

# **The Determinants of Capital Structure: Evidence from Dutch Panel Data**

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August-1998

## **Abstract**

This paper studies the determinants of capital structure choice of Dutch firms. Our main objective is to investigate whether and to what extent the main capital structure theories can explain capital structure choice of Dutch firms. A better understanding of the capital structure determinants in a relatively small yet open industrialized economy is essential not only for enriching empirical studies in this field, but also for the purpose of cross country asset evaluation. By estimating a panel data model explaining both the absolute level of leverage with respect to various factors and the year-to-year changes in leverage with respect to the changes of various factors, we find evidence suggesting the relevance of the pecking order hypothesis in explaining the financing choice of Dutch firms, which implies the importance of asymmetric information models in explaining capital structure choice of Dutch firms. We argue that factors based on agency costs and corporate control considerations are relatively unimportant for the Dutch case.

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## 1. Introduction

Forty years ago, Modigliani and Miller (1958) illustrated that if the financial market is perfect and if there are no taxes or transaction costs, a firm's value depends solely on the level and risk of its future cash flows. In that case, firms will be indifferent with regard to financing investment with internal or different forms of external funds. This implies that there does not exist an optimal capital structure because a firm's value cannot be affected by its choice of financing.

Since the publication of the seminal article of Modigliani and Miller, a vast theoretical literature has emerged to identify the conditions under which the irrelevance hypothesis does no longer hold. Harris and Raviv (1991) survey the theoretical literature that explains differences in observed capital structures in developed economies. This theoretical literature has proven that the assumptions underlying the Modigliani and Miller theory are, in general, not fulfilled.

However, empirical evidence on the determinants of firm's capital structure is still scarce. Among the most important empirical studies are Titman and Wessels (1988) and Rajan and Zingales (1995). Titman and Wessels perform an empirical study on the determinants of capital structure choice in the United States. Rajan and Zingales (1995) attempt to give more empirical evidence on the determinants of capital structure by providing a detailed study on how institutional factors can explain differences in firms' capital structures in the largest industrial countries. For a relatively complete survey of the empirical literature on capital structure until the beginning of the 1990s, see Cools (1993).

This paper presents an empirical analysis of capital structure of Dutch firms. The objective is to investigate whether and to what extent the main capital structure theories can explain capital structure choice of Dutch firms. The Dutch case provides additional insights, since the Netherlands is a small open economy with an overrepresentation of large-scale internationally oriented firms. Moreover, Dutch corporate governance is a mixture of Anglosaxon market- and German Bank-relation models. The contribution of the paper is threefold. First, by providing information on the capital structure choice of Dutch firms and on the Dutch corporate governance system, the paper gives a descriptive analysis of the relevance of different capital structure theories for the Netherlands. Second, the study further examines the relevance of different capital structure theories by a panel data regression for listed Dutch firms for the period 1984-1995. There are a few recent studies on Dutch capital structure available. Good examples are Scholtens (1997) and De Bondt (1998). However, they refer to the macro level. In our opinion, a better understanding of the determinants of capital structure of Dutch firms requires the usage of firm level mi-

cro data. This will not only improve the understanding of the Dutch case, but it also tests for the robustness of the evidence brought forward by studies on other countries. To the best of our knowledge, Cools (1993) is the only relatively recent study on Dutch capital structure choice which bases the empirical analysis on a panel of firm level data. In his study, firm level data for two periods (1977-1978 and 1987-1988) is used. An important difference between our study and that of Cools (1993) is that we use a longer observation period and more recent data. We think that this may give a better understanding of capital structure choice of Dutch firms. The final contribution of our paper is that the panel regression of the model in first differences alleviates the problem of heteroscedasticity as well as auto- and cross-correlation of the error terms, thus improves the robustness of the OLS estimation results. Most capital structure studies, including the one by Cools <sup>1</sup>, use a fixed effects panel data approach. Basically this comes down to a transformation of the original data set by subtracting the means of individual firm observations from the original observations and then applying the least-squares method to the transformed data. A drawback of that approach is that it is not heteroscedastic consistent and assumes that disturbances are not autocorrelated. Due to size differences of firms in the panel, the disturbance terms probably will not have the same variance and hence heteroscedasticity may be an important phenomenon in this kind of studies, even after scaling the data set. Moreover, a random shock affecting one firm may also affect other firms because of close ties between the firms. Hence, in panel data sets, especially when several years are taken into account, it may well be the case that disturbances are correlated with one another. As is well known, the violation of spherical disturbances (disturbances have uniform variance and are not autocorrelated) may reduce the efficiency of the estimates considerably.

The paper is organized as follows. Section 2 provides some macroeconomic figures concerning the financing choice of Dutch firms. Section 3 gives a brief review of capital structure theory and relates that to the situation in the Netherlands. It gives a first idea about the relevance of different capital structure theories for the Netherlands. Section 4 discusses the capital structure determinants and their proxy variables which will be used in the panel data study. It also explains which proxies we use for capital structure. Section 5 describes the data set we use in this analysis, and provides some important summary statistics. In section 6, after presenting the results for the fixed effects least-squares regression of both the absolute level and the year-to-year change models, we give a further interpretation of the empirical results. Section 7 concludes.

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1 It should be noted that Cools, in line with Titman and Wessels (1988) also uses the LISREL technique.

## 2. Macroeconomic facts for the Netherlands

This section provides some macroeconomic information on the financing choice of Dutch firms. It is a first attempt to characterize the capital structure choice of the Dutch corporate sector, as compared to some other industrialized countries. The analysis is summarized in Table 1, which gives aggregate figures for some industrialized countries, including the Netherlands. All figures in the table are from De Bondt (1998) .

The second and third column refer to the leverage ratio. Rajan and Zingales (1995) present and critically discuss several measures of the leverage ratio. They also point at accounting differences among countries, so that a comparison may need some adjustments in the leverage ratio. However, since adjusted leverage ratios are not yet available for the Netherlands, we restrict the analysis to the debt-equity ratio as a proxy for leverage. By taking this caveat into account, the table shows that the leverage ratio in all countries has declined during the 1980s. It also appears that the aggregate leverage ratio in the Netherlands in 1992 is much smaller than that of Italy. However, by and large, it is comparable to the leverage ratios of Germany, France, the UK and Belgium.

The fourth column gives information on the relative importance of the public market (stocks and bonds) vis-à-vis the private market (financial intermediaries, such as banks). It appears that in none of the countries the public market is important as a provider of credit to the private sector. In the Netherlands, the share of loans from the private market is even 97%. However, it should be noted that these figures refer to the entire private sector, so that for the corporate sector the picture may change somewhat. Nevertheless, it indicates the importance of financial intermediaries as providers of credit.

A closer look at the indirect credit market makes clear that the banking sector is by far the most important financial intermediary in all selected countries (see column 5). However, there is a clear difference between the Netherlands and the other countries. In all countries, except for the Netherlands, the share of bank loans in total loans to the private sector is above 85 %. The share is lower in the Netherlands, due to a relatively important role for institutional investors.

Another important difference between the Netherlands and other industrialized countries concerns the concentration rate of commercial banks. In the Netherlands, the banking system is extremely concentrated: the share of the three main banks (ABN-AMRO, Rabobank and ING bank) in total bank assets is almost 85%. This is much higher than in the other countries under consideration. In Germany the concentration rate of the top three banks is even below 20%. Moreover, the last column in the Table

shows that the share of long-term credit as a percentage of total credit to the corporate sector is relatively high in the Netherlands.

We end this section by giving some information on the relevance of internal versus external funds for the financing of Dutch firms. Although, exact figures are not available, the evidence strongly suggest that Dutch firms, like firms in other industrialized countries, prefer internal funds over external funds. A large scale interview study by De Haan et al. (1994) shows that 54% of all firms prefer internal funds, 18% of all firms prefer debt and 3% of all firms prefer share issues. De Haan et al. (1998) find that about 25% of medium-sized and large firms faced debt constraints in the years 1985-1992.

### **3. The relevance of capital structure theory for the Netherlands**

The analysis of the previous section suggests that Dutch firms prefer internal funds over external funds. Moreover, debt finance is much more important than equity finance. This does not differ from the situation in many other industrialized countries. However, the previous section has also pointed at some important special features of the Dutch system, such as the importance of pension funds and life insurance companies and the concentration rate of commercial banks. One may wonder whether the special features of the Dutch system are important for capital structure choice of Dutch firms. This section tries to assess the relevance of capital structure theory for the capital structure choice of Dutch companies. Moreover, it tries to value the importance of the Dutch specialties for the financing decision of firms in the Netherlands.

Broadly speaking five theoretical approaches can be distinguished, namely, models based on tax considerations, agency costs, asymmetric information, product/input market interactions, and corporate control issues. For a survey, see Harris and Raviv (1991).

#### **3.1 Models based on tax considerations**

Many discussions on capital structure choice deal with the effects of taxes, or more precisely with the effects of different taxation of debt and equity. Modigliani and Miller (1958) show that due to the fact that interest payments on debt are tax deductible, corporate taxation implies that the invariance condition no longer holds. Under plausible values for tax variables, an increase in leverage would increase the value of the firm.

Due to its large institutional detail it goes beyond the scope of this paper to give an overall and complete theoretical discussion of the effects of taxation on the market

value of firms. It may be preferable to consult comparative empirical work in this area (see, for instance, Rajan and Zingales, 1995). Moreover, for the subject matter of this paper it is relevant to have a look at the Dutch case. In first instance, it seems that tax considerations are important determinants of the financing hierarchy and hence capital structure of Dutch firms. In the Netherlands, the corporate tax rate is rather low, from an international comparative perspective. Interest is tax deductible for corporate taxes, dividend is (progressively) taxed as income and capital gains are tax exempt. However, investors are allowed to choose a dividend re-investment option, under which dividend can become tax-free. In general, though, the Dutch tax system favors debt over equity financing and hence can explain why firms prefer debt over share issues. The Dutch tax system cannot explain why firms prefer internal finance over debt (De Haan et al., 1994, p. 300). Therefore, tax considerations can at the best only partly explain capital structure choice of Dutch firms, so that other theories are needed to understand the Dutch case.

### 3.2 Models based on agency costs

The agency costs models were initiated by Jensen and Meckling (1976), building on earlier work of Fama and Miller (1972). Under this framework, (1) debt is considered as a necessary mechanism to mitigate the conflicts between equity holders and managers. The arguments are: first of all, debt financing reduces the amount of “free” cash available at managers’ disposal (Jensen, 1986), and it explains why companies in mature industries with few growth opportunities and abundant cash flow tend to have high leverage ratio. Secondly, debt can be considered as a mechanism to force liquidation if a firm’s cash flow is poor (Harris and Raviv, 1990), even though managers may always want to continue firms’ current operation whereas shareholders may be better-off by liquidating current operations. Further, managers’ tendency in empire building can be confined with debt financing (Stulz 1990)<sup>2</sup>. The optimal capital structure is thus obtained by trading off the benefit of debt in preventing investment in value decreasing projects against the cost of debt in preventing investment in value increasing projects.

(2) Once debt is introduced into capital financing, another type of conflict of interest among agents emerges: the conflict between equity holders and debt holders. In a highly leveraged firm, the incentives for shareholders to push managers to pursue riskier projects can result in an *asset substitution problem*<sup>3</sup>. Diamond (1989) argues

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2 Managers’ tendency in empire building may sometimes lead them to carry out negative net present value projects even though paying out cash is a better choice for shareholders.

3 Because of shareholders’ limited liability, they suffer minimal declines in wealth if the project fails,

that agency costs from the above mentioned perspective are trivial for older, more established firms with good track records of repaying debt. These firms value their reputation along with the lower borrowing costs, thus preferring safe projects rather than risky projects. Young firms with little reputation may choose risky projects. Managers' reputation concerns in the managerial labor market can somehow reduce the agency costs of debt, as managers' objective is to maximize the probability of success, while shareholders prefer to maximize expected returns (Hirshleifer and Thakor, 1989). Leverage may cause another adverse incentive which is the so called *underinvestment problem*, in which case managers, acting in shareholders' interest, might reject investments which would increase firm value because the expected gains would accrue largely to creditors (Myers, 1977).

The agency theory emphasizes agency conflicts with equity holders. Therefore, in order to assess the relevance of the agency theory for explaining the capital structure choice of Dutch firms, it is important to consider the role of equity holders in the Netherlands. The possibilities of (internal) shareholders to control and monitor the corporate sector depend on the ownership structure of shares and on the influence of shareholders on the supervisory board of firms. In the Netherlands, shareholdings of companies are more widely dispersed, especially in comparison to the concentration of shareholdings in Germany. This implies that there are many small shareholders, who have little incentives in monitoring the firms. Moreover, corporate governance can be characterized as a system of cooptation. In this system, new members of the supervisory board are elected by the current members of the supervisory board. Nevertheless, in practice it appears that the management board strongly influences the composition of the supervisory board. The system of cooptation reduces the corporate governance role of shareholders in general. The system of cooptation is also one of the reasons why pension funds do not have an important role in corporate governance in the Netherlands, although a substantial percentage of total corporate shares is held by them (about 8%). Pension funds are mainly interested in the safeness of their investments, and generally do not try to change policies of firms. The limited role of pension funds in influencing corporate strategies is magnified by the weak links of pension funds with the supervisory board representation, as is the case in the system of cooptation. This probably implies that one of the main differences between the Dutch system and other industrialized countries, being the importance of pension funds and life insurance companies (see previous section) does not play an important role in the capital structure choice of Dutch firms.

Another special feature of the Dutch system concerns the high concentration rate of

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while they reap all of the gains in wealth if the project is successful. On the other hand, creditors can never receive more than their promised return.

the Dutch banking sector. Moreover, in the Dutch system, banks are not precluded from owning non-financial firms. However, percentage wise, banks' ownership of non-financial firms is not significant in real practice (Chirinko et. al, 1998) . It seems that the large Dutch banks have the exceptional ability on focusing on doing what they are best at, i.e. managing to grow through international banking acquisitions (a broader term here) rather than putting themselves into total new territory to manage non-financial business. Shareholdings of commercial banks in the Netherlands are extremely small (below 1% of total shareholdings) and proxy voting whereby banks are allowed to vote for shareholders who deposit their shares with banks hardly exists. Hence, the corporate governance role of banks in the Netherlands is limited. In the Netherlands, banks do not seem to monitor the corporate sector for reasons of controlling firms policies, they predominantly monitor from a creditor's perspective.

The small corporate governance role of shareholders in the Netherlands suggests that agency problems between shareholders on the one hand and managers and debt holders on the other hardly exist. It also implies that monitoring by creditors (banks) is relatively important, which reduces risk-taking activities of Dutch firms. Most importantly, the (almost) absence of a corporate governance role of shareholders makes the traditional version of the agency theory irrelevant for explaining capital structure choice of Dutch firms.

The small influence of shareholders and the important role for managers may also imply that maximizing shareholders value is not the main objective of Dutch firms. This is partly confirmed by an early survey conducted by Stonehill, et al. (1975). In this survey, French, Japanese, Dutch and Norwegian financial executives shared the same view that a sustained growth in after-tax earnings, not necessarily maximizing shareholders' wealth, is their main goal. In the United States, on the other hand, growth in earnings per share was the unequivocal first choice for financial executives, which can be viewed as the indirect way of maximizing shareholders' value. Hence, the survey shows that the normative goal of maximizing share-holders' value, in capital management case, minimizing the cost of capital, has to be modified, particularly in analyzing the capital structure decisions in countries such as the Netherlands.

### **3.3 Models based on asymmetric information**

Generally, asymmetric information theory assumes that firm managers or insiders possess private information about the characteristics of the firm's return streams or investment opportunities. (1) Management can use the firm's capital structure to signal the information. According to Ross's model (1977), investors take larger debt levels as a signal of management's confidence in the firm. Thus the issuance of debt



is good news to the financial market<sup>4</sup>. The main empirical implication of this model is that firm value (or profitability), debt level, and bankruptcy probability are all positively related. However, any firm attempting to convince the market that it is of a type other than its true type will gain from overvaluation of one security and lose from undervaluation of the other (Heinkel, 1982)<sup>5</sup>. In cases that involve competition between an incumbent firm and an entrant, low cost entrants signal this fact by issuing debt while the incumbent and high cost entrants issue only equity. The main result is that issuance of debt is good news to the financial market (Poitevin, 1989).

(2) Management's decision on its firm's capital financing can be viewed as a way to mitigate inefficiencies in the firm's investment decisions that are caused by the information asymmetry. With information asymmetry, a firm will choose to finance new investment, first internally, then with low risk debt, and finally with equity as a last resort. This is often referred as the *pecking order theory* (Myers and Majluf, 1984, and Myers, 1984). The most important implication according to this line of analysis is that, upon announcement of an equity issue, the market value of the firm's existing shares will fall. Firms with comparatively little tangible assets relative to firm value are more subject to information asymmetries. For such firms, the under-investment problem will occur more often than for similar firms with less severe information asymmetries<sup>6</sup>.

The relevance of models based on asymmetric information may first be examined by considering transaction costs for financial intermediates, such as commercial banks. De Bondt (1998) suggests that the importance of the private credit market in the Netherlands is a result of the low transaction costs for banks, and the low information asymmetries of banks regarding the corporate sector. Especially in the UK and the Netherlands, the corporate sector does not seem to have considerable problems with respect to communicating information to the banking sector. Therefore, costs of borrowing from banks may be kept low for the corporate sector, which may explain the importance of the indirect credit market vis-à-vis the direct credit market.

More insights into the importance of models based on asymmetric information is given by the survey study of De Haan et al. (1994). They interview nonfinancial Dutch companies by sending them questionnaires. Their sample consists of both listed and

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4 In the Ross model, managers know the true distribution of firm returns, but investors do not. Managers benefit if the firm's securities are more highly valued by the market but are penalized if the firm goes bankrupt. Leland and Pyle (1977) adapt the similar approach on this topic.

5 In equilibrium, the amounts issued of debt and equity are such that the gains and losses balance at the margin.

6 Krasker (1986) confirms the results of Myers and Majluf and shows that the larger the stock issue the worse the signal and the fall in the firm's stock price.

non-listed companies. The interviews show that about 75% of all responding firms have a certain financial hierarchy, whereas 25% of the firms do not give a preference ordering. Within this last group there may be some firms which have no access to capital markets, so that they are forced to finance with internal funds, and hence can not choose between different sources of funds. As mentioned before, De Haan et al. show that 54% of all firms prefer internal funds, 18% of all firms prefer debt and 3% of all firms prefer share issues. This strongly confirms the relevance of the pecking-order theory, and hence asymmetric information, for explaining capital structure of Dutch firms. De Haan et al. also provide information on the reasons why firms prefer a certain type of funds. A substantial part (35%) of the firms refers to credit rationing as the main reason for their preference for internal financing. The costs of external finance also plays an important role. These two reasons suggest that asymmetric information, leading to credit rationing and higher costs of external finance, can explain why firms prefer internal finance in the Netherlands. This is somewhat in contrast to the remarks made by De Bondt who suggests that asymmetric information is not of great importance in the Netherlands (see above).

One of the most striking results of the survey of De Haan et al. (1994) concerns the target capital structure of firms. Most of the firms respond that they do not have a target capital structure, which suggests that their capital structure mainly depends on the availability of internal funds. This further supports the pecking order theory. Firms with a target capital structure appear to be the larger firms and the publicly listed firms. This is confirmed in the study by Cools (1993). He only interviews listed companies and finds that 54% of the companies have a target leverage ratio. In the group of firms with a target capital structure in the study of De Haan et al. (1994), profitability appears to be a major determinant. Since leverage is said to be negatively related to profitability, this again points at the relevance of the pecking order theory. The same result is obtained by Cools (1993).

### **3.4 Models based on product/input market interactions and firms' business nature**

Under this framework, a firm's specific industry environment, such as its relationships to its customers, suppliers and of rival firms, and a firm's financing decisions interacts. (1) Brander and Lewis (1986) address the relationship between a firm's capital structure and its strategy when competing in the product market. They argue that oligopolists increase risk by a more aggressive output policy. They show that oligopolists tend to have more debt than monopolists or firms in competitive in-

dustries, and that the debt will tend to be long term <sup>7</sup>. If managers are assumed to maximize the value of equity (as opposed to the value of the firm), there will be a maximum level of leverage that firms can achieve without destroying the possibility of tacit collusion (Maksimovic, 1988) <sup>8</sup>.

(2) The second industrial-organization-based approach addresses the relationship between a firm's capital structure and the characteristics of its growth opportunity, product or input. Under this framework, capital structure is influenced by firms' customers and/or suppliers, i.e. a firm's product (input) or product market (input market) characteristics interacts in a significant way with the debt level <sup>9</sup>. Titman (1984) argues that liquidation of a firm may impose costs on its customers (or suppliers) such as inability to obtain the product, parts, and/or service. These costs are transferred to the stockholders in the form of lower prices for the firm's product. Titman shows that capital structure can be used to commit the shareholders to an optimal liquidation policy <sup>10</sup>. Maksimovic and Titman (1991) show that producers of non-unique and non-durable goods may also be subject to a similar effect. The reputation for being a high quality producer is lost when the firm goes bankrupt. One would expect firms that produce high quality products tend to have less debt. If tacit collusion is important, debt is limited, and debt capacity increases with the elasticity of demand. Another advantage of debt is that debt strengthens the bargaining position of equity holders in dealing with input suppliers which predicts that highly unionized firms and/or firms that employ workers with highly transferable skills will have more debt, *ceteris paribus* (Sarig, 1988) .

Due to a shortage of information, it is almost impossible to gauge the relevance of the models based on product/input market interactions for capital structure choice in the Netherlands. However, some information can be obtained from the studies of Cools (1993) and De Haan et al. (1994). These studies suggest that capital structure choice differs for different groups of firms, which may be seen as an indication for the

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7 They use the basic idea of Jensen and Meckling (1976) that increases in leverage induce equity holders to pursue riskier strategies.

8 He derives comparative static results on debt capacity as a function of industry and firm characteristics and shows that debt capacity increases with the elasticity of demand and decreases with the discount rate.

9 The examples include customers' need for a particular product or service, the need for workers to invest in firm-specific human capital, product quality, and the bargaining power of workers or other suppliers.

10 Specifically, a firm will default only when the net gain to liquidation exceeds the cost to customers. It is shown that firms for which this effect is more important, e.g., computer and automobile companies, will have less debt, other things equal, than firms for which this effect is less important, e.g., hotels and restaurants.

importance of this set of theories, although this may also be caused by asymmetric information issues.

### **3.5 Theories driven by corporate control considerations**

Following the growing takeover activities in the 1980's, the finance literature began to examine the linkage between the market for corporate control and capital structure. How capital structure affects the outcome of takeover contests through its effect on the distribution of votes, the value of the firm, and the price effects of takeover are discussed in detail by Harris and Raviv (1988). Israel (1992) studies how capital structure affects the distribution of cash flows between equity and debt claimants. They show that the optimal share of incumbent can be obtained by choosing a certain debt level. However, the expected benefits on control decrease with the debt level, thus it is optimal to choose the lowest debt level. If the case where successful tender offer is optimal, the firm will have no debt<sup>11</sup>. Generally speaking, proxy fights require some debt, and unsuccessful tender offer requires even more debt. Takeover targets will increase their debt levels on average and targets of unsuccessful tender offers will issue more debt on average than targets of successful tender offers or proxy fights. Debt issues are usually accompanied by stock price increases. The ability of shareholders to affect the nature of a takeover attempt is by changing the incumbent's ownership share<sup>12</sup>; increases in debt also increase the gain to target shareholders if a takeover occurs but lower the probability of this event (Israel, 1992). The argument is that target and acquiring shareholders bargain only over the portion of the gains that is not previously committed to debt holders. The more debt, the less gain is left for target and acquiring shareholders to split and the smaller is the portion of the gain captured by acquiring shareholders. The optimal debt level is obtained by maximizing target shareholders' payoff, subject to the decrease in the probability that takeover occurs. The optimal debt level is determined by balancing this effect against the reduced probability of takeover resulting from the reduced share of the gain that accrues to acquiring stockholders.

In the Netherlands, the limited role of internal shareholders regarding corporate control (see above) also seems to hold for external shareholders. Models based on corpo-

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11 They assume that incumbent's objective is to maximize his expected payoff which is the value of his equity stake plus the value of his control benefits if he remains in control.

12 This conclusion is drawn by Stulz (1988). He discusses how the ownership share of the incumbent is affected by capital structure and obtains the result that takeover targets have an optimal debt level that maximizes the value of outside investors' shares. Targets of hostile takeovers will have more debt than those firms that are not targets. Moreover, the probability of a takeover is negatively related to the target's debt/equity ratio, and the takeover premium is positively related to this ratio.

rate control considerations argue that there is an efficient market for corporate control, in the sense that threats of takeovers may act as a disciplining device. The threats of takeovers may discipline managers and stimulate them to act in shareholders interest. However, in the Netherlands, as in Germany but in contrast to the US, there are all kind of mechanisms by which hostile takeovers are prevented. For instance, the system of cooptation in combination with the fact that members of the supervisory appoint the members of the management board, protect managers from shareholders. Other “defence” possibilities which are often used are e.g.: issuing preference shares, which give the holders a right to a fixed dividend percentage before other shareholders receive dividend, and priority shares, which may give the holder special rights, such as appointing members of the management. Both types of shares reduce the benefits of ordinary shares and hence discourage takeovers. The (almost) absence of hostile takeovers strongly reduces the efficiency of the market for corporate control via monitoring of external shareholder control. This also implies that the traditional models based on corporate control considerations do not have an important role in explaining capital structure choice of Dutch firms.

### **3.6 Conclusions**

What can be concluded from the survey in this section? First, since the corporate governance role of share holders seems to be unimportant, models based on agency costs are probably of minor importance for explaining capital structure choice of the corporate sector in the Netherlands. Second, since proxy votes are unimportant and since hostile takeovers are extremely rare, the evidence suggests that theories driven by corporate control considerations are also relatively unimportant for explaining capital structure choice in the Netherlands. Third, tax considerations cannot explain the preference for internal funds, so that also the relevance of tax considerations may be questioned. Fourth, there seems to be some evidence for the importance of models based on product/input market interactions and firms business nature since some studies suggest that capital structure choice differs for different groups of firms. However, this can also be explained by models based on asymmetric information. These group of models seem to be very important for explaining capital structure choice in the Netherlands. Some recent interview studies strongly confirm the pecking order theory and hence suggest that models based on asymmetric information are most important for explaining capital structure choice of Dutch firms.

In the remainder of this paper we will further test the relevance of different theories for explaining capital structure choice of the Dutch corporate sector by an empirical panel data analysis. The analyses will mainly provide more information on the relevance of agency theories versus asymmetric information theories for Dutch capital

structure choice. Due to a lack of data, it is difficult to test for the importance of the other theories.

#### **4. Determinants and measures of capital structure**

Titman & Wessles (1988), among many other authors <sup>13</sup>, have conducted empirical tests on capital structure determinants in the United States. An early piece of cross country study was conducted by Toy, et al. (1974) in 1974 to investigate the determinants of capital structure in manufacturing sectors of France, Japan, the Netherlands, Norway, and the United States. Rajan and Zingales (1995) investigate the determinants of capital structure of G7 countries after some detailed accounting adjustments. The basis approach that has been taken in empirical work is trying to identify certain proxies for the unobservable theoretical attributes. As Titman & Wessels (1988) have explained, this approach certainly has its limitations. First of all, there may be some attributes which can not be well represented by available proxies, or there may be several proxies that can be used for certain attributes. Secondly, the attributes themselves can be related as well, so the proxies chosen may actually measure the effects of several different attributes. Thirdly, measurement errors in the proxy variables may be correlated with measurement errors in the dependent variables thus creates spurious correlations.

Our empirical research intends to further investigate the relevance of different capital structure theories for capital structure choice in the Netherlands. We focus on the following six attributes: asset tangibility, growth, size, earning volatility, profitability and market to book ratio. The data used in this study are constructed from the annual financial report of listed Dutch firms. The construction of the data set is explained in more detail in Section 5.

##### **4.1 Asset Tangibility**

In an uncertain world, with asymmetric information, the asset structure of a firm has a direct impact on its capital structure since firms tangible assets are the most widely accepted sources for bank borrowing and raising secured debt. If banks have imperfect information regarding the behavior of the firm, firms with little tangible assets

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<sup>13</sup> See also Ferri and Jones (1979) , Bowen, et al. (1982), Boquist and Moore (1982), Bradley, Jarrell and Kim (1984), Long and Malitz (1985), Kim and Sørensen (1986) , Friend and Hasbrouch/Lang (1988, 1988) , Givoly, et al. (1992).

find it difficult to raise funds via debt financing. This suggests that a positive relationship between asset tangibility and leverage implies the existence of imperfect information, and hence indirectly confirms the relevance of models based on asymmetric information for explaining capital structure choice of Dutch firms. On the other hand, the absence of a relationship between tangible assets and leverage seems to suggest that information problems do not play an important role. Hence, the sign of the coefficient with respect to asset tangibility provides information on the importance of theories based on asymmetric information.

We use the ratio of tangible asset to total asset (TANG) for the tangibility attribute. We use the sum of fixed assets and inventories as tangible assets.

## **4.2 Growth**

Different theories give different predictions on how a firm's growth is related to its leverage. The agency theory predicts a negative relationship between growth and leverage. Myers' (1977) underinvestment problem suggests a negative relationship between growth and long-term debt. The argument is that a firm's growth opportunities are intangible assets instead of tangible assets; the liquidity effect of high leverage may reduce a firm's ability to finance its future growth. So he suggests that managers at firms with valuable growth opportunities should choose low leverage.

However, according to Lang, Ofek and Stulz (1996), leverage is negatively related to growth only for firms with low Tobin's  $q$  ratio, i.e. for firms whose growth opportunities are not recognized by the capital market. But the negative relationship between leverage and growth does not hold for firms or industries with high Tobin's  $q$  ratio.

We use percentage change of sales year over year as the proxy for growth (GROWTH). Even though the signs of the coefficient with respect to growth remain positive, they are not significant.

## **4.3 Size**

A firm's size is considered positively related to leverage. The most important argument is that informational asymmetries are less severe for larger firms than for smaller firms. If the public is more aware of what is going on at larger firms, the firm will find it easier to raise debt. Further, larger firms can diversify their investment projects on a broader basis and limit their risk to cyclical fluctuation in one particular line of production. Thus the financial distress risk can be considered lower for larger firms.

We use the logarithm of sales as the proxy for size (SIZE) and interpret a positive sign as evidence for the relevance of capital market imperfections and hence the impor-

tance of models based on asymmetric information for Dutch capital structure choice.

#### **4.4 Earning Volatility**

Apart from some inherent cyclicalities or seasonality related to certain lines of businesses, financial markets usually regard a firm's volatile earnings as the results of poor management therefore discounting such firm's stock price and demanding an extra premium should such firm seek debt financing. Generally speaking, these firms will face additional difficulties in external financing. According to this line of argument, earning volatility should be negatively related to leverage. However, the agency theory suggests a positive relationship between earning volatility and leverage. The reason is that the underinvestment problem decreases when the volatility of firm's returns increases (see Cools, 1993, p. 223).

We use the absolute value of the first difference of percentage change of operating income as the proxy for earning volatility (EVOL). The results are mixed.

#### **4.5 Profitability**

Many authors have different views on the relationship between leverage and profitability. The pecking order theory strongly suggests a negative relationship between leverage and profitability. If a firm has more retained earnings, it will be in a better position to finance its future projects by retained earnings, instead of external debt financing. However, in Ross's (1977) and Leland and Pyle's (1977) approaches, the choice of the firm's capital structure signals to outside investors the information of insiders, in which case investors take larger debt levels as a signal of good performance of the firm and management's confidence. If their argument is true, one would expect that firm value (or profitability) and debt level are positively related.

We use the ratio of operating income to total asset as the proxy for profitability (PROF). Our result strongly confirms the "pecking order" hypothesis.

#### **4.6 Market to book ratio**

The market to book ratio is commonly used as a proxy for Tobin's q ratio. As we discussed previously, growth companies will have relatively higher Tobin's q ratio. Myers and Majluf's "pecking order" model and Ross's "signaling" model give different answers to whether leverage is positively related to growth. The reason for us to include market to book ratio (MBR) along with growth (GROWTH) as explanatory variables in our model is that we want to capture more information on the relationship between growth and leverage.



Market to book ratio (MBR) is obtained by  $(\text{total assets} - \text{equity book value} + \text{year end stock price} \times \text{number of shares outstanding}) / \text{total assets}$ . The results are mixed.

#### **4.7 Measures of capital structure**

In this paper, we use two measures of financial leverage, one is total debt divided by equity book value (LEVB) and the other is total debt divided by equity market value (LEVM). Data limitation confines us to measure debt only in book value. Again equity market value is the product of year-end stock price and the number of shares outstanding. The reasons for us to choose both book value and market value leverage are: (1) various capital structure theories have not specified explicitly which leverage measurements should be used; (2) for consistency purpose, most empirical studies have used both book value leverage and market value leverage.

### **5. The Data Set and Summary Statistics**

We use the dataset *Jaarboek van Nederlandse ondernemingen 1984-1995*. Starting from 1984, there are about 140 firms in our dataset, and over 200 by 1995. After deleting all financial companies (leverage pertaining to financial companies are not our concern in this particular study), newly privatized and still partially government owned enterprises (their unique capital structures demand further study from different perspectives), and all the observations that did not have a complete record, we retain 51 firms over 12 year period of time in a balanced panel.

The panel structure of LEVB/LEVM for 51 firms over 12 years between 1984-95 are plotted in Figure 7.1. Our data show that book value leverage for each firm is rather consistent compared with market value leverage. However, we cannot simply state that the leverage ratio is set at random, either. Because our data also show that book value leverage does not change dramatically across firms, which suggests that the leverage ratio at firm level actually falls into a narrow band. Summary statistics of the data set, including mean, median, standard deviation, minimum and maximum are reported in Table 7.2. The variation of LEVB/LEVM with each explanatory variables are plotted in Figure 7.2 and Figure 7.3. The correlation matrix is reported in Table 7.3.

### **6. The Panel Data Model**

The panel data model we specify in this paper is of the following structure:

$$y_{it} = \alpha_i + x'_{it}\beta + \epsilon_{it}$$

or

$$y_{it} = \sum_{j=1}^N \alpha_i d_{ij} + x'_{it}\beta + \epsilon_{it}$$

where

$$d_{ij} = \begin{cases} 1 & \text{if } i = j \\ 0 & \text{otherwise} \end{cases}$$

which are used to capture the individual effects (either fixed or random). In our model,  $y_{it}$  = LEVB or LEVM, and  $x_{it}$  = [TANG, GROWTH, SIZE, EVOL, PROF, MBR]', where  $i = 1, 2, \dots, 51, t = 1, 2, \dots, 12$ .

### 6.1 The level panel data model: OLS estimation and specification test

In the above model setup, assumptions for consistency and efficiency of OLS estimator are as follows:

- i)  $E(\epsilon_i) = 0, \forall i$ ;
- ii)  $E(\epsilon_i \epsilon'_i) = \sigma_\epsilon^2 I, \forall i$ ;
- iii)  $E(\epsilon_i \epsilon'_j) = 0$ , if  $i \neq j$ .

Assumption (i) states that the unconditional mean of the error term is zero; (ii) a) constant  $\sigma_\epsilon^2$  for all  $i$  means no cross-sectional heteroscedasticity; and b) identity matrix  $I_{T \times T}$  means no autocorrelation over time within each section; (iii) implies no cross-sectional correlation.  $\beta_{OLS}, \alpha_{OLS}$  are BLUE (best linear unbiased estimator) under the assumptions of (i), (ii) and (iii).

*Fixed effects versus random effects:* To test the fixed effects versus random effects, we employ the Hausman specification test. The test statistics for the model with LEVB and LEVM as dependent variables are respectively 22.911 and 39.948. Both statistics are asymptotically  $\chi^2$  distributed with 6 degrees of freedom. The random effect models can be rejected at any conventional critical level.

*Estimation Results:* The estimation results of the fixed effects model for both LEVB and LEVM are reported Tables 4 and 5 respectively. The relationship between capital structure and various factors are summarized in Table 8 for each model.

Based on  $t$ -statistics, the estimates of all explanatory variables except TANG and

MBR are significantly different from zero at the 95% significance level either by using book value leverage or market value leverage. We further employ the  $F$ -test for the null hypothesis  $H_0 : \alpha, \beta = \alpha_i, \beta$  and  $H_0 : \alpha, \beta = \alpha_i, \beta_i$ , for model LEVB the test statistics are  $F(50, 555) = 17.167$  and  $F(300, 255) = 2.9416$ . For model LEVM the test statistics are  $F(50, 555) = 8.0442$  and  $F(300, 255) = 3.9012$ . In both cases, the null hypotheses are rejected, thus there is a distinct fixed effect among firms for the level panel data model.

For both models LEVB and LEVM, we perform a formal White test for homoscedasticity in the fixed effects framework based on OLS estimation results. The White test statistics for both models are respectively 88.05 and 110.96. The test statistics ( $NT R^2$ ) in both cases are asymptotically  $\chi^2$  distributed with degree of freedom 27. The null hypotheses of homoscedasticity are strongly rejected. This implies that the results with the OLS estimator should be taken with caution and that another estimation technique is needed.

## 6.2 The year-to-year change panel data model: Various components estimation and specification

In this section, we conduct further analysis by estimating a panel data model of the year-to-year change in leverage with respect to changes in various factors. Such a model can allow us to test the joint hypotheses: firms are actively choosing certain level of leverage due to the changes of certain factors as predicted by theories; and firms are free to do so given the macroeconomic and financial environment. From an econometric point of view, this model can alleviate the problem associated with heteroscedasticity as well as auto- and cross-correlation among error terms.

*Fixed effects versus random effects:* To test the fixed effects versus random effects, we employ the Hausman specification test. The test statistics for the model with  $\Delta LEVB_t$  and  $\Delta LEVM_t$  as explained variables are respectively 1.5121 and 0.46158. Both statistics are asymptotically  $\chi^2$  distributed with 6 degrees of freedom. The random effect models can not be rejected at any conventional critical level, which is a plausible result for the year-to-year change panel data model. Intuitively, we do not expect the relationship between year-to-year change of firms' leverage and the year-to-year changes of the independent variables have firm specific effects.

*Estimation Results:* The estimation results of the year-to-year change panel data models for both LEVB and LEVM are reported in Tables 6 and 7 respectively. The relationship between capital structure and various factors are summarized in Table 8 for each model.

Based on  $t$ -statistics, the estimates of all explanatory variables except GROWTH are

significantly different from zero at the 95% significance level. We think the reason is that the measurement for growth in our model has already incorporated the changes year over year. By taking a second difference, we cannot expect it will have any definite sign with respect to the changes in year-to-year leverage changes.

For both models LEVB and LEVM, we perform a formal White test for homoscedasticity in the random effect framework based on variance components estimation results. The White test statistics for both models are respectively 8.42 and 43.76. The test statistics ( $NT R^2$ ) in both cases are asymptotically  $\chi^2$  distributed with degree of freedom 27. The null hypotheses of homoscedasticity is not rejected for the LEVB model at any conventional critical level. But it is rejected for the LEVM model at 5% critical level. Our interpretation is that the leverage measurement based on the book value–LEVB, tends to be more stable over time while the leverage measurement based market value–LEVM, tends to be more volatile both cross time and cross firm as shown in Figure 1.

## **7. Conclusion and Discussion**

This paper examines the relevance of different capital structure theories in explaining capital structure choice of Dutch firms. Based on a descriptive analysis and a panel data study we conclude that theories based on the asymmetric information paradigm, especially the pecking order theory, is most relevant for explaining financing choice of Dutch companies. Dutch firms seem to have an preference of internal financing to external financing, debt financing to equity financing. As for the agency cost hypotheses, our results are mixed.

Our empirical study also shows that measurement choices of leverage can yield completely different empirical results, namely the relationship between leverage and explanatory variables do not always yield the same sign with respect to book value leverage and market value leverage. It is especially necessary to point out that market to book ratio is positively related to book value leverage but negatively related to market value leverage. The positive relationship between market to book ratio and book value leverage supports Ross's signaling approach, whereas the negative relationship between market to book ratio and market value leverage supports Myers and Majluf's pecking order hypothesis. We argue that the Ross's signaling approach and Myers and Majluf's pecking order hypothesis are not necessarily contradictory. At firm level, management can choose a firm's desirable book value leverage, but it will be very difficult for a firm to manipulate market value leverage on a very frequent basis. Relatively speaking, firms with high book value leverage convey their positive

outlook of the firms' prospects to the investors, market rewards such firms by giving them higher market value relative to their book value. This is the theme of the Ross's signalling approach. For the rewarded firms, carrying a higher market to book value ratio is equivalent to carrying a lower market value leverage holding debt constant. Therefore, market value leverage directly reflects market assessment with respect to the portion of equity holders' claim on a continuous basis. Shareholders of a firm with good future prospects will proportionally capture more gains compared with that of bond holders, which we view simply as another way of stating the pecking order hypothesis.

Based on our year-to-year change panel data model, our results show that firms do actively choose certain level of leverage given the changes with respect to the explanatory variable. Although corporate governance is an actively debated topic in the Netherlands, our empirical results do not show that management of Dutch public traded companies are entrenched in their capital structure choice. From a theoretical point of view, due to the small internal and external corporate governance role of shareholders, corporate control considerations suggested by various theories seem to be less relevant for the Dutch case. We argue that relative small and less mobile managerial market in the Netherlands along with the unavoidable management performance comparison with their international counterparts serves as an indirect incentive and control mechanism to assure that management at firm level has to ultimately align their interest with shareholders.

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Table 7.1: Cross country capital structure choice comparison

Country	Leverage	Leverage	% Indirect	% Banks	Concentration	% long
Year	1982	1992	1993	1992	1995	1993
Germany	1.71	1.53	94	89	19.8	78
France	2.61	1.35	85	85	24.5	73
Italy	4.87	3.24	95	89	24.0	44
UK	1.13	1.04	81	92	30.9	50
Belgium	2.50	1.54	93	90	52.3	63
Holland	1.33	1.27	97	73	73.8	77

Note:

**Leverage** the debt-equity ratio at book value,

**Indirect** refers to the share of the indirect credit market in % of total credit to private sector,

**% banks** refers to the share of loans from banks in % of total loans to the private sector,

**Concentration** refers to the share of the top three banks in % of total assets of banks,

**% Long** refers to the share of long-term credit in % of credit of the corporate sector.

Table 7.2: Summary statistics

NUMBER OF OBSERVATIONS: 612

Variable	Mean	Median	Std Dev	Minimum	Maximum
LEVB	1.45794	1.34269	0.95338	0.056397	9.56406
LEVM	1.43521	0.97323	1.38121	0.048105	10.94690
TANG	0.63627	0.65832	0.16062	0.073458	0.97532
GROWTH	0.06848	0.04347	0.15712	-0.35453	1.70110
SIZE	13.3468	13.2788	1.86849	8.50451	17.98159
EVOL	0.73847	0.20251	2.19981	0.00000	20.41779
PROF	0.08276	0.08056	0.04965	-0.17021	0.27309
MBR	1.15811	1.08708	0.34291	0.61212	3.37682

Table 7.3: Correlation Matrix

	LEVB	LEVM	TANG	GROW	SIZE	EVOL	PROF	MBR
LEVB	1.000							
LEVM	0.591	1.000						
TANG	-0.026	0.005	1.000					
GROW	0.058	-0.126	-0.099	1.000				
SIZE	0.232	0.168	0.081	0.018	1.000			
EVOL	0.151	0.146	0.089	0.001	-0.069	1.000		
PROF	-0.381	-0.531	-0.086	0.305	-0.065	-0.213	1.000	
MBR	-0.028	-0.461	-0.063	0.268	0.050	-0.115	0.520	1.000

Table 7.4: Level panel data model: fixed effects estimates: LEVB

Variable	Estimated Coefficient	Standard Error	t-statistic
TANG	1.65685	0.38426	4.31178
GROWTH	0.59878	0.16025	3.73647
SIZE	0.11996	0.07334	1.63562
EVOL	0.00567	0.01170	-0.48493
PROF	-5.10414	0.77472	-6.58828
MBR	0.39035	0.09762	3.99857

Note: Adjusted  $R^2 = .0359$

Table 7.5: Level panel data model: fixed effects estimates: LEVM

Variable	Estimated Coefficient	Standard Error	t-statistic
TANG	.548396	.625466	.876780
GROWTH	.267175	.260849	1.02425
SIZE	-.390486	.119384	-3.27085
EVOL	-.045720	.019053	-2.39965
PROF	-6.03759	1.26104	-4.78779
MBR	-.832388	.158904	-5.23829

Note: Adjusted  $R^2 = .0915$

Table 7.6: Year-to-year change panel data model: random effects estimates: LEVB

Variable	Estimated Coefficient	Standard Error	t-statistic
TANG	1.54744	.469200	3.29803
GROWTH	.264934	.143508	1.84613
SIZE	.893748	.224858	3.97472
EVOL	-.816107	1.10041	-.741642
PROF	-4.12022	.667533	-6.17231
MBR	.130005	.102256	1.27137

Note: Adjusted  $R^2 = .0425$

Table 7.7: Year-to-year change panel data model: random effects estimates: LEVM

Variable	Estimated Coefficient	Standard Error	t-statistic
TANG	-.150590	.814757	-.184829
GROWTH	.001941	.248974	.007795
SIZE	-.304489	.388520	.783715
EVOL	-4.73945	1.91216	-2.47859
PROF	-5.77568	1.16024	-4.97800
MBR	-1.19174	.177583	-6.71089

Note: Adjusted  $R^2 = 0.0507$

Table 7.8: The relationship between capital structure and various factors

Factors	Signs by theories	L evel estimation		Y -Y change estimation	
		LEVB	LEVM	LEVB	LEVM
TANG	+	+(***)	+	+(***)	-
GROWTH	+,-	+(***)	+	+(*)	-
SIZE	+	+(*)	-(***)	+(***)	+
EVOL	-	+	-(**)	-	-(**)
PROF	+,-	-(***)	-(***)	-(***)	-(***)
MBR	+,-	+(***)	-(***)	+	-(***)

Note:

\* — significant at 10% critical level;

\*\* — significant at 5% critical level;

\*\*\* — significant at 1% critical level.



Figure 7.1: Plot of LEVB/LEVM for 57 firms over 12 years

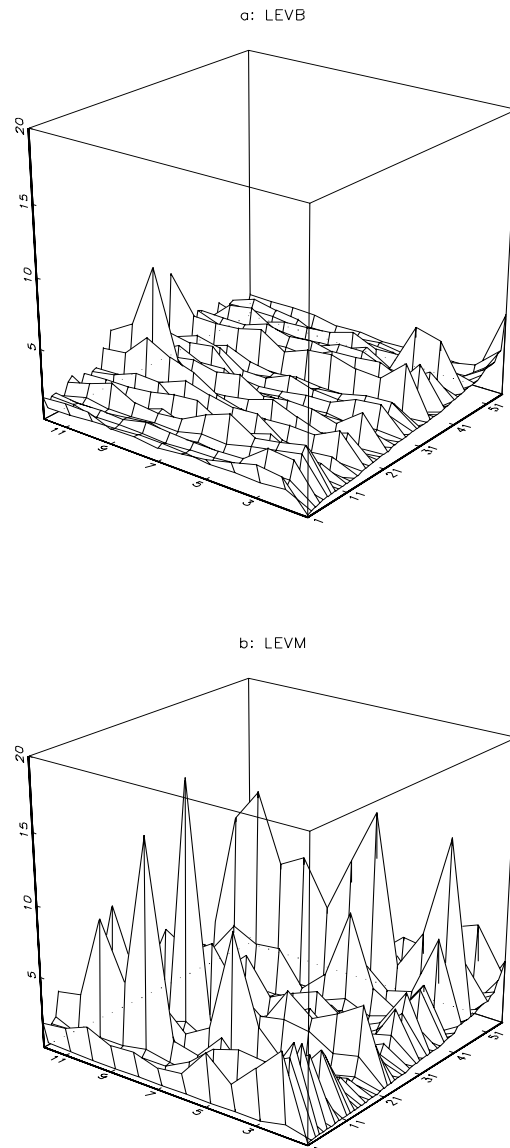
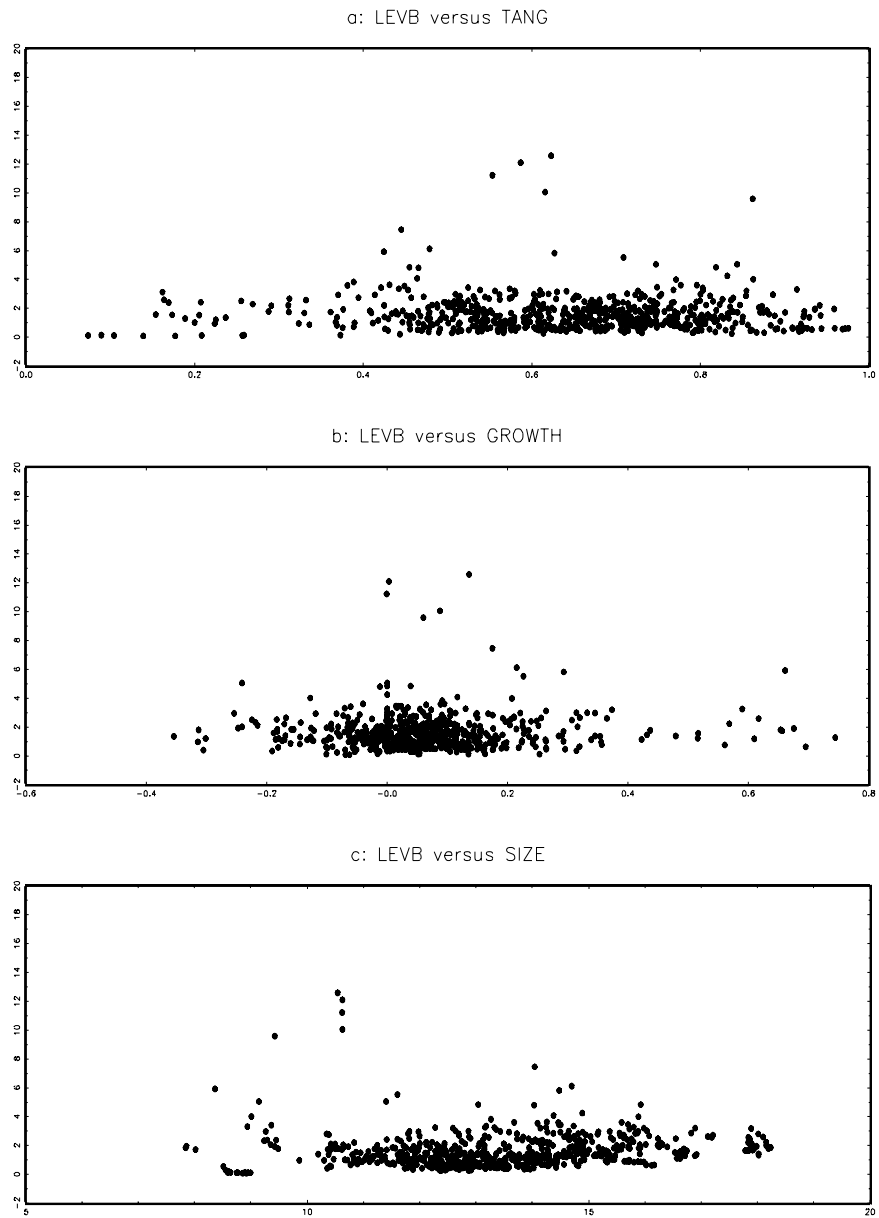
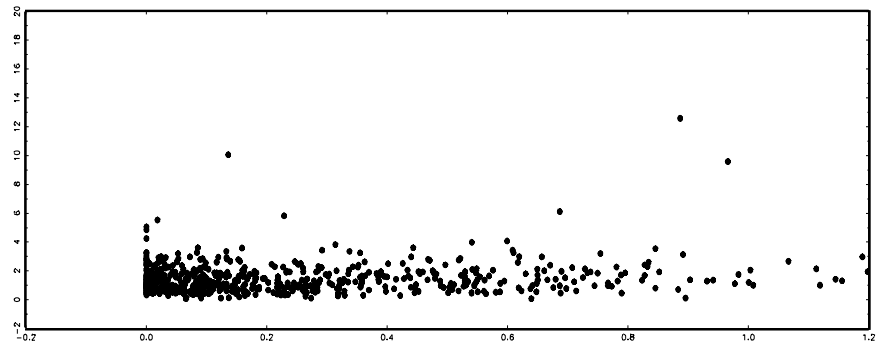


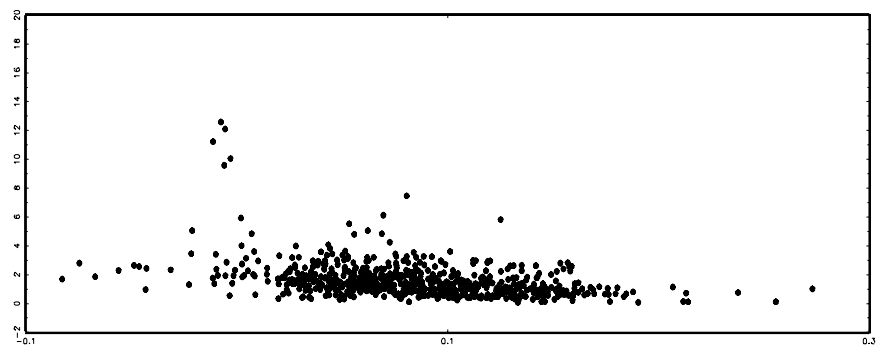
Figure 7.2: Variation of LEVB with various determinants



d: LEVB versus VOLATILITY



e: LEVB versus PROFIT



f: LEVB versus MBR

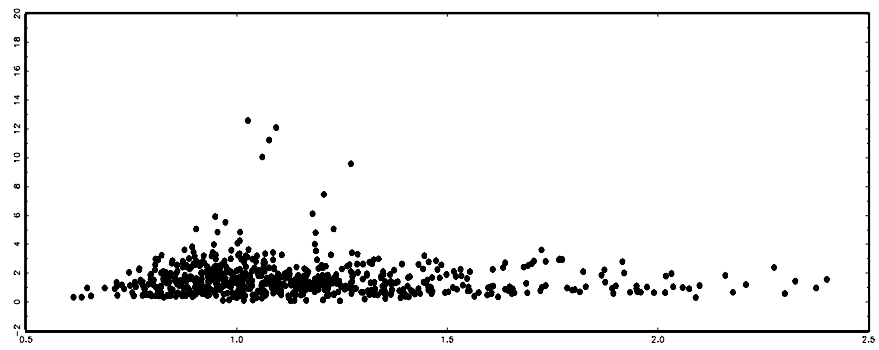


Figure 7.3: Variation of LEVM with various determinants

