firms tend to have more equity in their capital mix. Further, the

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[27] But note the opposite conclusions arrived at from the results of the non-debt tax shield proxy whose negative sign indicates it may reflect asset tangibility.

coefficients on AGE, in Panel A, for both non-affiliated and group-affiliated firms are of similar magnitudes. Thus the results do not point to a difference in the impact of AGE on the capital structure decision of group and non-group firms. This variable however drops out of the models of Panel B of Table 6.5 where the problem of multicollinearity is addressed.

STOCK ILLIQUIDITY, is expected to enter the model with positive estimated coefficients because highly traded equity is taken as a sign of confidence on the part of investors that the firm is free from agency costs of equity. This variable does not appear to play an important role in the capital structure decisions of group-affiliated firms. Indeed, it enters both Regression (4) and Regression (8) of Table 6.5 with very high probability values of being insignificantly different from zero. There is also not much that can be said about how this variable influences the capital structure decisions of non-affiliated firms. Particularly, although in Regression (3) of Table 6.5 it enters with the predicted positive sign, this sign is reversed in Regression (7).

GROWTH is included to measure the agency cost of debt and it appears to confirm to expectations. It enters the regressions for the non-affiliated firms with negative and significant estimated coefficients but is insignificant for group-affiliated firms. One caveat, however, with regards the importance of this variable, is the relatively small magnitudes of its coefficients.

Finally firm’s profitability as reflected by the variable PROFITABILITY is shown to be important to both group and non-group firms with a stronger impact in the case of the former. This is consistent with pecking order considerations and with agency theory where managers of profitable firms prefer to use internal funds to avoid the constraints imposed by external debt. It is also in line with Booth, Aivazian, Demirguc-Kunt and Maksimovic (2001) and the suggestion that internal sources are particularly important to group-affiliated firms, perhaps due to these firms guarding their secrecy more jealousy compared with non-affiliated firms.

There are important conclusions to be drawn from the empirical results from both the comparison analysis and the multivariate analysis described in this section. Particularly it may be concluded that debt levels and their determinants behave systematically different in the case of group-affiliated firms compared with non-affiliated firms. The next section reports the results from the empirical approach that attempts to account for these differences.

6.5.2.2 Results for the multivariate analysis incorporating group-level variables and interaction terms

In the second stage explanatory variables at the group level are added to the model as specified in Equation (6.2). Group-affiliation dummy variables and interaction terms are also added in order to allow the constant and the slopes of the firm level characteristics to differ when the firm is group-affiliated. Moreover, the conclusions from the comparison analysis are that there tend to be some differences in the debt ratios within the group-affiliated category. Particularly it has been shown that debt ratios tend to change as the group with which a firm is affiliated becomes more diversified. These findings justify the inclusion in Equation (6.2) of the dummy variable, HD, for firms affiliated with highly diversified groups. These conclusions further justify the inclusion of interaction terms that measure the extra change in the firm level characteristics' slopes when the firm is affiliated with a highly diversified group.

The results from the group level analysis are reported in Table 6.6 and are discussed in more detail below. As before, Panel A of the table gives the general and specific regressions that are based on Equation (6.2). Similarly, Panel B is a variant of Equation (6.2) where some of the explanatory variables suspected of causing multicollinearity are replaced by the residuals from auxiliary regressions. These include NON DEBT TAX SHIELD, FIRM SIZE, and AGE.

As emerges from Table 6.6, the general results from the multivariate analysis at the group level, indicate that group-affiliated firms display different sensitivities to the determinants of capital structure. Further, it is shown that there is merit to the idea that the capital structure decision of group-affiliated firms may be explained in terms of the various business group theories. In particular it is appears that control considerations, sharing of group-wide resources and group complexity influence the leverage decisions of group-affiliated firms.

Table 6.6 Ordinary Least Squares regressions of LEV2 on firm and group characteristics.

1,384 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000 (of which 472 are group-affiliated).

Panel A: Original explanatory variables

	GENERAL MODEL			SPECIFIC MODEL		
Mean of dep. var.	0.419			0.419		
Std. dev. of dep. var.	0.235			0.235		
Sum of squared residuals	46.872			47.335		
Variance of residuals	0.035			0.035		
Std. error of regression	0.187			0.187		
R-squared	0.387			0.381		
Adjusted R-squared	0.368			0.370		
LM het. test	1.937 [0.164]			2.047 [0.152]		
Jarque-Bera test	2.018 [0.365]			3.016 [0.221]		
Ramsey's RESET2	3.746 [0.053]			3.466 [0.063]		
F (zero slopes)	20.139 [0.000]			34.812 [0.000]		
Schwarz B.I.C.	-223.328			-281.610		
Log likelihood	378.832			372.019		
Variable	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.445	9.971	0.000	0.448	15.003	0.000
GP	0.203	2.006	0.045	0.177	3.192	0.001
HD	0.129	0.966	0.334	0.056	1.892	0.059
NON-DEBT TAX SHIELD	0.065	8.028	0.000	0.068	11.900	0.000
LIQUIDITY (CA/CL)	-0.001	-1.996	0.046	-0.001	-2.027	0.043
INTANGIBILITY	-0.839	-2.715	0.007	-0.893	-3.486	0.001
FIRM SIZE	0.003	0.434	0.664			
AGE	-0.036	-2.830	0.005	-0.033	-3.574	0.000
STOCK ILLIQUIDITY	0.119	5.088	0.000	0.122	5.167	0.000
GROWTH (P/B)	-0.006	-4.255	0.000	-0.008	-4.650	0.000
PROFITABILITY	-0.557	-4.188	0.000	-0.535	-4.288	0.000
(NON-DEBT TAX SHIELD) x GP	-0.020	-1.208	0.227	-0.033	-4.058	0.000
LIQUIDITY x GP	0.006	2.012	0.044	0.005	1.824	0.068
INTANGIBILITY x GP	0.008	0.013	0.990	-0.095	-2.241	0.025
(FIRM SIZE) x GP	-0.012	-0.679	0.497			
AGE x GP	0.003	0.159	0.874			
(STOCK ILLIQUIDITY) x GP	-0.101	-2.094	0.036			
GROWTH x GP	-0.007	-0.585	0.558			
PROFITABILITY x GP	-0.340	-1.156	0.248	-0.397	-1.461	0.144
(NON-DEBT TAX SHIELD) x HD	0.007	0.252	0.801			
LIQUIDITY x HD	-0.002	-0.352	0.725			
INTANGIBILITY x HD	-2.131	-2.212	0.027	-2.072	-2.902	0.004
(FIRM SIZE) x HD	-0.025	-0.778	0.437			
AGE x HD	0.013	0.395	0.693			
(STOCK ILLIQUIDITY) x HD	-0.022	-0.281	0.779			
GROWTH x HD	0.013	1.002	0.317	0.006	1.331	0.183
PROFITABILITY x HD	-0.552	-1.677	0.094	-0.509	-1.663	0.096
GROUP PROFITABILITY	-0.230	-1.885	0.060	-0.199	-1.945	0.052
GROUP LIQUIDITY	0.005	0.511	0.610			
GROUP DEBT	-0.007	-2.115	0.035	-0.007	-2.255	0.024
GROUP DIVERSITY	0.012	0.699	0.484			
GROUP SIZE	-0.022	-2.226	0.026	-0.018	-2.420	0.016
I1 (food & beverages)	0.081	3.311	0.001	0.081	3.924	0.000
I2 (Textiles)	0.127	5.677	0.000	0.129	7.411	0.000
I3 (Chemicals)	0.055	2.904	0.004	0.057	4.317	0.000
I4 (Mineral products)	0.006	0.221	0.825			
I5 (Metals)	0.037	1.603	0.109	0.038	2.028	0.043
I6 (Machinery)	-0.015	-0.763	0.446			
I7 (transport equipment)	0.019	0.665	0.506			
I8 (Misc. manufacturing)	0.064	2.306	0.021	0.067	2.727	0.006
I9 (Diver. Manufacturing)	0.021	0.379	0.705			
I10 (Mining)	0.051	0.581	0.561			
I11 (Electricity)	0.007	0.104	0.917			

Standard Errors are heteroskedastic-consistent (HCTYPE=2); All variables are defined in Table 6.2

WALD TEST-For several coefficients jointly: F(18 1342) Test Statistic: 0.738 Upper tail area: 0.774

Panel B: residuals replace some of the explanatory variables

	GENERAL MODEL			SPECIFIC MODEL		
Mean of dep. var.	0.419			0.419		
Std. dev. of dep. var.	0.235			0.235		
Sum of squared residuals	46.872			47.540		
Variance of residuals	0.035			0.035		
Std. error of regression	0.187			0.187		
R-squared	0.387			0.378		
Adjusted R-squared	0.368			0.368		
LM het. test	1.937 [0.164]			2.984 [0.084]		
Jarque-Bera test	2.018 [0.365]			1.995 [0.369]		
Ramsey's RESET2	3.746 [0.053]			0.599 [0.439]		
F (zero slopes)	20.139 [0.000]			35.940 [0.000]		
Schwarz B.I.C.	-223.328			-282.234		
Log likelihood	378.832			369.027		
Variable	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.456	21.022	0.000	0.463	31.359	0.000
GP	0.130	1.927	0.054	0.128	2.458	0.014
HD	0.062	1.213	0.225	0.067	2.231	0.026
RESIDUAL TAX SHIELD	0.163	9.425	0.000	0.153	11.799	0.000
LIQUIDITY (CA/CL)	-0.001	-4.050	0.000	-0.001	-4.017	0.000
INTANGIBILITY	-1.032	-3.250	0.001	-1.098	-4.251	0.000
RESIDUAL FIRM SIZE	0.138	5.577	0.000	0.117	9.504	0.000
RESIDUAL AGE	0.020	1.056	0.291			
STOCK ILLIQUIDITY	-0.064	-2.936	0.003	-0.074	-4.336	0.000
GROWTH (P/B)	-0.005	-3.567	0.000	-0.006	-3.889	0.000
PROFITABILITY	-0.669	-5.254	0.000	-0.755	-7.185	0.000
(RESIDUAL TAX SHIELD) x GP	-0.084	-2.886	0.004	-0.071	-3.769	0.000
LIQUIDITY x GP	0.006	2.123	0.034	0.004	1.565	0.118
INTANGIBILITY x GP	-0.026	-0.041	0.967			
(RESIDUAL FIRM SIZE) x GP	-0.096	-2.247	0.025	-0.075	-3.601	0.000
(RESIDUAL AGE) x GP	-0.033	-1.060	0.289			
(STOCK ILLIQUIDITY) x GP	-0.025	-0.572	0.567			
GROWTH x GP	-0.008	-0.629	0.530			
PROFITABILITY x GP	-0.332	-1.201	0.230			
(RESIDUAL TAX SHIELD) x HD	-0.028	-0.726	0.468			
LIQUIDITY x HD	-0.002	-0.333	0.739			
INTANGIBILITY x HD	-2.127	-2.293	0.022	-2.053	-2.845	0.005
(RESIDUAL FIRM SIZE) x HD	-0.049	-0.834	0.404			
(RESIDUAL AGE) x HD	-0.004	-0.097	0.923			
(STOCK ILLIQUIDITY) x HD	0.017	0.258	0.797			
GROWTH x HD	0.013	0.988	0.323	0.006	1.247	0.213
PROFITABILITY x HD	-0.588	-1.800	0.072	-0.763	-3.323	0.001
GROUP PROFITABILITY	-0.230	-1.885	0.060	-0.240	-2.346	0.019
GROUP LIQUIDITY	0.005	0.511	0.610			
GROUP DEBT	-0.007	-2.115	0.035	-0.007	-2.234	0.026
GROUP DIVERSITY	0.012	0.699	0.484			
GROUP SIZE	-0.022	-2.226	0.026	-0.020	-2.657	0.008
I1 (food & beverages)	0.081	3.311	0.001	0.082	4.053	0.000
I2 (Textiles)	0.127	5.677	0.000	0.131	7.526	0.000
I3 (Chemicals)	0.055	2.904	0.004	0.056	4.269	0.000
I4 (Mineral products)	0.006	0.221	0.825			
I5 (Metals)	0.037	1.603	0.109	0.042	2.259	0.024
I6 (Machinery)	-0.015	-0.763	0.446			
I7 (transport equipment)	0.019	0.665	0.506			
I8 (Misc. manufacturing)	0.064	2.306	0.021	0.067	2.741	0.006
I9 (Diver. Manufacturing)	0.021	0.379	0.705			
I10 (Mining)	0.051	0.581	0.561			
I11 (Electricity)	0.007	0.104	0.917			

Standard Errors are heteroskedastic-consistent (HCTYPE=2); All variables are defined in Table 6.2, apart from RESIDUAL TAX SHIELD, RESIDUAL FIRM SIZE and RESDIUAL AGE that are defined in the notes to Panel B of Table 6.3.

WALD TEST-For several coefficients jointly: F(19 1342) Test Statistic: 1.008 Upper tail area: 0.448

The group dummy, GP, and the highly diversified group dummy, HD, enter the model of both Panel A and Panel B of Table 6.6 with significant and positive estimated coefficients. This implies that group-affiliated firms tend to use more debt, and is consistent with the results of the comparison analysis. The positive coefficient on GP is also in line with the cultural-based/social structure theory, which implies that due to control considerations group-affiliated firms should prefer debt to external equity. The additional positive effect for firms affiliated with highly diversified groups, is consistent with Khanna and Palepu (2000a) and with the prediction of Table 6.2 but not with the results of the comparison analysis.

In general, excluding AGE and STOCK ILLIQUIDITY the slopes on the other six firm level explanatory variables are shown in Table 6.6 to change when the firm is group-affiliated. The interpretation of AGE, and STOCK ILLIQUIDITY, however, is ambiguous because both these variables display inconsistency when Panel A and Panel B of Table 6.6 are compared. The results for the eight firm level explanatory variables are basically the same as the results obtained for Equation (6.1) as reported in Table 6.5. The discussion here, therefore, focuses only on new information that emerges from running the extended model of Equation (6.2).

INTANGIBILITY as reflected by the ratio of R&D and advertising expenditure to sales has the predicted negative effect in the case of non-affiliated firms. This effect is stronger for group-affiliated firms and much stronger when the firm is affiliated with a highly diversified group. To the extent that R&D and advertising represent intangibility of assets and hence distress costs, this extra sensitivity implies that firms affiliated with highly diversified groups face higher risk of failure. This could be rationalised in two ways. First, as the diversified groups are also likely to be larger, this higher risk may reflect size-related inefficiencies that are associated with the business group structure. Such inefficiencies could relate, for instance, to cumbersome control structure or to cross subsidisation as in Chang and Hong (2000). Second, in the spirit of Chang and Hong (2000) it may be argued that group-affiliated firms with high R&D expenditure tend to share their knowledge with other group members. This means that the consequences of their failure can be critical not only to the firm itself but also to other firms in the group. Diversified groups are likely to be large which means more firms depend on the high R&D firm and the consequences of it failing are particularly severe. To reduce risk, these firms tend to reduce their dependency on debt.

Alternatively, to the extent that R&D and advertising represent growth opportunities, the extra sensitivity may suggest that firms affiliated with highly diversified groups face greater agency costs of debt. This may be due to the typical complex structure of highly diversified groups, which makes agency behaviour difficult to detect. Thus the debt levels of firms affiliated with highly diversified groups are particularly sensitive to factors that increase the opportunities for wealth expropriation from debt holders such as risk shifting.

PROFITABILITY has a negative impact on the leverage decision of non-affiliated firms. This negative impact seems to increase with group-affiliation and is particularly strong for firms affiliated with highly diversified groups. As previously suggested, this is consistent with pecking order considerations, with agency behaviour, and with the notion that internal sources are particularly important to group-affiliated firms, perhaps due to secrecy factors.

Turning to the group-level variables out of the five proxies included, two show to be unimportant. Specifically both GROUP LIQUIDITY and GROUP DIVERSITY drop out of the specified models of not only of Table 6.6, but also of the specified models of the other debt measures as given in Appendix 6C. It should, however be noted that group diversity may still be important to the capital structure decision of firms, in spite of dropping out. Indeed, the reason that this variable drops out may simply be due to the fact that the effect of this variable is reflected in the group diversification dummy, HD, which is found to be positive and significant and which also enters with a few interaction terms.

In contrast to GROUP LIQUIDITY and GROUP DIVERSITY, the three group-level variables that are shown in Table 6.6 to be important include GROUP PROFITABILITY, GROUP DEBT and GROUP SIZE. GROUP PROFITABILITY enters the regressions of Panels A and B with negative coefficients, which is inconsistent with the idea that firms share group-wide reputation that gives them better access to debt. The negative sign on GROUP PROFITABILITY, however, may be explained in terms of group internal capital market. Thus the group channel profits to where it is needed to avoid member firms having to resort to external finance. Hence firms affiliated with profitable firms tend to have lower debt ratios. This is consistent with pecking order considerations, with agency behaviour, and with the market failure theory of groups.

GROUP DEBT enters the models of Table 6.6 with negative but small coefficients. The negative association between the ability of the affiliated firm to obtained debt finance and the group-wide debt level is consistent with expectations and with the notion of internal dependency within the group. Intra-group trading, sharing of resources and loan guarantee links mean that a default by one firm may cause a chain reaction within the group. Therefore the financial risk to which other firms in the group are exposed, impact the leverage decision of an affiliated firm. It could further be argued that in order to create group-wide reputation, the group imposes debt levels on member firms that are designed to move the group towards its group-wide optimal capital structure.

Finally, GROUP SIZE has a small but important and negative impact on the debt ratios of the affiliated firm. In the spirit of Dewenter, Novaes and Pettway (2001) it is assumed that group size, due to high visibility reduces agency behaviour. The negative sign on the GROUP SIZE coefficient implies that the impact of visibility on reducing the agency costs of equity is stronger than its impact on reducing the agency costs of debt.

Table 6.7 summarises the key empirical findings, and is divided into two panels. Panel A summarises the key findings from the comparison analysis as discussed in Section 6.5.1, while Panel B is devoted to the findings from the multivariate analysis of Section 6.5.2. These key findings are discussed in the concluding section below.

Table 6.7 Summary of Empirical Findings

Panel A: Comparison analysis

Debt measures predicted correlation with group affiliation	**Rationale for prediction**	**Summary results**
Leverage (+)	Due to control considerations and access to debt via group visibility	▪ Mean/median higher for group-affiliated firms compared with non-affiliated firms. ▪ The difference becomes weaker with the level of group diversification. ▪ The difference between the mean/median of firms affiliated with highly diversified groups is not significantly higher from the category of non-affiliated firms.
Long term debt (+) Short term debt (-)	Savings on issuing costs by using long-term debt and reducing the issuance frequency create preference for long-term debt. For non-affiliated firms the issuance costs saved do not offset the additional insolvency risk that is associated with long-term debt thus creating preference for short-term debt.	Long term debt ▪ Mean/median higher for group-affiliated firms compared with non-affiliated firms. ▪ The difference becomes weaker with the level of group diversification. ▪ The difference between the mean/median of firms affiliated with highly diversified groups is still significantly higher compared with the category of non-affiliated firms. Short term debt ▪ Mean/median lower for group-affiliated firms compared with non-affiliated firms. ▪ The difference becomes stronger with the level of group diversification. ▪ While the difference between all group-affiliated and non-affiliated firms is insignificant, the difference between firms affiliated with highly diversified groups and non-affiliated firms is significant.
Bank debt (-)	Greater access to capital markets by group-affiliated firms	▪ Mean/median lower for group-affiliated firms compared with non-affiliated firms. ▪ The difference becomes stronger with the level of group diversification. ▪ The difference between group-affiliated and non-affiliated firms is always significant
Government debt (+)	Greater access to policy makers by group-affiliated firms	▪ Group-affiliated firms tend to rely more on government loans compared with non-affiliated firms. ▪ The difference becomes stronger with the level of group diversification but is always significant.
Foreign debt (+)	Greater access to foreign markets via group' visibility and reputation	▪ Group-affiliated firms tend to rely more on loans from foreign institutions compared with non-affiliated firms. ▪ The difference becomes stronger with the level of group diversification but is always significant.
Intra-group debt	Groups create internal capital markets thus they rely heavily on internal loans	▪ The mean loans from group firms, as a fraction of total corporate loans is about 12 percent. ▪ The mean increases with the level of group diversity but the difference between diversified and non-diversified groups is never significant

Panel B: Multivariate analysis

Variable and	Predicted sign and Rationale for prediction	Predicted impact of group affiliation	Summary results
Constant		(+) – Due to control considerations. Also as affiliation increases access to external funds via sharing of group-wide reputation and policy distortions	(+) - Group affiliation has a positive impact on the constant, which increases when the group is highly diversified.
NON DEBT TAX SHIELD	(-) – The availability of alternative tax shields reduces the value of the debt tax shield	(Reduced effect) – The tax benefits of debt should not play an important role for group firms due to alternative shields such as internal transfer of profits.	(+) – Opposite to expectations. Also group firms are only about half as sensitive compared with independent firms.
FIRM SIZE	(+) – Large firms tend to be diversified, which reduces distress costs	(Reduced effect) – It is the group size and diversification levels that determine the present value of financial distress costs	(+) – Positive impact in the case of non-affiliated firms but almost no effect in the case of group-affiliated firms.
GROWTH	(-) – Growth increases the opportunities for managers to engage in risk shifting.	(Ambiguous) – Agency conflicts within groups are complicated and determined by visibility, complexity, and conflicts between firms and controlling entity.	(-) – Evidence of negative impact for non-affiliated firms but appears unimportant in the case of group-affiliated firms.
AGE	(+/-) – Proxy for reputation with agency costs implications.	(Reduced effect) – It is the group size and diversification that determine the present value of financial distress costs	(-) – Relatively small effect with no difference between group and non-group firms.
STOCK ILLIQUIDITY	(+) – Indicates agency cost of equity. Highly traded stock means less agency behaviour by managers.	(Ambiguous) – Agency conflicts within groups are complicated and determined by visibility, complexity, and conflicts between member firms and the controlling entity.	(+/-) – Sign reversals once multicollinearity is accounted for. No difference between group and non-group firms
LIQUIDITY	(+) – Reduces the present value of financial distress costs	(Reduced or increased effect) – Sensitivity of the firm's leverage decision partly depends on the general financial position of the group	(+) – Positive effect (albeit small) in the case of group-affiliated firms but almost no effect for independent firms.
INTANGIBILITY	(-) – Increases the present value of financial distress costs	(Reduced or increased effect) – Sensitivity of the firm's leverage decision partly depends on the general financial position of the group	(-) – Negative effect, which becomes stronger with the level of group diversification.
PROFITABILITY	(-) – Due to pecking order and agency considerations	(Increased effect) – Preference for secrecy increases the effects of pecking order and agency considerations.	(-) – Negative impact increases with group affiliation and further for diversified groups
GROUP PROFITABILITY		(+) – Profitability creates reputations. (-) – Group internal capital markets	(-) – Negative and significant impact
GROUP DEBT		(-) – Increases financial distress costs due to debt guarantee links. Also due to group-wide optimal capital structure	(-) – Negative and significant impact but relatively small coefficient
GROUP SIZE		(+/-) – Increases group visibility and can have impact on agency costs of both equity and debt.	(-) – Negative and significant impact but relatively small coefficient
GROUP DIVERSITY		(+) – reduces financial distress costs (-) – increases group complexity	Unimportant - drops out of specified models
GROUP LIQUIDITY		(+) – Profitability creates reputations. (-) – Group internal capital markets	Unimportant - drops out of specified models

6.6 Summary and concluding remarks

In this chapter, we initially provide a brief review of two strands of the corporate finance literature. The first strand relates to the firm's capital structure decisions, with emphasis on pecking order, agency and the trade off theories. The second strand of the literature relates to business groups and theories regarding their role, especially in the context of emerging markets. The chapter integrates these two strands, particularly with reference to three factors that are expected to influence both capital structure decisions and the behaviour of groups. These include distress costs, as reflected by asset structure, agency costs, and control considerations. This synthesis is then used to compare the debt levels of group-affiliated and non-affiliated firms and to generate some plausible models that explain the capital structure decisions of these two categories of firms.

The comparison analysis utilises a sample of 1811 Indian Private Sector, non-financial firms with a year ending of March 2000, of which 1146 are non-affiliated firms and 665 are group-affiliated firms. In particular ten debt measures are compared across these two categories of firms further splitting the group-affiliated firms into 314 firms affiliated with diversified groups and 131 firms affiliated with highly diversified groups. Indeed significant differences are found between the debt levels of group and non-group firms as well as between firms that are affiliated with groups at various levels of diversification. These results are further reinforced by the conclusions from the multivariate analysis, which involves the estimation of two models. The first model includes explanatory variables at the firm-level only and is tested on a sample of 1472

Indian firms, of which 912 are independent and 560 are group-affiliated. The second model expands the first by adding group-level explanatory variables as well as interaction terms between group affiliation dummies and firm-level variables. This is tested on a sample of 1384 Indian firms, of which 912 are independent firms and 472 are group-affiliated. Table 6.7 summarises the main conclusions from the empirical procedures.

In general, the findings of the study confirm that group-affiliated firms are significantly different from their independent counterparts, in the context of their capital structure decisions. For example, the results show that the mean as well as median leverage of group-affiliated firms is higher than the counterpart measures for non-affiliated firms. This result is consistent with the findings relating to long-term debt, government debt and foreign debt, which all show higher mean and median measures for group-affiliated firms compared with independent firms. In contrast, the mean and median of short-term debt and bank debt are found to be lower for group-affiliated firms compared with independent firms. Peculiarly, there is no evidence to suggest that group-affiliated firms rely mainly on sister firms as a source of corporate debt.

In terms of the main determinants of capital structure, a number of interesting findings were uncovered. First the alternative tax shield, as measured in terms of depreciation, is found to have a positive rather than the expected negative effect on the level of debt. This, however, is the only variable whose sign is opposite to expectations and it could be due to the fact that depreciation is a proxy for the tangibility of assets. It is also found that group affiliation reduces the effect of this variable on capital structure decisions. Second, it is found that firm size, and growth prospects, do not matter for the capital structure of group-affiliated firms, whereas these are critical factors for the debt level decisions of independent firms with a positive and negative impact respectively. Third, it appears that there are no differences between group and non-group firms in terms of the impact of age and stock illiquidity on capital structure decisions. Fourth, liquidity, asset structure, and profitability appear to have stronger impact on the capital structure decisions of group-affiliated firms compared with non-affiliated firms. Indeed, liquidity has a positive (albeit small) effect in the case of group-affiliated firms while almost no effect on the capital structure decision of independent firms. Similarly intangibility of assets and profitability appear to have a negative impact on the leverage decisions of firms and this impact becomes stronger with group-affiliation and stronger still for firms affiliated with highly diversified groups.

Finally it is shown that consistent with the market failure theory of business groups, group-affiliated firms appear to share tangible and intangible assets so that group-wide factors enter the capital structure decisions of these firms. In particular, group profitability, group debt, and group size have significant negative impact on the leverage of affiliated firms. Furthermore, although group liquidity is not shown to be important, there is some evidence to show that group diversification increases the debt capacity of the affiliated firm.

Clearly more research into the workings of business groups is required. It is noted, however, that this task can be difficult because the Indian Business House as well as most business groups world-wide, are typically an informal organisation without a legal base. Thus it may be difficult to obtain data such as accounts at the group level. Indeed, in this chapter group-level variables had to be estimated using information from member firms for which data were available, ignoring those member firms for which no data was available. Undoubtedly, this is one weakness of the empirical approach in this chapter. Another weakness of this as well as the previous chapter is the concentration on a single year, which as explained is due to lack of historic group-affiliation information. Thus the second idea for possible future research is to incorporate time series into the business group analysis.

Appendix 6A: Notes on the empirical procedures of previous studies

(1). **Chang and Hong (2000)**

The study uses 12,019 observations on 1,248 listed and unlisted Korean firms associated with 317 business groups and spanning the period 1985 to 1996. The idea is to assess how group-affiliation influences member firms' performance, and the model is of the form:

Performance = f(firm-level resources, group-level resources, intra-group financial & trade transactions)

Using Panel data technique with fixed time and industry effects and Weighted Least Squares methodology the conclusions are that group-affiliated firms benefit from intra-group sharing of intangible and financial resources. Specifically, a positive and significant relationship is recorded between the performance of the firm, and the level of advertising, R&D and liquidity of other firms in the group. Further, there is evidence that Intra-group transactions, such as debt guarantee, equity investment, and trade transactions, are extensively used by member firms. It is shown that exchanging debt guarantees and equity investments have an inverse affect on the profitability of the providing firm, but a positive affect on the profitability of the receiving firm. The study also records a positive (negative) association between internal sales and the profitability of the selling (buying) firm, suggesting that profitable firms buy from unprofitable firms in the group at higher than market prices. It is proposed that this practice may be designed to achieve cross-subsidisation or tax avoidance. Regression results are given below, where 11 year dummies, 45 industry dummies, and 451 industry-year interaction terms are included but not reported. Standard errors are given in parentheses and ***, **, and * indicate significance at the

1, 5, and 10 percent respectively. The dependent variable, profitability is measured as: Profitability = 100* (net income before tax + interest payments) / total assets

Explanatory variables	Period 1: 1985-1988	Period 3: 1993-1996	Comments
Firm-level resources			The higher the firm level of intangible & cash resources, the more profitable it is. (Variables 1 and 2 stand for intangible assets, 3 stands for cash availability, 4 is and inverse proxy of cash availability, 5 is a control variable)
1. Advertising = Advertising expenditure / total sales	0.06 (0.07)	0.20 (0.05)***	
2. R&D = R&D expenditure / total sales	0.40 (0.32)	0.22 (0.10)**	
3. Liquidity = R&D expenditure / total sales	1.10 (0.17)***	0.48 (0.12)***	
4. Leverage = Long term debt / equity	-0.18 (0.02)***	-0.09 (0.01)***	
5. Firm size = Logarithm of assets in thousands won	0.30 (0.12)**	-0.29 (0.09)***	
Group-level resources (of other firms in the group)			▪ The higher the levels of intangibles of other firms in the same business group (Variables 6 and 7), the more profitable the firm. ▪ The higher the liquidity of other firms in the same group (Variable 8 and the inverse of variable 9), the more profitable the firm.
6. Group advertising (where sales is the weighting series)	0.21 (0.07)***	0.18 (0.05)***	
7. Group R&D (where sales is the weighting series)	0.83 (0.41)**	0.35 (0.13)***	
8. Group liquidity (where current liability is the weighting series)	1.09 (0.24)***	-0.21 (0.18)	
9. Group leverage (where equity is the weighting series)	-0.06 (0.03)**	-0.09 (0.02)***	
10. Unrelated diversification based on distribution of sales within industries)	0.52 (0.35)	-0.15 (0.25)	
11. Related diversification (based on distribution of sales across industries)	1.84 (0.45)***	0.37 (0.29)	
12. Group size (Log of total assets of all firms in group)	-0.73 (0.13)***	-0.07 (0.09)	
Internal transactions			▪ The negative sign on variable 18, and the positive sign on variable 17 indicate either cross-subsidisation (buying firms in the group support unprofitable affiliates by paying high prices) or tax avoidance through passing of profits. ▪ Cross-subsidisation has strong effects in slump periods (period 3) but weak effects in boom periods (period 1).
13. Supply of debt guarantee to group members / equity of providing firm	-0.16 (0.08)**	-0.18 (0.05)***	
14. Debt guarantee received from group members / equity of recipient	0.00 (0.04)	0.09 (0.02)***	
15. Equity investment in affiliates / equity base of investor	-0.27 (0.32)	-0.31 (0.18)*	
16. Equity investment from affiliates / equity base of issuer	0.03 (2.02)	-9.68 (1.13)***	
17. Sales to affiliates / total sales of the firm	0.66 (0.54)	1.10 (0.35)***	
18. Purchases from affiliates / total sales of the firm	-0.90 (0.85)	-0.77 (0.60)	
Constant	13.38 (4.11)***	13.97 (3.34)***	
Number observations	2901	4923	
Total adjusted R^2	0.20	0.14	

(2). **Vilasuso and Minkler (2001)**

The authors set out to test the idea that there is an optimal debt to equity ratio, which minimises the sum of agency costs given the degree of asset specificity. A distinction is made between agency costs of debt and agency costs of equity, which have opposite effects on the attractiveness of debt financing. They formulate a dynamic adjustment process where the actual change in each period towards the optimal debt to equity ratio is some fraction of the optimal change. The optimal debt to equity ratio, in turn, is inversely determined by the degree of asset specificity, because when assets are highly specific the expected payment to debt holders in the event of liquidation is low.

Using US firms listed in the Compustant database with at least three years of annual data in the period 1987-1997, provides the unbalanced Panel dataset, to which a non-linear least squares methodology is applied. Particularly the sample consists of 28 publicly held firms in the transportation equipment sector including aircraft, defence, and space vehicles and components, and 37 firms in the printing and publishing industry.

The dependent variable is the debt to equity ratio, and the asset structure proxy is measured by two alternative ways. For the sample of firms in the transportation equipment sector, asset structure is measured as the ratio of sales to government to total sales. The idea is that assets dedicated to government procurement are highly specific. For the sample of firms in the printing and publishing sector, asset structure is measured as the ratio of advertising expenditure to total assets. The idea is that these costs can not be recovered and should therefore present high degree of asset specificity.

The regression results show the sign on the estimated coefficient of the degree of asset specificity to be negative as expected, implying that equity levels increase with asset specificity. It is further shown that due to agency costs the capital structure of the firm converges to an optimal level. Convergence is evident from the fact that the null hypothesis, that the absolute value of the estimated partial adjustment coefficient is less than 1, can not be rejected at conventional significance levels.

(3). Dewenter, Novaes and Pettway (2001)

The study uses data on 159 initial public offers by independent and group-affiliated private firms that subsequently listed the Tokyo Stock Exchange in the period 1981-1994. The aim is to investigate agency theory in the context of business groups, and in particular the implications of the trade off between group visibility and group complexity to agency costs. The model is of the following form:

Opportunity for agency behaviour by group-affiliated firms = f(increasing function of structure complexity, decreasing function of visibility of member firms)

Results from Ordinary Least Squares regressions provide evidence to support the domination of group complexity over visibility. The immediate IPO return is measured as the percentage change from the offer price to the closing price on the first day of trading following an IPO. This is shown to be significantly larger when the firm is affiliated with one of the largest keiretsu compared to when it is independent. The results hold after controlling for changes in the pricing regimes of IPOs, and for visibility and complexity at the firm level. The implications are that despite the high visibility of keiretsu members, their complex structure gives rise to agency problems that are difficult to control. It is noted that the impact of group affiliation is larger when shares are sold with fixed prices compared with when they are set by an auction. This is consistent with the idea that market structure is important for market efficiency and that because the auction system reveals more information to investors, it reduces uncertainty.

(4). <u>Gul (1999)</u>

The idea is to use Japanese data to provide further evidence on the theory that capital structure and dividend policy decisions are influenced by growth opportunities in a way that is consistent with agency cost explanations. For this purpose both a pooled cross-sectional time-series analysis and a time-series analysis with a one-year lag for the dependent variable are utilised. The sample includes over 1000 firm-year observations on listed Japanese firms with year ending date of 31 March and with no missing values for the period 1988 to 1992. The regressions alternatively include and exclude data for the year 1990 due to a crash experienced in that year by the Japanese market.

The dependent variable is measured alternatively as the book debt to equity ratio and as the market debt to equity ratio. To measure the asset structure as represented by growth opportunities the study uses a growth measure that takes into account three measures. In particular, the growth measure is the common factor obtained when each of three growth measures is regressed on the other two. These three measures include the ratio of market value of assets to book value of assets, the ratio of market value of equity to book value of equity and the earnings to price ratio.

Controlling for firm size, profitability, regulation and business-group affiliation, the study finds significant negative relationship between growth opportunities and debt financing. Furthermore, Keiretsu firms are found to be associated with higher debt, which is explained by the fact that the keiretsu's main bank is normally also a main shareholder in these firms. Specifically, it is proposed that conflicts between shareholder and debt-holders are less severe in Keiretu-affiliated firms because the main bank is also the main shareholder.

(5). **<u>Gleason, Mathur, and Mathur (2000)</u>**

The study utilises 1994 data on 198 retailers from the following 14 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, Switzerland, and UK. It is proposed that culture influences the choice of capital structure and that capital structure and cultural factors influence the performance of firms. To test these propositions the countries are classified into four cultural clusters, defined in terms of power distance, masculinity, and uncertainty avoidance. Indeed, the results from regressions of debt levels on the cultural clusters show that the capital structure of retailers varies by culture. However, the results from regressions of various measures of performance on cultural clusters and capital structure show that cultural influence on performance is insignificant. For the capital structure model, the results are as follows:

$$\textit{Total debt/ Total assets} = 33.48^{***} - 9.44\, C_1^{**} - 15.29\, C_2^{***} - 11.20\, C_3^{***}$$

Where *, **, and *** denote significance at 10, 5 and 1 percent levels respectively. F-value is 7.11***, and Adjusted R^2 is 0.0851. C_1, C_2 and C_3 are dummy variables representing membership in that cluster and are included to test for differences in the mean capital structure against the mean of cluster 4. The clusters are defined as follows:

Cluster 1 – Strong uncertainty avoidance, feminine, and large power distance. (Belgium, France, Portugal, and Spain.)

Cluster 2 – Weak uncertainty avoidance, masculine, and small power distance. (Ireland, and UK.)

Cluster 3 – Strong uncertainty avoidance, masculine, and small power distance. (Austria, Germany, Italy, and Switzerland.)

Cluster 4 – Weak uncertainty avoidance, feminine, and small power distance. (Denmark, Finland, Netherlands, and Sweden.)

(6). **Khanna and Rivkin (2001)**

The study utilises 1990s data on non-financial publicly traded firms from 14 emerging markets, each with between 10531 to 86 group-affiliated and non-affiliated firms. These include Argentina, Brazil, Chile, India, Indonesia, Israel, Mexico, Peru, the Philippines, South Africa, South Korea, Taiwan, Thailand, and Turkey. The idea is to investigate how affiliation with a business group affects performance. The first hypothesis is that group-affiliated firms are more profitable compared with independent firms. The second hypothesis is that the profitability levels of firms within the same business group are more similar compared with the profitability of firms that do not belong to the same group. The model basic is of the following form:

Profitability = f(time effect, industry effect, group effect, firm effect)

Strong support is documented for the hypothesis that group-affiliated firms enjoy higher profits in India, Indonesia and Taiwan, while the reverse is true for Argentina. Further, in 10 out of the 14 countries, differences in profitability rates tend to be smaller for firms from the same group compared with firms that do not belong to the same group. Thus it appears that within groups, firms tend to share both costs and benefits. In the final part of their paper, Khanna and Rivkin (2001) investigate the correlation between group importance and proxies for market conditions. They expect group-affiliation to be most valuable, where capital markets are the least developed. Instead, however, they find group effect to be more valuable the more developed the capital market. No evidence is found to support an association between the importance of business groups and country conditions other than capital market development.

Appendix 6B: Firm-level regressions of Model (6.1), with alternative debt measures

Table 6B.1: Ordinary Least Squares regressions of LEV1 (Total liabilities / Quasi market value of total assets) on firm-level characteristics. 1,472/1479 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000.

	All firms (General model)			**All firms (Specific model)**			**Non-affiliated firms**			**Group-affiliated firms**		
Regression	1			2			3			4		
Mean of dep. var.	0.681			0.680			0.657			0.716		
Std. dev. of dep.	0.258			0.259			0.269			0.236		
Sum of squared residuals	62.391			75.162			46.947			23.595		
Variance of residuals	0.043			0.051			0.052			0.043		
Std. error of regression	0.207			0.226			0.228			0.207		
R-squared	0.363			0.240			0.292			0.248		
Adj R-squared	0.355			0.235			0.285			0.235		
LM het. Test	59.560 [.000]			32.870 [.000]			51.796 [.000]			34.241 [.000]		
Jarque-Bera test	96.774 [.000]			107.549 [.000]			39.985 [.000]			90.249 [.000]		
Ramsey's RESET2	73.528 [.000]			162.495 [.000]			90.134 [.000]			43.808 [.000]		
F (zero slopes)	43.528 [.000]			51.467 [.000]			41.501 [.000]			20.183 [.000]		
Schwarz B.I.C.	-164.842			-68.213			-27.435			-61.796		
Log likelihood	237.786			104.708			61.541			93.453		
Number observations	1472			1479			917			562		
Variable	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**
C	0.480	11.181	[.000]	0.483	12.994	[.000]	0.424	8.877	[.000]	0.730	13.204	[.000]
NON-DEBT TAX	-0.005	-0.646	[.519]									
LIQUIDITY	-0.003	-2.743	[.006]	-0.003	-3.048	[.002]	-0.003	-2.995	[.003]	-0.016	-3.545	[.000]
INTANGIBILITY	-1.413	-3.617	[.000]	-1.662	-3.933	[.000]	-1.304	-2.415	[.016]	-1.933	-2.744	[.006]
FIRM SIZE	0.036	4.662	[.000]	0.029	5.497	[.000]	0.048	6.706	[.000]	-0.002	-0.235	[.814]
AGE	0.025	2.601	[.009]	0.023	2.221	[.027]	0.018	1.268	[.205]	0.013	0.855	[.393]
STOCK ILLIQUIDITY	0.096	4.495	[.000]	0.130	6.183	[.000]	0.159	6.282	[.000]	0.081	2.108	[.035]
GROWTH	-0.006	-1.928	[.054]	-0.007	-1.994	[.046]	-0.011	-3.868	[.000]	-0.005	-1.196	[.232]
PROFITABILITY	-1.022	-8.714	[.000]									
I1 (food & beverages)	0.027	1.098	[.272]									
I2 (Textiles)	0.070	3.063	[.002]	0.081	5.002	[.000]	0.062	2.999	[.003]	0.128	5.068	[.000]
I3 (Chemicals)	0.029	1.356	[.175]									
I4 (Mineral products)	0.013	0.460	[.646]									
I5 (Metals)	0.062	2.606	[.009]	0.068	3.474	[.001]	0.042	1.641	[.101]	0.086	2.822	[.005]
I6 (Machinery)	-0.031	-1.302	[.193]	-0.048	-2.493	[.013]	-0.073	-2.912	[.004]	-0.011	-0.405	[.685]
I7 (transport equipment)	0.021	0.714	[.475]									
I8 (Misc. manufacturing)	0.006	0.180	[.857]									
I9 (Diver. Manufacturing)	0.016	0.383	[.702]									
I10 (Mining)	-0.040	-0.605	[.545]									
I11 (Electricity)	-0.034	-0.448	[.654]									

Standard Errors are heteroskedastic-consistent (HCTYPE=2); The dependent variable is defined in Panel A of Table 6.2; The explanatory variables are defined in Panel B of Table 6.2

WALD TEST - TESTING SEVERAL COEFFICIENTS JOINTLY [Equation (1) versus Equation (2)]:

F(7 1453) Test Statistic: 17.496 Upper tail area: 0.000

CHOW TEST FOR STABILITY [Equation (2) Versus Equations (3) and (4) separately]:

F(9 1461) Test Statistic: 10.633 Upper tail area: 0.000

Table 6B.2: Ordinary Least Squares regressions of LEV3 (Total debt / Quasi market value of net assets) on firm-level characteristics. 1,472 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000.

	All firms (General model)			All firms (Specific model)			Non-affiliated firms			Group-affiliated firms		
Regression	1			2			3			4		
Mean of dep. var.	0.560			0.560			0.536			0.598		
Std. dev. of dep.	0.292			0.292			0.299			0.278		
Sum of squared residuals	78.614			78.844			50.972			23.871		
Variance of residuals	0.054			0.054			0.057			0.044		
Std. error of regression	0.233			0.232			0.238			0.209		
R-squared	0.374			0.373			0.372			0.447		
Adj R-squared	0.366			0.367			0.364			0.435		
LM het. Test	0.344 [.557]			0.386 [.534]			0.617 [.432]			1.240 [.266]		
Jarque-Bera test	17.991 [.000]			18.457 [.000]			4.002 [.135]			38.810 [.000]		
Ramsey's RESET2	11.238 [.001]			11.129 [.001]			3.261 [.071]			10.259 [.001]		
F (zero slopes)	45.749 [.000]			72.219 [.000]			44.415 [.000]			36.866 [.000]		
Schwarz B.I.C.	5.269			-18.114			23.107			-47.743		
Log likelihood	67.675			65.528			21.194			88.875		
Number observations	1472			1472			912			560		
Variable	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**
C	0.487	10.760	[.000]	0.443	14.296	[.000]	0.396	10.688	[.000]	0.581	10.570	[.000]
NON-DEBT TAX	0.034	4.074	[.000]	0.033	4.057	[.000]	0.053	5.073	[.000]	0.008	0.667	[.505]
LIQUIDITY	-0.002	-2.344	[.019]	-0.002	-2.337	[.020]	-0.001	-2.244	[.025]	-0.008	-2.323	[.021]
INTANGIBILITY	-1.403	-3.475	[.001]	-1.438	-3.574	[.000]	-0.982	-1.777	[.076]	-1.918	-3.329	[.001]
FIRM SIZE	0.021	2.559	[.011]	0.019	2.409	[.016]	0.027	2.750	[.006]	0.010	0.778	[.437]
AGE	-0.016	-1.502	[.133]									
STOCK ILLIQUIDITY	0.128	5.290	[.000]	0.125	5.231	[.000]	0.165	5.611	[.000]	0.073	1.754	[.080]
GROWTH	-0.004	-1.837	[.066]	-0.004	-1.911	[.056]	-0.007	-3.640	[.000]	-0.003	-0.785	[.433]
PROFITABILITY	-1.241	-8.591	[.000]	-1.241	-8.644	[.000]	-1.031	-5.843	[.000]	-1.573	-5.529	[.000]
I1 (food & beverages)	0.073	2.597	[.009]	0.077	3.312	[.001]	0.104	3.715	[.000]	0.005	0.116	[.908]
I2 (Textiles)	0.119	4.656	[.000]	0.125	6.549	[.000]	0.106	4.099	[.000]	0.151	5.670	[.000]
I3 (Chemicals)	0.063	2.750	[.006]	0.068	4.286	[.000]	0.070	3.314	[.001]	0.054	2.346	[.019]
I4 (Mineral products)	0.009	0.277	[.782]									
I5 (Metals)	0.091	3.272	[.001]	0.094	4.289	[.000]	0.081	2.765	[.006]	0.083	2.442	[.015]
I6 (Machinery)	-0.013	-0.514	[.607]									
I7 (transport equipment)	0.014	0.425	[.671]									
I8 (Misc. manufacturing)	0.054	1.641	[.101]	0.057	2.011	[.045]	0.055	1.499	[.134]	0.049	1.183	[.237]
I9 (Diver. Manufacturing)	0.009	0.161	[.872]									
I10 (Mining)	-0.018	-0.230	[.818]									
I11 (Electricity)	-0.060	-0.690	[.490]									

Standard Errors are heteroskedastic-consistent (HCTYPE=2); The dependent variable is defined in Panel A of Table 6.2; The explanatory variables are defined in Panel B of Table 6.2

WALD TEST - TESTING SEVERAL COEFFICIENTS JOINTLY [Equation (1) versus Equation (2)]:

F(7 1453) Test Statistic: 0.607 Upper tail area: 0.751

CHOW TEST FOR STABILITY [Equation (2) Versus Equations (3) and (4) separately]:

F(12 1448) Test Statistic: 6.450 Upper tail area: 0.000

Table 6B.3: Ordinary Least Squares regressions of LEV4 (Total debt / Quasi market value of capital) on firm-level characteristics. 1,472 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000.

	All firms (General model)			**All firms (Specific model)**			**Non-affiliated firms**			**Group-affiliated firms**		
Regression	1			2			3			4		
Mean of dep. var.	0.580			0.580			0.554			0.622		
Std. dev. of dep.	0.295			0.295			0.301			0.279		
Sum of squared residuals	81.490			81.749			52.686			24.730		
Variance of residuals	0.056			0.056			0.059			0.045		
Std. error of regression	0.237			0.237			0.242			0.212		
R-squared	0.362			0.360			0.364			0.430		
Adj R-squared	0.354			0.355			0.356			0.419		
LM het. Test	5.587 [.018]			5.644 [.018]			5.709 [.017]			3.146 [.076]		
Jarque-Bera test	24.476 [.000]			24.619 [.000]			8.278 [.016]			49.428 [.000]		
Ramsey's RESET2	12.593 [.000]			12.931 [.000]			4.808 [.029]			8.520 [.004]		
F (zero slopes)	43.406 [.000]			74.729 [.000]			46.730 [.000]			37.588 [.000]		
Schwarz B.I.C.	31.711			4.868			34.778			-41.007		
Log likelihood	41.233			38.899			6.116			78.975		
Number observations	1472			1472			912			560		
Variable	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**
C	0.468	10.169	[.000]	0.457	14.647	[.000]	0.408	10.978	[.000]	0.598	10.723	[.000]
NON-DEBT TAX	0.030	3.588	[.000]	0.030	3.609	[.000]	0.051	4.906	[.000]	0.002	0.146	[.884]
LIQUIDITY	-0.002	-2.378	[.018]	-0.002	-2.431	[.015]	-0.002	-2.348	[.019]	-0.008	-2.110	[.035]
INTANGIBILITY	-1.442	-3.515	[.000]	-1.447	-3.554	[.000]	-0.999	-1.807	[.071]	-1.918	-3.114	[.002]
FIRM SIZE	0.024	2.902	[.004]	0.023	2.914	[.004]	0.031	3.130	[.002]	0.015	1.108	[.268]
AGE	-0.004	-0.401	[.688]									
STOCK ILLIQUIDITY	0.127	5.173	[.000]	0.128	5.258	[.000]	0.171	5.752	[.000]	0.073	1.728	[.085]
GROWTH	-0.005	-1.860	[.063]	-0.005	-1.912	[.056]	-0.008	-3.690	[.000]	-0.003	-0.783	[.434]
PROFITABILITY	-1.225	-8.724	[.000]	-1.225	-8.787	[.000]	-1.008	-5.952	[.000]	-1.570	-5.640	[.000]
I1 (food & beverages)	0.066	2.289	[.022]	0.066	2.837	[.005]	0.094	3.403	[.001]	-0.011	-0.272	[.786]
I2 (Textiles)	0.111	4.266	[.000]	0.111	5.933	[.000]	0.091	3.570	[.000]	0.141	5.434	[.000]
I3 (Chemicals)	0.057	2.413	[.016]	0.057	3.601	[.000]	0.059	2.795	[.005]	0.045	1.942	[.053]
I4 (Mineral products)	0.001	0.040	[.968]									
I5 (Metals)	0.082	2.913	[.004]	0.082	3.762	[.000]	0.068	2.338	[.020]	0.073	2.194	[.029]
I6 (Machinery)	-0.017	-0.647	[.518]									
I7 (transport equipment)	0.018	0.524	[.601]									
I8 (Misc. manufacturing)	0.043	1.266	[.206]									
I9 (Diver. Manufacturing)	-0.003	-0.060	[.952]									
I10 (Mining)	-0.019	-0.236	[.814]									
I11 (Electricity)	-0.057	-0.623	[.533]									

Standard Errors are heteroskedastic-consistent (HCTYPE=2); The dependent variable is defined in Panel A of Table 6.2; The explanatory variables are defined in Panel B of Table 6.2

WALD TEST - TESTING SEVERAL COEFFICIENTS JOINTLY [Equation (1) versus Equation (2)]:

F(8 1453) Test Statistic: 0.577 Upper tail area: 0.798

CHOW TEST FOR STABILITY [Equation (2) Versus Equations (3) and (4) separately]:

F(11 1450) Test Statistic: 7.378 Upper tail area: 0.000

Table 6B.4: Ordinary Least Squares regressions of LONG TERM DEBT (Long term debt including preference capital/ Quasi market value of capital) on firm-level characteristics. 1,472 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000.

	All firms (General model)			All firms (Specific model)			Non-affiliated firms			Group-affiliated firms		
Regression	1			2			3			4		
Mean of dep. var.	0.332			0.332			0.296			0.389		
Std. dev. of dep.	0.245			0.245			0.241			0.241		
Sum of squared residuals	62.278			62.672			37.446			23.105		
Variance of residuals	0.043			0.043			0.042			0.042		
Std. error of regression	0.207			0.207			0.204			0.205		
R-squared	0.293			0.289			0.289			0.287		
Adj R-squared	0.284			0.283			0.281			0.273		
LM het. Test	28.471 [.000]			26.543 [.000]			9.484 [.002]			19.659		
Jarque-Bera test	14.735 [.001]			17.399 [.000]			45.912 [.000]			29.777		
Ramsey's RESET2	5.865 [.016]			5.462 [.020]			3.156 [.076]			3.243		
F (zero slopes)	31.701 [.000]			53.878 [.000]			33.322 [.000]			20.097		
Schwarz B.I.C.	-166.174			-190.711			-120.925			-60.036		
Log likelihood	239.118			234.477			161.819			98.004		
Number observations	1472			1472			912			560		
Variable	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**	**Coeff**	**t-stat.**	**Prob**
C	0.541	13.607	[.000]	0.508	14.542	[.000]	0.513	12.034	[.000]	0.613	8.764	[.000]
NON-DEBT TAX	0.083	11.459	[.000]	0.082	11.376	[.000]	0.090	10.249	[.000]	0.059	4.203	[.000]
LIQUIDITY	-0.001	-2.008	[.045]	-0.001	-2.005	[.045]	-0.001	-1.762	[.078]	-0.004	-1.109	[.268]
INTANGIBILITY	-0.761	-3.342	[.001]	-0.743	-3.296	[.001]	-0.416	-1.449	[.148]	-1.176	-3.388	[.001]
FIRM SIZE	-0.030	-4.146	[.000]	-0.030	-4.094	[.000]	-0.030	-3.465	[.001]	-0.029	-1.928	[.054]
AGE	-0.029	-3.150	[.002]	-0.028	-3.061	[.002]	-0.040	-3.307	[.001]	-0.037	-2.528	[.012]
STOCK ILLIQUIDITY	0.104	4.736	[.000]	0.104	4.975	[.000]	0.131	5.412	[.000]	0.089	2.144	[.033]
GROWTH	-0.003	-1.896	[.058]	-0.003	-1.907	[.057]	-0.004	-3.344	[.001]	-0.002	-0.798	[.425]
PROFITABILITY	-0.654	-6.289	[.000]	-0.658	-6.294	[.000]	-0.526	-4.129	[.000]	-0.809	-4.208	[.000]
I1 (food & beverages)	-0.069	-2.731	[.006]	-0.041	-2.208	[.027]	-0.018	-0.793	[.428]	-0.092	-2.856	[.004]
I2 (Textiles)	-0.036	-1.522	[.128]									
I3 (Chemicals)	-0.038	-1.797	[.073]									
I4 (Mineral products)	-0.073	-2.561	[.011]	-0.045	-1.965	[.050]	-0.106	-3.415	[.001]	0.004	0.136	[.892]
I5 (Metals)	-0.017	-0.649	[.517]									
I6 (Machinery)	-0.103	-4.687	[.000]	-0.076	-5.215	[.000]	-0.089	-4.982	[.000]	-0.069	-2.944	[.003]
I7 (transport equipment)	-0.065	-2.153	[.031]									
I8 (Misc. manufacturing)	-0.015	-0.511	[.609]									
I9 (Diver. Manufacturing)	-0.017	-0.374	[.709]									
I10 (Mining)	-0.081	-1.052	[.293]									
I11 (Electricity)	0.025	0.271	[.786]									

Standard Errors are heteroskedastic-consistent (HCTYPE=2); The dependent variable is defined in Panel A of Table 6.2; The explanatory variables are defined in Panel B of Table 6.2

WALD TEST - TESTING SEVERAL COEFFICIENTS JOINTLY [Equation (1) versus Equation (2)]:

F(8 1453) Test Statistic: 1.149 Upper tail area: 0.327

CHOW TEST FOR STABILITY [Equation (2) Versus Equations (3) and (4) separately]:

F(11 1450) Test Statistic: 4.618 Upper tail area: 0.000

Appendix 6C: The expanded Model (6.2), with alternative debt measures

Table 6C.1: Ordinary Least Squares regressions of LEV1 (Total liabilities / Quasi market value of total assets) on firm and group characteristics. 1,384 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000 (of which 472 are group-affiliated).

	GENERAL MODEL			SPECIFIC MODEL		
Mean of dep. var.	0.679			0.679		
Std. dev. of dep. var.	0.259			0.259		
Sum of squared residuals	53.577			54.439		
Variance of residuals	0.040			0.040		
Std. error of regression	0.200			0.200		
R-squared	0.422			0.413		
Adjusted R-squared	0.404			0.403		
LM het. test	84.963 [.000]			61.065 [.000]		
Jarque-Bera test	67.115 [.000]			87.550 [.000]		
Ramsey's RESET2	70.802 [.000]			45.295 [.000]		
F (zero slopes)	23.305 [.000]			43.461 [.000]		
Schwarz B.I.C.	-130.801			-192.090		
Log likelihood	286.305			275.266		
Variable	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.451	8.892	[.000]	0.457	10.981	[.000]
GP	0.337	3.419	[.001]	0.284	4.311	[.000]
HD	-0.020	-0.144	[.886]			
NON-DEBT TAX SHIELD	0.012	1.238	[.216]	0.011	1.201	[.230]
LIQUIDITY (CA/CL)	-0.002	-2.715	[.007]	-0.002	-2.718	[.007]
INTANGIBILITY	-1.046	-2.067	[.039]	-1.095	-2.841	[.005]
FIRM SIZE	0.046	4.980	[.000]	0.048	5.264	[.000]
AGE	0.019	1.448	[.148]	0.018	1.880	[.060]
STOCK ILLIQUIDITY	0.141	5.470	[.000]	0.137	5.435	[.000]
GROWTH (P/B)	-0.009	-3.567	[.000]	-0.010	-4.207	[.000]
PROFITABILITY	-0.833	-6.134	[.000]	-0.875	-7.755	[.000]
(NON-DEBT TAX SHIELD) x GP	-0.030	-1.980	[.048]	-0.028	-2.177	[.030]
LIQUIDITY x GP	-0.003	-0.845	[.398]	-0.006	-1.881	[.060]
INTANGIBILITY x GP	-0.022	-0.026	[.979]			
(FIRM SIZE) x GP	-0.022	-1.251	[.211]	-0.031	-2.274	[.023]
AGE x GP	-0.012	-0.543	[.587]			
(STOCK ILLIQUIDITY) x GP	-0.108	-2.176	[.030]	-0.105	-2.548	[.011]
GROWTH x GP	-0.010	-0.548	[.584]			
PROFITABILITY x GP	-0.166	-0.603	[.547]			
(NON-DEBT TAX SHIELD) x HD	-0.005	-0.207	[.836]			
LIQUIDITY x HD	-0.004	-0.701	[.483]			
INTANGIBILITY x HD	-2.607	-2.139	[.033]	-1.732	-2.323	[.020]
(FIRM SIZE) x HD	-0.005	-0.188	[.851]			
AGE x HD	0.019	0.606	[.545]			
(STOCK ILLIQUIDITY) x HD	-0.027	-0.363	[.717]			
GROWTH x HD	0.016	0.816	[.415]			
PROFITABILITY x HD	-0.615	-1.969	[.049]	-0.698	-3.330	[.001]
GROUP PROFITABILITY	-0.276	-2.179	[.029]	-0.389	-3.181	[.002]
GROUP LIQUIDITY	-0.008	-1.049	[.294]			
GROUP DEBT	-0.010	-2.415	[.016]	-0.009	-3.196	[.001]
GROUP DIVERSITY	0.020	1.174	[.240]			
GROUP SIZE	-0.014	-1.465	[.143]	-0.006	-1.077	[.282]
I1 (food & beverages)	0.017	0.703	[.482]			
I2 (Textiles)	0.044	1.879	[.060]	0.043	2.660	[.008]
I3 (Chemicals)	0.010	0.476	[.634]			
I4 (Mineral products)	-0.016	-0.548	[.584]			
I5 (Metals)	0.032	1.342	[.180]	0.032	1.859	[.063]
I6 (Machinery)	-0.051	-2.135	[.033]	-0.049	-2.861	[.004]
I7 (transport equipment)	0.004	0.139	[.889]			
I8 (Misc. manufacturing)	-0.005	-0.166	[.868]			
I9 (Diver. Manufacturing)	0.050	1.261	[.208]	0.052	1.620	[.105]
I10 (Mining)	-0.027	-0.337	[.736]			
I11 (Electricity)	0.036	0.465	[.642]			

Standard Errors are heteroskedastic-consistent (HCTYPE=2); All variables are defined in Table 6.2

WALD TEST-For several coefficients jointly: F(20 1342) Test Statistic: 1.079 Upper tail area: 0.365

Table 6C.2: Ordinary Least Squares regressions of LEV3 (Total debt / Quasi market value of net assets) on firm and group characteristics. 1,384 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000 (of which 472 are group-affiliated).

	GENERAL MODEL			SPECIFIC MODEL		
Mean of dep. var.	0.559			0.559		
Std. dev. of dep. var.	0.293			0.293		
Sum of squared residuals	68.724			69.729		
Variance of residuals	0.051			0.051		
Std. error of regression	0.226			0.226		
R-squared	0.420			0.411		
Adjusted R-squared	0.401			0.401		
LM het. test	3.493 [.062]			0.721 [.396]		
Jarque-Bera test	14.779 [.001]			18.982 [.000]		
Ramsey's RESET2	11.622 [.001]			3.979 [.046]		
F (zero slopes)	23.089 [.000]			41.291 [.000]		
Schwarz B.I.C.	41.494			-17.173		
Log likelihood	114.010			103.965		
Variable	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.468	8.298	[.000]	0.479	11.379	[.000]
GP	0.342	2.938	[.003]	0.251	3.896	[.000]
HD	0.021	0.141	[.888]			
NON-DEBT TAX SHIELD	0.053	5.080	[.000]	0.056	6.012	[.000]
LIQUIDITY (CA/CL)	-0.001	-2.252	[.024]	-0.001	-2.268	[.023]
INTANGIBILITY	-0.960	-1.760	[.079]	-1.061	-2.586	[.010]
FIRM SIZE	0.030	3.046	[.002]	0.025	3.135	[.002]
AGE	-0.023	-1.438	[.151]	-0.023	-1.976	[.048]
STOCK ILLIQUIDITY	0.167	5.751	[.000]	0.162	5.766	[.000]
GROWTH (P/B)	-0.008	-3.612	[.000]	-0.008	-4.232	[.000]
PROFITABILITY	-1.029	-5.849	[.000]	-1.095	-7.469	[.000]
(NON-DEBT TAX SHIELD) x GP	-0.041	-2.171	[.030]	-0.052	-5.060	[.000]
LIQUIDITY x GP	-0.002	-0.586	[.558]	-0.004	-1.329	[.184]
INTANGIBILITY x GP	-0.139	-0.178	[.858]			
(FIRM SIZE) x GP	-0.008	-0.392	[.695]			
AGE x GP	-0.012	-0.492	[.623]			
(STOCK ILLIQUIDITY) x GP	-0.091	-1.544	[.123]	-0.088	-1.885	[.060]
GROWTH x GP	-0.009	-0.522	[.602]			
PROFITABILITY x GP	-0.275	-0.735	[.462]			
(NON-DEBT TAX SHIELD) x HD	-0.003	-0.109	[.913]			
LIQUIDITY x HD	-0.002	-0.277	[.782]			
INTANGIBILITY x HD	-2.470	-2.286	[.022]	-1.730	-2.255	[.024]
(FIRM SIZE) x HD	-0.022	-0.699	[.485]			
AGE x HD	0.046	1.301	[.193]	0.018	1.864	[.062]
(STOCK ILLIQUIDITY) x HD	-0.090	-1.018	[.309]			
GROWTH x HD	0.014	0.751	[.453]			
PROFITABILITY x HD	-0.737	-1.866	[.062]	-0.848	-3.251	[.001]
GROUP PROFITABILITY	-0.246	-1.661	[.097]	-0.329	-2.324	[.020]
GROUP LIQUIDITY	-0.003	-0.331	[.741]			
GROUP DEBT	-0.010	-1.959	[.050]	-0.009	-2.100	[.036]
GROUP DIVERSITY	0.019	0.970	[.332]			
GROUP SIZE	-0.027	-2.298	[.022]	-0.021	-2.338	[.020]
I1 (food & beverages)	0.063	2.176	[.030]	0.072	3.065	[.002]
I2 (Textiles)	0.092	3.509	[.000]	0.108	5.403	[.000]
I3 (Chemicals)	0.044	1.848	[.065]	0.057	3.479	[.001]
I4 (Mineral products)	-0.022	-0.687	[.492]			
I5 (Metals)	0.058	2.034	[.042]	0.076	3.323	[.001]
I6 (Machinery)	-0.033	-1.281	[.200]			
I7 (transport equipment)	0.000	0.005	[.996]			
I8 (Misc. manufacturing)	0.040	1.188	[.235]	0.055	1.884	[.060]
I9 (Diver. Manufacturing)	0.025	0.400	[.689]			
I10 (Mining)	0.000	-0.003	[.998]			
I11 (Electricity)	0.019	0.231	[.818]			

Standard Errors are heteroskedastic-consistent (HCTYPE=2); All variables are defined in Table 6.2

WALD TEST-For several coefficients jointly: F(19 1342) Test Statistic: 1.033 Upper tail area: 0.419

Table 6C.3: Ordinary Least Squares regressions of LEV4 (Total debt / Quasi market value of capital) on firm and group characteristics. 1,384 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000 (of which 472 are group-affiliated).

	GENERAL MODEL			SPECIFIC MODEL		
Mean of dep. var.	0.578			0.578		
Std. dev. of dep. var.	0.295			0.295		
Sum of squared residuals	70.860			72.723		
Variance of residuals	0.053			0.053		
Std. error of regression	0.230			0.231		
R-squared	0.412			0.396		
Adjusted R-squared	0.393			0.388		
LM het. test	11.956 [.001]			3.605 [.058]		
Jarque-Bera test	21.392 [.000]			26.989 [.000]		
Ramsey's RESET2	13.494 [.000]			4.244 [.040]		
F (zero slopes)	22.329 [.000]			49.731 [.000]		
Schwarz B.I.C.	62.673			-6.160		
Log likelihood	92.831			74.871		
Variable	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.457	8.046	[.000]	0.460	14.313	[.000]
GP	0.309	2.615	[.009]			
HD	0.055	0.364	[.716]			
NON-DEBT TAX SHIELD	0.051	4.882	[.000]	0.051	5.511	[.000]
LIQUIDITY (CA/CL)	-0.002	-2.295	[.022]	-0.002	-2.325	[.020]
INTANGIBILITY	-0.992	-1.818	[.069]	-1.102	-2.730	[.006]
FIRM SIZE	0.033	3.325	[.001]	0.027	3.407	[.001]
AGE	-0.014	-0.894	[.371]			
STOCK ILLIQUIDITY	0.171	5.837	[.000]	0.132	5.419	[.000]
GROWTH (P/B)	-0.008	-3.625	[.000]	-0.009	-4.168	[.000]
PROFITABILITY	-1.004	-5.938	[.000]	-1.097	-7.759	[.000]
(NON-DEBT TAX SHIELD) x GP	-0.047	-2.497	[.013]	-0.050	-5.488	[.000]
LIQUIDITY x GP	-0.001	-0.343	[.732]			
INTANGIBILITY x GP	-0.198	-0.235	[.814]			
(FIRM SIZE) x GP	-0.006	-0.288	[.774]			
AGE x GP	-0.003	-0.130	[.897]			
(STOCK ILLIQUIDITY) x GP	-0.105	-1.756	[.079]			
GROWTH x GP	-0.010	-0.540	[.589]			
PROFITABILITY x GP	-0.295	-0.825	[.409]			
(NON-DEBT TAX SHIELD) x HD	0.002	0.075	[.940]			
LIQUIDITY x HD	-0.003	-0.390	[.697]			
INTANGIBILITY x HD	-2.628	-2.272	[.023]	-2.138	-2.687	[.007]
(FIRM SIZE) x HD	-0.026	-0.828	[.408]			
AGE x HD	0.037	1.023	[.307]			
(STOCK ILLIQUIDITY) x HD	-0.080	-0.883	[.377]			
GROWTH x HD	0.015	0.775	[.439]			
PROFITABILITY x HD	-0.716	-1.872	[.061]	-0.934	-3.753	[.000]
GROUP PROFITABILITY	-0.299	-1.987	[.047]	-0.485	-3.513	[.000]
GROUP LIQUIDITY	-0.003	-0.309	[.758]			
GROUP DEBT	-0.010	-1.903	[.057]	-0.011	-2.985	[.003]
GROUP DIVERSITY	0.021	1.042	[.298]			
GROUP SIZE	-0.026	-2.175	[.030]	0.008	3.210	[.001]
I1 (food & beverages)	0.055	1.887	[.059]	0.054	2.242	[.025]
I2 (Textiles)	0.082	3.062	[.002]	0.086	4.255	[.000]
I3 (Chemicals)	0.036	1.481	[.139]	0.042	2.418	[.016]
I4 (Mineral products)	-0.030	-0.918	[.359]			
I5 (Metals)	0.048	1.663	[.097]	0.050	2.156	[.031]
I6 (Machinery)	-0.037	-1.433	[.152]	-0.035	-1.732	[.084]
I7 (transport equipment)	0.005	0.148	[.882]			
I8 (Misc. manufacturing)	0.030	0.853	[.394]			
I9 (Diver. Manufacturing)	0.018	0.285	[.776]			
I10 (Mining)	-0.001	-0.009	[.992]			
I11 (Electricity)	0.024	0.275	[.783]			

Standard Errors are heteroskedastic-consistent (HCTYPE=2); All variables are defined in Table 6.2

WALD TEST-For several coefficients jointly: F(24 1342) Test Statistic: 1.470 Upper tail area: 0.067

Table 6C.4: Ordinary Least Squares regressions of LONG TERM DEBT (Long term debt including preference capital/ Quasi market value of capital) on firm and group characteristics. 1,384 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000 (of which 472 are group-affiliated).

	GENERAL MODEL			SPECIFIC MODEL		
Mean of dep. var.	0.329			0.329		
Std. dev. of dep. var.	0.245			0.245		
Sum of squared residuals	55.684			56.741		
Variance of residuals	0.042			0.042		
Std. error of regression	0.204			0.204		
R-squared	0.327			0.314		
Adjusted R-squared	0.305			0.304		
LM het. test	12.610 [.000]			22.888 [.000]		
Jarque-Bera test	17.764 [.000]			21.777 [.000]		
Ramsey's RESET2	11.020 [.001]			4.001 [.046]		
F (zero slopes)	15.483 [.000]			31.162 [.000]		
Schwarz B.I.C.	-104.108			-170.654		
Log likelihood	259.612			246.598		
Variable	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.540	11.622	[.000]	0.555	14.738	[.000]
GP	0.183	1.535	[.125]	0.091	5.601	[.000]
HD	0.047	0.269	[.788]			
NON-DEBT TAX SHIELD	0.093	10.580	[.000]	0.090	11.276	[.000]
LIQUIDITY (CA/CL)	-0.001	-1.810	[.071]	-0.001	-1.906	[.057]
INTANGIBILITY	-0.432	-1.510	[.131]	-0.547	-2.383	[.017]
FIRM SIZE	-0.030	-3.365	[.001]	-0.031	-3.973	[.000]
AGE	-0.039	-3.250	[.001]	-0.042	-4.360	[.000]
STOCK ILLIQUIDITY	0.136	5.427	[.000]	0.108	4.796	[.000]
GROWTH (P/B)	-0.004	-3.559	[.000]	-0.005	-4.008	[.000]
PROFITABILITY	-0.533	-4.142	[.000]	-0.573	-5.564	[.000]
(NON-DEBT TAX SHIELD) x GP	-0.036	-1.830	[.067]	-0.023	-3.011	[.003]
LIQUIDITY x GP	0.001	0.342	[.732]			
INTANGIBILITY x GP	-0.318	-0.709	[.478]			
(FIRM SIZE) x GP	0.011	0.511	[.609]			
AGE x GP	-0.026	-1.110	[.267]			
(STOCK ILLIQUIDITY) x GP	-0.053	-1.059	[.290]			
GROWTH x GP	-0.008	-0.660	[.510]			
PROFITABILITY x GP	-0.162	-0.651	[.515]			
(NON-DEBT TAX SHIELD) x HD	0.020	0.588	[.556]			
LIQUIDITY x HD	-0.013	-2.006	[.045]	-0.009	-2.280	[.023]
INTANGIBILITY x HD	-2.261	-2.422	[.016]	-1.531	-2.077	[.038]
(FIRM SIZE) x HD	-0.049	-1.356	[.175]			
AGE x HD	0.064	1.566	[.118]			
(STOCK ILLIQUIDITY) x HD	-0.194	-1.439	[.150]			
GROWTH x HD	0.012	0.913	[.361]			
PROFITABILITY x HD	0.023	0.045	[.964]			
GROUP PROFITABILITY	-0.285	-1.781	[.075]	-0.320	-2.295	[.022]
GROUP LIQUIDITY	-0.001	-0.166	[.868]			
GROUP DEBT	-0.009	-2.174	[.030]	-0.009	-3.180	[.002]
GROUP DIVERSITY	0.023	1.116	[.265]			
GROUP SIZE	-0.007	-0.569	[.569]			
I1 (food & beverages)	-0.067	-2.539	[.011]	-0.058	-2.728	[.006]
I2 (Textiles)	-0.048	-1.979	[.048]	-0.034	-1.814	[.070]
I3 (Chemicals)	-0.046	-2.093	[.037]	-0.035	-2.159	[.031]
I4 (Mineral products)	-0.085	-2.897	[.004]	-0.071	-2.946	[.003]
I5 (Metals)	-0.031	-1.143	[.253]			
I6 (Machinery)	-0.114	-4.999	[.000]	-0.099	-5.771	[.000]
I7 (transport equipment)	-0.070	-2.178	[.030]	-0.065	-2.389	[.017]
I8 (Misc. manufacturing)	-0.011	-0.372	[.710]			
I9 (Diver. Manufacturing)	-0.013	-0.260	[.795]			
I10 (Mining)	-0.065	-0.693	[.488]			
I11 (Electricity)	0.071	0.828	[.408]			

Standard Errors are heteroskedastic-consistent (HCTYPE=2); All variables are defined in Table 6.2

WALD TEST-For several coefficients jointly: F(22 1342)Test Statistic: 1.158 Upper tail area: 0.277

CHAPTER 7: CONCLUSION

7.1 The aim

The aim of this concluding chapter is to summarise the key findings of the study and to offer some possible research ideas for future work. The first task is thus to briefly restate the purpose and approach of each chapter, emphasising the main results and conclusions. This will be followed by the concluding section, which highlights some promising research ideas as were mentioned at chapters' ends.

7.2 Key findings

After a brief introduction, the study turns, in Chapter 2, to a survey on the dividend puzzle. Particularly, Chapter 2 begins by introducing the main theoretical and empirical work on the question of how dividend policy affects firm value. The leading theories of dividend include the transaction cost theory, the tax hypothesis, the bird in the hand argument, and signalling and agency theories. Discussed in length is the Lintner's (1956) survey on the dividend decision process of US managers, as this is a point of reference for many subsequent studies, particularly those that focus on the signalling role of dividends. It is noted that the empirical literature has recorded systematic variations in dividend behaviour across firms, countries and time, as well as in the type of dividend paid. Such variation can be expected in imperfect markets that are distorted by taxes, transaction costs, information asymmetries and agency conflicts. The chapter ends with an inconclusive verdict on the dividend puzzle. In particular it is stated that despite of four decades of theoretical debate, and after very many attempts to empirically validate the various theories, the pile of evidence collected is not conclusive on the determinants of dividend policy. Indeed, nor does it fully clarify the impact of dividend policy on firm value.

Following Chapter 2, the remaining four chapters are empirical in nature. In Chapter 3 a specific agency model of dividends is applied to Indian data extracted from the PROWESS database, by way of cross sectional Weighted Least Squares methodology. The data span the five years' period from 1994 to 1998 and the sample includes 910 Private Sector firms listed on the Bombay Stock Exchange. The chapter innovates on similar studies by introducing second power and interaction terms, as well as a number of new explanatory variables such as government and foreign holdings. The reported results are consistent with the idea that Private Sector firms in India set their target payout ratios so as to minimise the sum of agency costs and the costs associated with raising external finance. In particular insider ownership and debt levels, being alternative measures for controlling conflicts between managers and shareholders, are shown to have a negative impact on the payout ratio. Similarly, risk and growth tend to have a negative impact on the payout ratio because these variables increase dependency on external finance and the associated transaction costs. In contrast, ownership dispersion increases the free rider problem while foreign ownership reduces the ability to monitor managers. Hence these two variables tend to positively impact the payout ratio. Furthermore, unlike most studies, firm size appears to reduce the payout ratio, while the impact of institutional ownership is not persistent. Finally the study shows that the percentage of shares held by central and state governments is an important determinant of the firm's target payout ratio. In particular it is shown that government holdings tends to reduce the payout ratio and it is suggested that this is due to the implications of such holdings on agency costs.

While Chapter 3 as well as the other empirical chapters in this study, are Indian based, Chapter 4 is unique in that it is African based. Specifically Chapter 4 utilises the most comprehensive database on non-financial listed companies in Mauritius, in order to empirically study the determinants of capital structure of these firms. The theory of capital structure is critically reviewed and used to develop a theoretical model, which predicts the main determinants of the level of debt in the capital structure. The model is then empirically estimated and tested on a sample of 24 firms first as a cross-section on each year from 1992 to 1999, and second as a panel over the period 1992 – 2000. It is illustrated that the factors previously found to be important in determining the capital structures of firms in other countries, have similar influence on the capital structures of Mauritian firms. First, age is found to have a negative impact on leverage, and this is consistent with the notion that mature firms have greater access to the capital market, which in Mauritius is dominated by equity as opposed to debentures. Second, profitability and risk provide weak evidence of having negative impact on debt capacity, which is consistent with pecking order and trade off considerations respectively. Third size provides strong evidence of having a positive impact on debt, which may be due to control considerations. Specifically, firms achieve larger size through debt financing because dilution of control is an important factor for the predominantly family owned groups that characterise the Mauritian business environment. Indeed, this control-based rationale for the positive impact of size on leverage can also explain the positive sign recorded for the growth variable. Fourth, and last, the non-debt tax shield and the asset tangibility variables are shown to enter with positive and negative signs respectively, which contradicts the trade off based predictions. However, it is noted that this could be due to the improper selection of proxies, which may also explain the perverse sign on the proxy for the industry-imposed level of credit given to debtors. In summary, the findings support the notion that the trade off, pecking order, and agency theories, as well as control considerations have an important role in explaining the capital structure decision.

The last two empirical chapters investigate the Indian Business House structure. Business groups are an important feature of many developed and developing markets but relatively little attention has been paid to them in the theoretical and empirical literature. Chapter 5 synthesises the transaction cost theory of dividend policy with the market failure and political economy theories of business groups in emerging markets. While the former theory suggests that dividend policy is inversely related to dependency on external finance, the latter theories imply that dividend policies of group-affiliated firms are mainly determined by group considerations. The sample consists of 1412 non-financial firms with data related to the year 2000. Particularly the sample comprises 858 independent firms and 554 group-affiliated firms, and is refined from the universe of all quoted Indian Private Sector firms available on the PROWESS database. However, in order to measure business groups' size and diversification levels, the sample is not restricted to firms listed on the Bombay Stock Exchange. Indeed, for that purpose a second sample of 2042 group-affiliated firms is drawn from the PROWESS total population of 6548 quoted and unquoted Indian Private Sector firms. The first stage of the empirical procedure includes some preliminary tests to determine whether the dividend policies of group-affiliated firms are substantially different from that of independent firms. The second stage of the empirical procedure includes application of Maximum Likelihood binary and limited dependent variable econometric techniques to the data. The aim is to disentangle the determinants of dividend policy of group-affiliated versus independent firms. In general, the results suggest that while the decision to pay dividend is sensitive to transaction cost considerations regardless of group-affiliation, the payout level of group-affiliated firms is less sensitive to transaction cost considerations compared with the case of independent firms.

Chapter 6 is the final empirical chapter and is similar to chapter 5 in that it synthesises two strands of the corporate finance literature. The two strands include the literature on business groups and the literature on the determinants of capital structure. This synthesis is then used to explain variation in the debt levels of group-affiliated and non-affiliated firms and to generate some plausible models that explain the capital structure decisions of these two categories of firms. The empirical procedures utilise a sample of 1811 Indian Private Sector, non-financial firms, which is extracted from the PROWESS database. The firms in the sample have a year ending of March 2000, and comprise 1146 non group-affiliated firms and 665 firms that are affiliated with Indian Business Houses. It is shown by way of comparison analysis that significant differences exist between the debt levels of group and non-group firms as well as between firms that are affiliated with groups at various levels of diversification. These results are further reinforced by the conclusions from an Ordinary Least Squares multivariate analysis, which involves the estimation of two models on slightly smaller samples. The main results from the multivariate analysis can be summarised in five points as follows. First the alternative tax shield proxy is the only variable whose sign is found to be opposite to expectations. Second, it is found that firm size and growth are unimportant for the capital structure decisions of group-affiliated firms, while they are critical for the leverage decisions of independent firms. Third, no major differences are recorded between group and non-group firms in terms of the impact of age and stock illiquidity on capital structure decisions. Fourth, liquidity, asset structure, and profitability appear to have stronger impact on the capital structure decisions of group-affiliated firms compared with non-affiliated firms. Fifth, it is shown that consistent with the market failure theory of business groups, group-affiliated firms appear to share tangible and intangible assets so that group-wide factors enter the capital structure decisions of these firms.

The conclusions from Chapter 6, as well as those from the rest of the chapters, are only valid to the extent that the sample selection procedures produce a representative sample of the population on which the conclusions are drawn. Further the validity of the results and conclusions are subject to the quality and accuracy of the data and of the empirical procedures. These results and conclusions should be rebuffed or reinforced by future research, suggestions for which are summarised in the next section.

7.3 Promising research ideas

Chapters 2 to 6 end with ideas for future research and the main suggestions from each are briefly repeated here, starting with Chapter 2. In that chapter a problem is identified which surfaces again in later chapters and concerns the difficulty in distinguishing between competing theories. A possible solution for this is offered at the end of Chapter 2. Specifically it is suggested that future research should exploit institutional differences across countries to understand better the factors that influence corporate financial decisions. Furthermore, based on La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000), it is noted that cross-country comparisons can also assist in establishing fine distinctions between various under-themes within major theories.

In Chapter 3 a call was made for a system of equations that allows the dividend decision, the capital structure decision, and ownership structure patterns to be simultaneously determined. It was also suggested to replace cross sectional data that is averaged over time with panel data and a panel procedure that allows for time effects.

Although obtaining data from emerging markets with adequate time series for this purpose can be problematic such a procedure should permit trends over time to be observed.

Another promising research idea, which is noted at the end of Chapter 4, is to investigate capital structure decisions of unlisted as opposed to quoted companies. In the context of emerging markets where non-quoted firms constitute a large fraction of companies, understanding how this sector undertake financial decisions should prove valuable. Further, as in many emerging markets (albeit not in India) the size of samples that includes only quoted companies are likely to be small and not necessarily to reflect the economy as a whole. Thus expanding the sample by including non-quoted firms should be beneficial for empirical inferences.

Chapter 5 advances two promising future research ideas relating to business groups. First it is noted that business groups may be changing in response to major changes that many emerging markets are going through. Thus studying the responsiveness of business groups to changing environments should give a clue as to the reason for their emergence, the efficiency of this corporate structure and to their future fate. Second, it is noted that although the results from the empirical investigations show that the dividend decisions of group-affiliated firms are less sensitive to transaction costs considerations, the issue of what determines the dividend policies of these firms was not addressed. Thus another promising research idea is to model the dividend policy decisions of group-affiliated firms.

It should be noted, however, that obtaining data at the group level for the purpose of investigation, or even simply identifying the group with which a firm is associated could prove to be a difficult task in many markets. Granovetter (1995) terms this the invisible problem of business groups, which may be due, for instance to the fact that the business group organisation typically does not have a legal structure. In India, for instance there is no legal requirements for groups to provide group-accounts, and in Chile due to pyramiding, Granovetter (1995) notes that it can be extremely difficult to identify the family controlling the group. Chapter 6 notes these problems but nonetheless concludes that further research into the workings of business groups and how this organisational structure impacts corporate financial decisions, is clearly required. Chapter 6 further identifies the weakness of using data on a single year and proposes that subject to data availability, this short fall should also be addressed by future studies.

In sum, there are plenty of interesting avenues which future research into the financing decisions of firms in general and in emerging markets in particular, could and no doubt will take. Thus the final word on the subject is yet to be known.

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