

UNIVERSITY OF TWENTE

SCHOOL OF MANAGEMENT AND GOVERNANCE

THE EFFECT OF FINANCIAL LEVERAGE ON FIRM VALUE:  
EVIDENCE FROM THE NETHERLANDS

**Master thesis**

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Since I have never devoted anything to anyone...

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And let it be a nice citation... “Attendre et espérer!”. Alexandre Dumas. *Le Comte de Monte Cristo* (1889).

Konstantin Korotkikh

## **Abstract**

In this master thesis author examines how financial leverage affects firm value of 78 Dutch companies listed on Amsterdam Euronext Stock Exchange in the period of 2007-2011, taking into account reciprocal relationship between these variables and involvement of corporate governance into the key relationship. The empirical results, provided by different estimation techniques, demonstrate a negative relationship between leverage and value, suggesting that by increasing total debt to capital ratio, companies damage their performance measured by Tobin's Q.

Overinvestment, when company has substantial amount of cash and low growth potential - is a relevant problem for Dutch listed companies that influences value negatively. As known from prior studies, debt may alleviate it due to its disciplinary effect thereby increasing value. However, such an effect of debt on value of overinvesting companies was not evidenced. Another effect of debt – negative on value of underinvestment companies (those with high growth potential, but with few cash) was discovered in the results. However, underinvestment problem by itself occurred to be irrelevant for Dutch listed companies. These findings correspond to evidence from the Netherlands provided in prior literature.

It was assumed that disciplinary effect of debt on overinvestors vanishes due to the presence of value-maximizing corporate governance mechanisms (among them are ownership by insiders, financial institutions and largest blockholders, and size of the board). However, neither value-maximizing role of such mechanisms, nor their influence on leverage were observed. In addition, mediatory role of corporate governance was tested regardless of investment behavior. The obtained empirical results did not allow author to conclude whether considered corporate governance variables had an impact on leverage-value relationship.

## Table of contents

<b>Chapter 1. Introduction</b>	<b>1</b>
1.1. Research problem	1
1.2. Research objective and research question	2
1.3. The rationale for chosen theoretical framework	2
<b>Chapter 2. Literature review</b>	<b>4</b>
2.2. Theoretical explanation of the relationship between leverage and value	4
2.3. Empirical evidence on the relation between leverage and value	8
2.4. A note on the predictions of capital structure theories and reverse causality	10
2.5. Overview of leverage determinants	13
2.6. The role of the corporate governance role in leverage-value relationship	16
2.7. Empirical evidence on the role of the corporate governance role in leverage-value relationship	21
<b>Chapter 3. Hypotheses</b>	<b>25</b>
3.1. Leverage, value and investment	25
3.2 The role of corporate governance in leverage-value relationship	28
3.3. Control variables	33
<b>Chapter 4. Data and research methodology</b>	<b>35</b>
4.1. Data	35
4.2. Measuring dependent and explanatory variables	40
4.3. Research methodology	42
<b>Chapter 5. Data analysis</b>	<b>46</b>
5.1. Summary statistics	46
5.2. Correlation analysis	51
5.3. Regression analysis	55
5.4. Summary	69
<b>Chapter 6. Conclusions</b>	<b>71</b>
6.1. Discussion	71
6.2. Limitations and recommendations for future research	72
<b>References</b>	<b>75</b>
<b>Appendices</b>	<b>80</b>

## **Chapter 1. Introduction**

**1.1 Research problem:** As known from corporate finance theory (Hillier et al., 2008), one of the most common problems the majority of the firms faces is raising cash for required capital expenditures. This question concerns the way how financing and investing decisions are made in the companies and relates to their capital structures, particularly, the proportions of equity and debt that compose firm's capital. The universal goal of any corporation is increasing value, the latter standing for the amount of cash going to firm's investors. Proportions of debt in capital structure depend on the way a company distributes its cash between shareholders and creditors. And in turn, the value of the company depends on this distribution. Back in 1958, Modigliani and Miller presented a theoretical perspective, stating that origins of financing do not matter in perfect capital markets. However, this is not applicable in the real world, and it would be fair to ask what proportions of debt are the best for any given firm with respect to its value. The question is, of course, rhetorical: firms working in different countries and economic sectors are subject to different legal and economical environments. This leads to a specific set of factors influencing financing and investing decisions, and consequently value, in each individual case.

When companies issue debt as a funding source, it may bring benefits of a tax-shield: obligatory interest is paid prior to payment of income taxes. Therefore, company pays less cash in taxes (than in case when no interest is paid), which is a plus for corporate value. Opposite to this benefit, debt may entail value-reducing costs of financial distress. In case of inability to pay for its obligations, company may face the necessity to transfer all its assets to creditors. This is described as a bankruptcy – an ultimate form of financial distress. In this case only one party will be satisfied (and yet, probably not completely) – creditors, while residual claims of shareholders' will remain unpaid, which destroys the value of the company. Debt can also fulfill another objectives, which have influence on corporate value. For instance, it can resolve agency conflicts between owners and managers of the company that arise due to the separation of ownership and control. However, debt can also deteriorate the situation, entailing agency conflicts between owners and creditors thus constraining growth potential of the company.

Therefore, if we look at firm-related aspects, especially growth opportunities, cash flow and ownership structure, we may notice that even within one country firms will have different structures of capital which consequently will influence their values differently. Managers of low-growing company may invest free cash in unprofitable projects to hold more resources

under their control. Leverage can be used to discipline managers from wasting cash, as they should pay out interest and principal in the future. Here debt is expected to positively influence value. On the other hand, too much debt obligations may impede a firm with many growth options from taking valuable projects as all the benefits will be transferred to creditors. This time, debt is negatively related to value. Although, solutions for financing and investing are unique for each firm, we can still examine the effect of financial leverage on firm value. We find that in the reviewed literature there is no certainty about the overall effect of debt on firm value: several studies found it to be negative: e.g. McConnell and Servaes, (1995), Aggarwal and Zhao, (2007), Zeitun and Tian (2007) Aggarwal, Kyaw and Zhao, (2011). Yet, some studies found the key relationship inconclusive: e.g. Agrawal and Knoeber, (1996), De Jong (2002), Dessi and Robertson, (2003).

**1.2. Research question:** The aim of this master thesis is to analyze the relationship between financial leverage and firm value of Dutch companies listed on Amsterdam Euronext Stock Exchange. The main research question of this master thesis is as follows:

*What is the effect of financial leverage on firm value of Dutch listed companies?*

**1.3. The rationale for chosen theoretical framework:** In order to fulfill the objective of the thesis, author tried to embrace all the important factors that influence key relationship and tried to compose this model as close as possible to the real world. First of all, the framework of this thesis is based on the agency theory (Jensen and Meckling, 1976). To the date, this theory considers a wide spectrum of factors influencing debt-value relation and reconstructs the most approximate model of the real firm. In fact, a significant body of the recent research resolving leverage-value puzzle is based on agency theory. The attention is particularly devoted to the two presumptions, initially made by Myers (1977) and Jensen (1986), and developed by consequent authors. These assumptions explain the connection between debt and firm's investment behavior, resulting in a certain effect on value. Also, a notion is made on corporate governance – an important mediatory mechanism, which may influence value as directly as indirectly (through its influence on leverage).

The logic of leverage-value relationship reviewed in this thesis comes down to a sequence: firm characteristics influence capital structure, and capital structure in turn, influences the value. Being more than just a source of financing, debt acts as an effective control mechanism that allows companies to control managerial behavior. And we may see a link: debt influences managerial behavior, and managers in turn undertake certain actions that influence value of the firm. However, some characteristics are difficult to account for in the econometrical

model. There are intermediating factors influencing leverage-value relationship, such as: firm reputation; managerial behavior or decision making; economic and political climate in the country and in the world. A list of all potential determinants of the leverage-value relationship could be rather extensive. Therefore, a review of prior studies was made in order to identify the most important determinants of the key relationship. A significant role is led by corporate governance, some elements of which may induce or alleviate agency costs (i.e. ownership structure). Depending on the effectiveness of corporate governance the effect of debt on value is expected to be different.

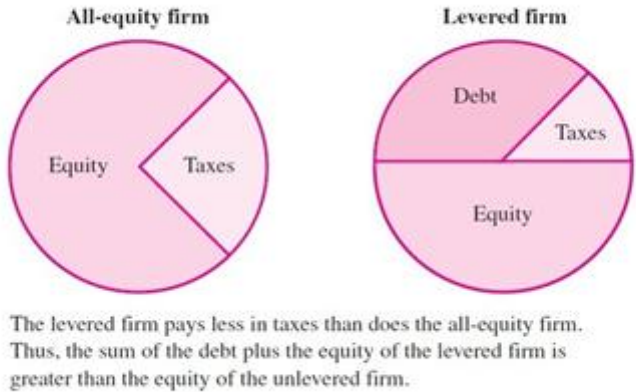
Thus, besides leverage, the most important factors influencing firm value and reviewed in this thesis are: growth opportunities, corporate governance structure (insider ownership, ownership by largest blockholders and their identity, and size of the board), size of the company and industry in which the firm operates. In many prior empirical models debt-value relation was examined simultaneously with the determinants of leverage to control for endogeneity. Based on prior experience and theoretical reasoning, the author of this thesis is convinced that one cannot review the relation between leverage and value without having an idea about factors that determine leverage. These are: growth opportunities, corporate governance, size and profitability of the company, tangibility and liquidity of its assets, free cash flow and tax.

**Chapter 2. Literature review**

**2.2. Theoretical explanation of the relationship between leverage and value**

**Modigliani and Miller propositions:** The examination of leverage-value relationship starts with the seminal work of Modigliani and Miller (1958). The first proposition authors made states that in the world *without corporate taxes* and financial distress, the value of the company is *indifferent* to the choice of capital structure. In a later update of their work (Modigliani and Miller, 1963) authors accounted for corporate tax. Due to the fact that interest payments are tax deductible, the levered firm pays *less* taxes than unlevered firm: because first company pays out interest, and only then it pays taxes. Total value of the company is represented by a sum of debtholders’ claims and shareholders’ claims minus tax claims paid to the government with only two latter items when firm is unlevered. This is represented in Figure 1. The sum of cash flows going to both debtholders and shareholders is larger than cash flow going only to shareholders. Due to this effect, which is called “*tax-shield*”, the greater is the value of the firm that has debt into its capital structure. Hence, debt increases the value of the company, and consequently, the capital structure of the firm should be entirely composed of debt. In this way, the maximal level of value is achieved.

**Figure 1. Two pie models of capital structure under corporate taxes. Source: Ross et al., (2002).**



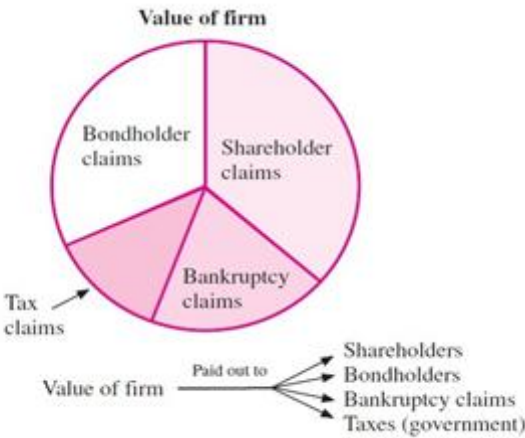
**Trade-off theory:** However, in the real world Modigliani and Miller’s assumptions do not hold true. As known from the corporate finance theory (Hillier et al., 2008), debt puts pressure on a firm, because interest and principal are obligatory payments. In case a firm could not pay for its obligations, a financial distress occurs. Costs of financial distress should be taken into account when one examines leverage-value relationship. The ultimate form of financial distress is a bankruptcy – when a firm cannot satisfy debt obligations, the ownership of its



assets is legally transferred from owners to creditors. By themselves, bankruptcy costs are not that high, and according to Hillier et al., (2008), represent insignificant percentage of total firm value. But the costs of financial distress in general can accumulate to a decent amount. Such costs could be direct (e.g. compensation of lawyers and witnesses, costs of negotiations and court) and indirect (e.g. inability to conduct business in a common way due to the loss of reputation of the company). In case of bankruptcy, these costs are incurred before the creditors acquire the assets, which means that owners of the company bear them completely.

If we look at the pie diagram of value again (Figure 2), we could see that in the real world it consists of four items: claims of shareholders, claims of debtholders, payments to government (as taxes) and costs of financial distress (bankruptcy claims). The ultimate goal of any company is, of course, maximizing cash on hands of its investors. Therefore, when we speak of firm value, we mean the first two claims. These are also called marketable claims, because debt and equity are traded on markets. Taxes and financial distress costs are non-marketable claims, as they are not traded. Moreover, government and entities that assist a company during distress, do not invest their funds in the company to get returns. Hence the value of the company that we review in this thesis equals the difference between marketable claims and non-marketable claims. With the rise of non-marketable claims the value of marketable claims declines and vice versa. As in the example of Modigliani and Miller propositions, debt increases firm value due to benefits of a tax shield. On the other hand, the more debt is issued by the company the more raises the probability of financial distress. In case of default these costs lower the firm value.

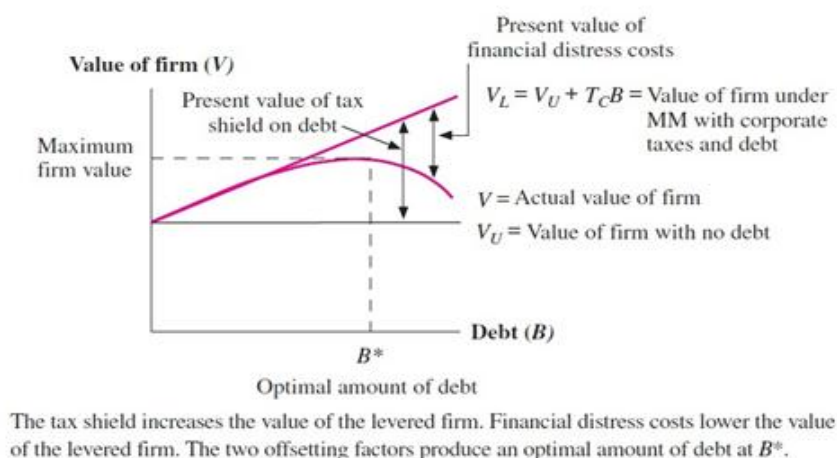
**Figure 2. The pie model with real-world factors. Source: Ross et al., (2002).**



According to the trade-off theory, the point exists where the benefits of debt are offset by costs of financial distress. This point reflects the optimal leverage ratio – when the costs of

financial distress equal benefits of debt, and value of the company reaches its *maximum*. It is represented in the Figure 3.

**Figure 3. The optimal amount of debt and the value of the firm. Source: Ross et al., (2002).**



**Agency costs theory:** In extension of trade-off theory, financial distress costs include agency costs. Consider relationship between managers of the company and its owners. Its essence lies in the aligning of managerial actions with owners' goals. It is assumed that an individual will perform better, owns he a percentage of the firm's equity. The more ownership he has in the company, the better his performance is expected to be. When initially an owner-manager possesses 100% of company, he is not likely to permit himself any inefficiency as he pays for it entirely himself. And the agency conflict arises due to the separation of ownership and control. When company needs external financing and issues equity, the ownership claim of owner-manager declines. Now he obtains only part of the return and also he will pay only part of costs for being inefficient. The less his ownership becomes (due to the separation), the more he loses an incentive to perform his activities in a way to satisfy the rest of the owners (Jensen and Meckling, 1976). He may decide to act inefficiently. *Agency costs associated with the issuing external equity are:*

- Consumption of perquisites;
- Shirking from duties;
- Undertaking negative net present value projects.

The less manager's stake the less he pays for the abovementioned items, while the rest is paid by other owners. According to Hillier et al., (2008) accounts of the company can stay covering the consumption of expensive car or furniture, and extended period of leisure. The most harmful consequence here is undertaking negative net present value projects. Managers

tend to increase the size of the firm in order to bring more resources under their control, which gives them more power (Jensen, 1986). Besides, their rewards increase: as being positively related to sales growth and hence the size of the company. As long as there are no more valuable projects, managers will undertake invaluable ones because when the project is taken (regardless of its NPV), managerial rewards increase. We may see here a *myopic* behavior of managers – pursuing short-term goals while neglecting long-term perspective (Leach and Melicher, 2012). Although investing in such lossmaking projects decreases firm value, managers still follow this route as long as they are rewarded (whether monetary or by obtaining higher status due to managing large corporation). In this way managers have motives for wasteful behavior, which increases agency costs of equity (Hillier et al., 2008). This problem is described as “*overinvestment*”.

According to free cash flow hypothesis (Jensen, 1986), debt decreases the amount of cash available to managers, hence reducing their possibilities for wasting corporate resources. Equity does not have such advantage, because shareholders’ claims are residual, not obligatory. It means that managers can delay the payment of dividends for next year (or longer) while they have to pay interest and principal on time. In such a way leverage serves as a commitment and incentive mechanism – it induces managers to pay out cash to firm’s investors and basically minimizes agency costs of external equity (consumption of perquisites, shirking from duties and undertaking negative NPV projects). Eventually, issuing debt instead of equity lowers agency costs and therefore increases firm value.

However, increasing levels of debt has also its disadvantages. According to Jensen and Meckling (1976), *agency costs associated with debt consist of:*

- The opportunity wealth loss caused by the impact of debt on the investment decisions of the firm;
- The monitoring and bonding expenditures by the bondholders and shareholders;
- The bankruptcy and reorganization costs.

As mentioned before, bankruptcy is determined by the default of obligatory payments. Shareholders’ monitoring expenditures are associated with the fact that managers tend to undertake negative NPV projects. Bondholders are induced to monitor companies, because when managers undertake high-risk projects, the wealth may become expropriated from creditors to shareholders. But the most important aspect here is “*underinvestment*” which is caused by conflicts that arise between debtholders and shareholders. As known, interest and

principal are obligatory payments, and when debt obligations are too high, the higher becomes the probability of a firm's bankruptcy.

When a firm under such conditions issues new equity to make new investments, the probability is high that regardless of paying off debt (or not paying it off in case of default), there is a little chance that shareholders will gain on their investments. The question raises: if shareholders invest, but have little or no chance of return, *why should they ever invest?* In this case even valuable investment projects could be given up when it becomes clear that debtholders will reap all the benefits. When neither owners nor creditors have extra cash (some return on their investment), there is no value added. Thus, debt can also destroy the value of the company, as issuance of more debt leads companies to underinvestment (Myers, 1977). Again, the more agency costs are incurred the lower is the value of the company and vice versa. And again, the *optimal point* should be found where benefits of debt are not exceeded by its costs.

**A note on signaling:** Managers are definitely more informed about current prospects of their company, thus having information advantage over investors. According to Ross (1977), issue of debt signals as increase in value: managers inform market that they are ready to pay out cash to their creditors. In this way, information asymmetry decreases, giving a rise to value. Issuing debt can also mean that managers are willing to be monitored by their investors (Harvey et. al., 2004).

### **2.3. Empirical evidence on the relation between leverage and value**

Stulz (1990) asserted that “the marginal benefit of debt is the decrease in loss of firm value resulting from the overinvestment cost of managerial discretion, whereas the marginal cost of debt is the increase in the loss of firm value caused by the underinvestment cost”. Results of this study showed that leverage was used as an effective disciplining mechanism. Author however assumed that managers had no ownership stakes in the company (an issue that will be covered later). McConnell and Servaes (1995) examined three samples of US companies, listed on NYSE and AMEX. They augmented sample from their previous research (McConnell and Servaes, 1990: 1173 firms in 1976, 1903 in 1993) by 1943 companies in 1988. Data for the research was obtained in Compustat and Disclosure databases. Authors showed that when firms have high level of internally generated funds (such as retained earnings), and few growth opportunities, debt affects value positively. McConnell and Servaes (1995) also discovered that underinvestment problem is mainly experienced by firms

with high growth opportunities. And when firms have high level of growth opportunities, leverage affects value negatively.

Leverage was negatively correlated with Tobin's Q (measure of value) in the article of Lang, Ofek and Stulz (1996), who investigated 142 industrial firms. Researchers evidenced a negative relation between growth and leverage for firms with low Tobin's Q. Authors interpreted these results as either firms have growth options that are good but not recognized yet by the market; or when firms do not have good growth options, but would nevertheless like to grow. Debt serves as a "brake on their growth", which might benefit shareholders of the firm, which goes in line with Jensen (1986) and Stulz (1990).

Agrawal and Knoeber (1996) examined leverage-value relationship on a sample of 383 US companies over the period of 1981-1987. What is remarkable about this study: authors proposed to simultaneously review the influence of several mechanisms that alleviate agency costs on firm value. These mechanisms included financing policy (leverage), internal corporate governance mechanisms (insider shareholdings and shareholdings by institutions and blockholders), external corporate governance (market for corporate control), and labor market for managers. Debt financing and internal corporate governance (which will be reviewed in the next section) represent particular interest for this thesis. While authors used ordinary least squares regression, they evidenced negative effect of debt on value. But when they took into account all the rest mechanisms (in a simultaneous equations model), the role of debt as a disciplining device vanished.

Dessi and Robertson (2003) examined the leverage-value effect in the UK setting – on 557 firms over the period 1967-1989. Authors used panel data – simultaneously cross-sectional and time-series observations, which gives more complete picture in comparison to using these methods apart. Second, authors applied instrumental variables method that allowed them to control for endogeneity of debt. Debt affected value positively in the uninstrumented regression, but there was no significant relation between debt and Tobin's Q once authors controlled for endogeneity. Therefore, authors illustrated that results obtained by McConnell and Servaes (1995) are not accurate due to methods of research they executed. Harvey et al., (2004) reviewed leverage-value relation within 1014 listed non-financial firms of 18 countries with emerging economies over the period 1980-1997. They estimated the effect using 3 stage least squares regression (with Tobin's Q in structural equation and leverage and ownership as dependent variables in other equations). The key finding is that debt limits the loss of value in firms that have high levels of assets in place and low growth options. Authors find that short-

term leverage also has this effect. However, overall effect of leverage on value (without splitting firms according to their growth and assets) is negative.

Alonso et al., (2005) examined 101 non-financial and publicly-traded Spanish firms for the period 1991-1995 (505 year-observations). The data was gathered at Spanish Stock Exchange Commission. Authors estimated the key effect in fixed-effects model and also like Harvey et al., (2004), researchers applied 3SLS regression (besides leverage they included ownership equation). Researchers evidenced a twofold effect of debt on value. They explained positive impact with disciplining managers in companies with low growth, and negative – with forgoing profitable projects in companies that have high growth opportunities. Zeitun and Tian (2007) evidenced significant negative effect of book leverage and long-term debt on corporate value among 167 listed (on the Amman Stock Exchange) Jordanian companies over 1989-2003. Researchers applied random-effects model, as authors argued, it allowed them to properly control for industry effect (companies were split by 16 industrial sectors). Remarkable, authors documented positive impact of short-term leverage on Tobin's Q.

Aggarwal and Zhao (2007) augmented the model of McConnell and Servaes and accounted for industry effects that were missing in prior studies literature. Their sample consisted of 81711 US firm-year observations from 1980 to 2003, obtained from Compustat. Only non-financial firms represented the sample, and were distributed by industrial sectors according to three-digit SIC codes. Authors reported significant negative relationship between leverage and value among firms of both groups – high and low growth. Aggarwal, Kyaw and Zhao (2011) executed the research on multinational level. Authors investigated leverage-value relationship in 13577 firms (72268 observations) from 25 countries in the period of 1990 – 2003 (data was available in Compustat). They implied ordinary least squares regression and 2SLS (for robustness test). Overall, leverage was negatively related to value within 20 countries. Results showed that leverage-value relation was positive among low-growth firms in 8 countries. Leverage-value relation was negative among high-growth firms in 17 countries.

#### **2.4. A note on the predictions of capital structure theories and reverse causality**

The goal of this subchapter is to show that capital structure theory is the subject that can be examined infinitely and from different angles, and when discussing one dimension, another should be considered as well. In the current thesis we are interested in leverage-value relation, but nevertheless some note on factors that determine leverage should be given, together with the reason for taking them into account. For the time-being we need to keep in mind that up to this point, we reviewed the relationship between leverage and value according to the next

simplified scheme (Figure 4.). This is by no means the final representation of examined relationship. Rather it is a starting point for discovering the puzzle. To make the model extended, we categorize the existing research on capital structure in order to augment it with essential factors that influence the key relationship.

**Figure 4. The representation of direct relationship between leverage and value.**



In principle, there are several categories of studies that reviewed capital structure puzzle. In the first category authors discussed factors influencing capital structure choice or leverage determinants (e.g. Titman and Wessels (1998), Harris and Raviv (1991), Fama and French (2002), De Jong et al., (2008), Frank and Goyal (2009), Gungoraydinoglu and Öztekin (2011) and others). Here is a brief summary of the main concepts. Myers (2001) speculated that none of the capital structure theories can give a complete representation of reality – because each concept embodies a set of conditions under which it explains a certain relationship. If we reckon one firm under different economic conditions we could observe evidence of different fundamental theories.

For instance, when there is a chance for companies to issue equity at higher price, firm is more likely to execute this opportunity, approving *market timing theory* (Baker and Wurgler, 2002). When taxes increase, firm will use benefits of tax shield by issuing debt, which supports *trade-off theory*. *Pecking order theory* will be supported when managers first use retained earnings as a source of finance, and only then address to external capital – to debt and equity (order goes from the less to the most risky source of financing). Researchers discuss factors influencing capital structure decisions and depending on a certain set of determinants and conditions, a certain theory becomes approved (among others see Titman and Wessles, 1988; Harris and Raviv, 1991; Myers, 2001; Fama and French, 2002; Frank and Goyal, 2009; Gungoraydinoglu and Öztekin, 2011).

Second category of research reviewed determinants of firm value: whether in terms of leverage-value relationship or within the topic of corporate governance mechanisms' impact on value (e.g. Stulz (1990), McConnell and Servaes (1995), Lang, Ofek and Stulz (1996), Demsetz and Villalonga (2001), Zeitun and Tian (2007), and others). We reviewed some of these ideas in the beginning of this chapter – while discussing theoretical presumptions of

leverage-value relation. As mentioned earlier, Modigliani and Miller's propositions do not represent the real world leverage-value model. These theorems serve more likely as the *origins* of investigation of the puzzle. In practice there are always *real world factors* that need to be considered - bankruptcy costs at least. Next, the main assumption of trade-off theory is that companies strive to a certain amount of debt to achieve maximal value. Evidence on trade-off theory results then in conclusions whether companies have or do not have these *target leverage ratios* (e.g. Bancel and Mittoo, 2004; Broenen and Koedijk, 2006).

Agency theory complements trade-off theory: apart from *financing* issues (tax-related benefits of debt versus its financial distress costs) this theory remarks the significance of debt as *controlling mechanism*. And as such mechanism, debt has influence on *investing* behavior of managers, making them investing optimally or not. Separation of ownership and control also brings in its specific conditions. Eventually, companies search for an optimal amount of debt to satisfy all the imposed requirements and finally achieve maximal value. Due to consideration of agency costs even more complicated trade-off is assumed.

In the third category there are studies that used two abovementioned approaches simultaneously: they reviewed leverage-value relationship at the same time considering the determinants of leverage. It allows researchers to reconstruct the puzzle more complete. (see Agrawal and Knoeber (1996), De Jong (2002), Dessi and Robertson (2003), Alonso et al., (2005), Ghosh (2007), Aggarwal and Zhao (2007), Aggarwal, Kyaw and Zhao (2011), Ruan et al., (2011) and others). Below is the explanation for this approach.

Predictions of leverage-value relation are often commented within certain assumptions, such as tax-shield benefits, overinvestment of cash flow or underinvestment. Following, for instance, the predictions of overinvestment (Jensen, 1986), debt influences value: depending on level of growth opportunities and available cash, there is a certain effect to expect. In other words, leverage is expected to have an impact on Tobin's Q (the most approximate measure for firm value used in previous research). But this impact depends on growth opportunities that firm might have. At the same time with measuring firm value, Tobin's Q could serve as a measure of growth and hence may have an influence on leverage. It allows us to represent leverage-value relationship in a different light - bidirectional (Figure 5.)

**Figure 5. The representation of bidirectional relationship between leverage and value (reverse causality).**





This issue is often reviewed as reverse causality (Margaritis and Psillaki (2007) and (2008); Ruan et al., (2009)) or it may be known as endogeneity of capital structure (Dessi and Robertson (2003), Aggarwal, Kyaw and Zhao (2011), De Jong (2002)). More specifically, reverse causality between dependent and independent variables cause endogeneity – when independent variable correlates with the error term (in the regression equation). To control for endogeneity, authors of the studies belonging to a third category used instrumental variables techniques - empirical models, such as two- or three-stage least squares regressions. In the first equation determinants of leverage were reviewed, in the second – value was measured with estimated leverage. (In case of 3SLS, one of equations considers determinants of corporate governance, e.g. ownership structure). Moreover, such approach allows to fulfill a complete picture: from the determinants of capital structure choice to the ultimate influence of this choice on firm value – the reasons why we follow this approach in the current thesis. While research methods are discussed in latter section, we shall review the determinants of leverage next.

## **2.5. Overview of leverage determinants**

According to the research framework discussed earlier, it would be not feasible and empirically valid to observe a direct link between leverage and value without taking into consideration factors that explain capital structure. Leverage is not a purely exogenous phenomenon, but it is also influenced by endogenous, firm-specific factors. Kayo and Kimura (2010) reviewed over 17000 companies from 40 countries within the period of 1997-2007 and found that 42% of leverage variance was due to intrinsic firm characteristics, whereas industry and country characteristics accounted for 12% and 3% respectively. Also, Gungoraydinoglu and Öztekin (2011) concluded that leverage is influenced on 66 percent by firm-specific factors, and only on 34 percent - by country-specific. Analysing a sample of 5591 firms from 22 different countries, Chui, Lloyd and Kwok (2002) discovered, that the most significant relationships can be observed between capital structure and firm size and profitability. On the contrary, Titman and Wessles (1988) found the relationship of size and profitability to various measurements of leverage inconclusive and requiring further research. Gungoraydinoglu and Öztekin (2011) state that liquidity, profitability, tangibility and size explain up to 63% of the variation in leverage, which is in accordance with Rajan and Zingales (1995) and Frank and Goyal (2009).

**Profitability:** According to pecking order theory, more profitable companies are likely to have low debt levels because they generate cash internally. Consequently, the relationship

between debt and profitability will be negative as concluded by Rajan and Zingales (1995). Jong et al. (2008) also found that profitability is negatively related to the leverage ratio. Fama and French (2002) discovered a negative relationship between leverage and profitability, therefore supporting pecking order theory. Trade-off theory presumes that firms with low profits will have lower levels of leverage because when they issue much debt, expected costs of financial distress will significantly raise and harm the firm value. More profitable companies will rely on debt to a greater extent – in order to reduce more taxes from their earnings. Latter firms are more secured than former ones, and by issuing debt their costs of potential distress will be relatively not harmful as that of less profitable firms. The expected relationship between profitability and leverage is positive.

**Tangibility:** According to the trade-off theory, tangibility is expected to positively correlate with leverage: tangible assets could be used as a collateral when borrowing: in a happenstance of financial distress, creditors will own these assets. Firms with higher proportion of tangible assets are expected to benefit from issuing debt due to its lower cost, because creditors are more likely to provide such companies with capital. Also there is a lower probability of mispricing in bankruptcy and lower costs of financial distress. In their study, Booth et al. (2001) confirmed that there is a positive relationship between leverage and tangibility. In contrast to this, when taking into account country determinants, Chui, Lloyd and Kwok (2002) found that this relationship was positive only in the US, and that it was negative in Brazil, Japan and Thailand. The authors stated that in most countries the relationship between debt and tangibility was insignificant. We expect the relationship between tangibility and leverage to be positive.

**Liquidity:** Theories are also contradictory when reviewing the relationship between liquidity and leverage. On the one hand, pecking order theory stipulates that there is a negative relationship between liquidity and leverage. Deesomsak et al., (2004) showed that companies that have more liquid assets will engage in debt less. It was also confirmed by Janbaz (2010), and others. There are also scholars, such as De Jong et al. (2008) that found only limited significant results of a relationship between liquidity and leverage. On the other hand, trade-off theory stipulates that there is a positive relationship between liquidity and leverage. The fact that liquidity shows the ability to pay obligations when they are due, may be an evidence of the premise that firms with high liquidity have lower bankruptcy costs of debt. It gives them the advantage when borrowing (like with tangibility). This positive relationship between

liquidity and leverage is confirmed by Gungoraydinoglu and Öztekin (2011). The expected relationship between liquidity and leverage is positive.

**Size:** According to the trade-off and pecking order theories, firms of larger size have shown to have lower bankruptcy risks and costs. Larger firms benefit from high levels of leverage due to the stability of their cash flows. It could be also explained that due to scale economies the cost of debt is expected to be lower for big firms than for small firms. Consequently, the size of the firm will be positively related to the leverage and, as concluded by Deesomsak et al., (2004), Fama and French (2002), Gungoraydinoglu and Öztekin (2011). Therefore, we expect that leverage is positively associated with firm size.

**Industry:** In accordance with Frank and Goyal (2009), and Gungoraydinoglu and Öztekin (2011), industry significantly determines financial leverage of the companies. Corporate finance theory (Hillier et al., 2008), states that industry determines the expected return on equity. Firms frequently use average (or median) industry leverage ratio for benchmarking (also Frank and Goyal, 2009), hence it is expected to have an influence on the leverage of companies. For instance, Kayo and Kimura (2010) claim that firms working in a particular industry are expected to have similar leverage ratios. One more way to control for industry effect is to include industry dummies in the model. Overall, the expected relationship between industry effect and leverage of the firm is expected to take place. Although, we cannot say whether it is positive or negative as it should depend greatly on a particular sector.

**Growth opportunities:** Growing companies need to invest in new valuable projects. According to pecking order theory, the first source of financing for such projects is company's own retained earnings. Therefore, companies strive to fund their growth with own cash prior to engaging in debt. Besides, as Kayo and Kimura (2010) suggested, agency theory assumes that managers strive to increase their utility at expense of the owners. High growth options produce incentives for suboptimal investment (Deesomsak et. al., 2004). Disciplinary effect of debt eliminates this opportunistic behavior. Debt presumes paying out interest, leaving less cash for new projects – according to trade-off theory. It makes the relationship between growth and leverage expected to be negative.

**Taxes:** According to Deesomsak et al., (2004), trade-off theory predicts companies to have benefits from issuing debt instead of equity (in order to save corporate tax). Explanation for this phenomena was given prior, and directly connected with firm's profitability. The more profits company has, the more it will benefit from debt, shielding therefore more taxable

income. The greater is the tax imposed by the firm, the greater will be benefits of debt, which presumes a positive relation between debt and taxes.

**Cash flow:** Overinvesting companies are considered to have high levels of cash flows (Jensen, 1986). Debt benefits this companies due to its disciplining properties (as it was noted previously). Due to bankruptcy costs associated with leverage, underinvesting companies that have fewer cash cannot enjoy the same benefits. The more cash a company has, the more likely it will overinvest, entailing thus issuance of debt which makes the relation between financial leverage and free cash flow expected to be positive.

To summarize, capital structure choice is a trade-off between tax-shield and disciplining benefits against probability of bankruptcy and underinvestment costs. Bankruptcy costs are presumed to be lower for large companies with high profits. Big companies have lower probability to go bankrupt due to their reputation in the market. High incomes attain taxation benefits, making it beneficial to engage in debt. Besides, these firms tend to have high levels of tangibility and liquidity of their assets as well as fewer options to grow. Having high levels of cash flow is also the reason of higher leverage ratios due to disciplining properties of debt. We add all these determinants in our framework as the variables for detailed estimation of leverage (in the first equation of the two stage least squares regression model). The empirical model is explained in the chapter 4, but for the moment this explanation was needed to extend the framework:

**Figure 6. The representation of relationship between leverage and value considering reverse causality and leverage determinants.**



## 2.6. The role of the corporate governance in leverage-value relationship

**The aim of corporate governance:** According to agency costs theory (Jensen and Meckling, 1976; Jensen, 1986), separation of ownership and control generates agency problems between owners and managers. Agrawal and Knoeber (1996) diversified several fundamental mechanisms that serve for alleviating these problems: managerial shareholdings; shareholdings by institutions and blockholders; outsider representation on boards; debt financing; labor market for managers; threat of displacement. Among these we can recognize elements of internal corporate governance – ownership structure and board of directors

(according to McConnell and Denis, 2003), while the rest of them (except for debt) belong to external corporate governance mechanisms.

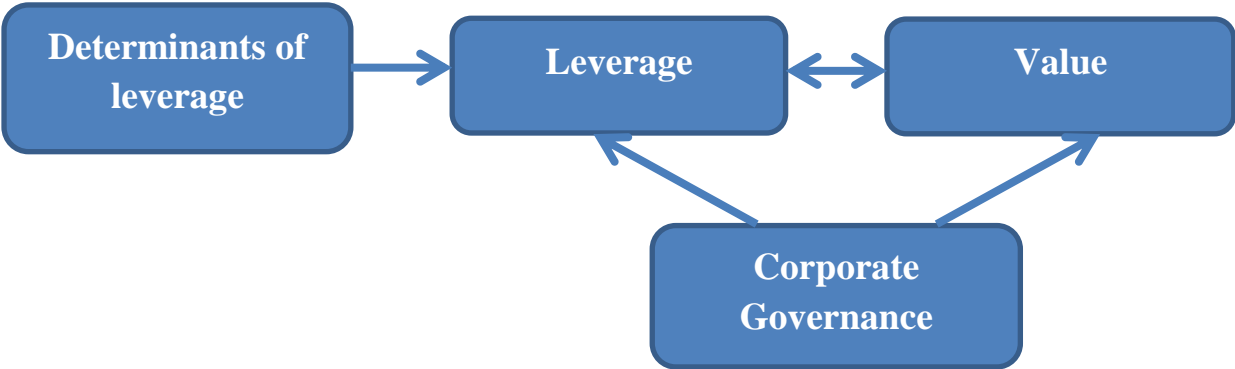
Debt financing is also an internally chosen disciplining device, which was described in the previous subchapter. What was left up to this moment is that managers have control over the financing policy of the firm. Therefore they are able to provide financing that maximizes firm value (Barclay et al., 2006). According to Jensen (1986), managers that overinvest may issue debt *voluntarily* in order to constrain themselves from empire-building actions. But due to bankruptcy costs of debt, governance mechanisms can be applied instead for reduction of investment and value maximization. It presumes a negative relation between corporate governance and leverage, because they are reviewed as *substitute* mechanisms. Zwiebel (1996) stated that presence of superior corporate governance system in the company is likely to assure that managers will not pursue overinvestment – and if they do, these mechanisms may also induce managers to issue debt. In this way, corporate governance and leverage are related positively, and may be reviewed as *complementary* devices.

De Jong (2002) defined corporate governance mechanisms as “devices that aim to resolve manager-shareholder problems, such as perk consumption and overinvestment”. Such devices may have a significant influence on the firm value, both *direct* (consider the effect of ownership-control separation) and *indirect* - through the influence on financing policy. In this way corporate governance serves as a *mediator* between leverage and value, as it impacts the relationship between these variables. Ghosh (2007) remarked that companies which have advanced governance mechanisms will have less debt in their capital structures. Also De Jong, (2002) reported that when a company complies to high corporate governance standards, debt may lose its significance as a disciplining device. Nevertheless, leverage (in its disciplinary role) and governance may be as *substitute* as *complementary* devices, but serving a common purpose – *alleviation of agency costs for value maximization*.

Agrawal and Knoeber (1996) reported that the extent to which debt and corporate governance are used is defined by companies’ internal choice that is based on value maximization. Each of the mechanisms has its benefits and costs. Regardless of complementarity or substitution of leverage and corporate governance, the extent of their implementation will be always limited by the entailed costs (we already know benefits and costs of debt; in this section we will cover benefits and costs of corporate governance that are related to leverage-value relationship). Given this premise, benefits should offset costs and if *optimally* chosen, these controls are presumed to enhance value of the company.

Agrawal and Knoeber (1996) remarked that when companies use one of the mechanisms to a greater extent, it may outweigh the benefits of the second one, making latter less significant. Zwiebel (1996) suggests that managers strive to retain control by issuing debt (so they minimize undertaking negative NPV growth opportunities) but at the same time they avoid debt because it entails loss of control (bankruptcy probability). So, whether these devices are substitutes or complementary, there is a trade-off in using them. In case of substitution, the influence of effective governance on leverage is expected to be more negative. In case of complementarity, companies with a strong corporate governance may assure double control for their managers: from inside (by governance mechanisms) and from outside (by creditors). However, at some point company will avoid engaging in debt due to probability of bankruptcy. Hence, we can expect that *effective governance is reducing the importance of leverage as disciplining device*. And it can be, of course, vice versa due to costs that corporate governance may entail (reviewed further). Finally, we may consider a next representation of leverage-value relationship:

**Fig. 7 The representation of leverage-value relationship, considering reverse causality, determinants of leverage and mediating role of corporate governance.**



**Institutional differences in governance:** Let us first specify the governance mechanisms that we review further. Because their importance depends on the international setting, we select only those having a greater impact in the Netherlands, according to De Jong (2002), De Jong and Van Dijk (2007), Akkermans et al., (2007), Frijns et al., (2008), Arping and Sautner, (2009), who investigated leverage-value relationship (and also involvement of corporate governance in the key relationship) in Dutch settings. First, many researchers remark that most of the studies, investigating involvement of corporate governance in leverage-value relationship, examined firms in British-American setting. Taking institutional differences into account, the external market for corporate control in the Netherlands is “virtually absent, while in British-American countries hostile takeovers prevail” – following De Jong and Van

Dijk (2007). Yet, Dutch companies generally have three antitakeover measures (priority shares, preferred shares and depositary receipts). De Jong (2002) summed up that Dutch listed firms rely mostly on internal mechanisms (blockholders, two-tier board system and relationships with financial institutions).

According to De Jong and Van Dijk (2007), five largest shareholders own on average 49% of Dutch firms' shares. Such blockholdings in the USA amount only up to 25%. Agrawal and Knoeber (2012) approved that dispersed ownership and active market for corporate control are peculiar to UK and US economies. Also LaPorta et al., (1999) concluded in their overview of ownership around the world that American ownership is rather dispersed, while that of emerging and European economies is far more concentrated. Moreover, companies there may have mixed-tier system board system, in contrast with Dutch two-tier board composition. Considering the significance of internal governance mechanisms (managerial ownership, ownership concentration and two-tiered board) within Dutch firms, we will review next their impact on leverage-value relation.

**Ownership concentration:** Significant shareholders receive significant proportions of profits realized by the firm and therefore they have a strong motivation for reducing agency problems by monitoring managers. High concentration of ownership (as in case with insiders) may protect companies from hostile takeovers. What also matters in the question concerning concentration – is the identity of shareholders. De Jong (2002) assumed that blockholders with greater professional skills would monitor companies in a best manner. Different financial institutions like banks, pension funds and insurance companies can fulfill the role of monitors. These companies may serve also functions of creditors, shareholders, or auditors (or providers of other financial services). Also representatives of financial institutions could be members of the company board. In this way De Jong (2002) reckons that financial institutions might be “*excellent monitors*”. According to De Jong (2002), when effective monitoring is assured by the large blockholders (including also financial companies), the significance of debt as a disciplining device may decline.

Nevertheless, each blockholder defines the percentage of shareholdings independently from firm's decision makers. As Alonso et al., (2005) suggested, shares may be acquired by blockholders because of high corporate performance. Consequently, there may be extra costs that are borne by external owners and therefore using this governance mechanism may not necessary lead to value maximization (Agrawal and Knoeber, 1996). For instance, large blockholders may pursue their own interests that could discord with that of smaller

shareholders (minorities). Besides, significant shareholders have an influence on managers: they can fire overinvestors or on contrary, encourage those managers who expropriate wealth from smaller shareholders or creditors. In case when the presence of large blockholders influences value negatively (while expropriation takes place), leverage will be more powerful as a control mechanism alleviating agency costs. Considering the significant role of financial institutions in Dutch corporate governance, we also study the effect of shareholdings by financials on leverage-value relation.

**Insider ownership:** Ownership of directors (whether of executives or supervisors) is a corporate governance element that presumes alignment between interests of managers and outside shareholders, in this way positively influencing firm value (Jensen and Meckling, 1976). Managerial wealth becomes thus dependent on the value of the company. The greater managerial ownership is, the more costs of on-the-job consumption will managers bear, (be it overinvestment, increased leisure time or consumption of perquisites) according to Agrawal and Knoeber, (2012). Supposing that managers with shareholdings will act rationally (it means that they will at least strive to minimize costs) presumes that the consumption should decline. Hence, managerial and shareholders' interests will converge, which has a positive influence on value. Due to this alignment effect, managers will also use less debt, because they are willing to minimize financial distress costs and the probability of bankruptcy. (Agrawal and Knoeber, 1996) Consequently, a role of leverage as controlling mechanisms weakens (or becomes more negative) when managerial interests are aligned with that of shareholders.

Stulz (1988) suggested that managerial ownership also serves as an effective “deterrent” from takeover. In this way, managers retain their positions in the company – because if outside takeover is attempted successfully, the chance is great that managers will be displaced due to their ineffectiveness. It gives them of course a motivation to resist such takeovers. But there may be a negative effect on value: apart from cash managers receive, ownership gives them voting rights. At high levels of share ownership, managers also may become entrenched as the probability of their displacement becomes minimal. Stulz (1990) explained that high levels of insider ownership may negatively influence value: pursuing own goals and overinvestment may take place while managers feel themselves secure at their positions. In case when entrenchment takes place, insider ownership is no more effective and financial leverage may bring its benefits of disciplining device, assuring that managers do not overinvest.



**Size of the board:** Board is often reviewed with regards to its size and structure: number of directors (both executives and supervisors), representation of outsiders in the board (board independence), and if the CEO also performs functions of the chairman – CEO duality (Dehaene, Vuyst and Ooghe, 2001; McConnell and Denis, 2003). Arslan, Karan and Eksi (2010) claim that board structure is explained by its size, independence and directors' ownership. De Jong (2002) included in the empirical model several board characteristics, among them: ownership by insiders and size of the board. We review only the board size in this thesis due to the fact that two-tier board structure in the Netherlands presumes that CEO belongs only to one board. Also we have ownership of by members of both boards (insiders) as one of board characteristics discussed earlier.

Coles et al., (2008) suggest that there is no optimal formula for a board size: it depends on size of the company, complexity of its operations and on the level of leverage. Thus, authors assume that complex companies should have bigger boards, while for relatively small companies big boards will be not that effective. Arslan, Karan and Eksi (2010) stated that in the examined corporate finance literature the relation between size of the board and firm value is mostly inversely related. In such a way, authors motivate that information asymmetry increases and communication worsens between members of larger boards, influencing value of the firm negatively. Too many board members could also induce the free-rider problem: not all of them will be involved into managing (or supervising) the company with the same degree of responsibility. In the examined literature there was relatively small attention devoted on the mediatory role of the board size in leverage-value relationship. Nevertheless it was reviewed among the rest corporate governance components (e.g. De Jong, 2002) and it is presumed to have a mediatory influence as well.

## **2.7. Empirical evidence on the role of corporate governance in leverage-value relationship**

McConnell and Servaes (1995) reviewed the relation between leverage and value and also included insider ownership in their regression as an explanatory variable of firm value. The coefficient of shares owned by company insiders was positive for samples of both low- and high-growth US companies. However, authors remark that allocation of ownership is more important for low-growth companies. This could be explained by the fact that in low-growth companies managers tend to overinvest, while ownership of shares will restrain them from stepping on the path of this value-reducing strategy. This, in addition to positive influence of leverage on value (discovered by authors) might have served as an evidence of

complementary role of two mechanisms. However, the estimations were made following ordinary least squares methodology and therefore did not take into account possible interaction between the two disciplining mechanisms.

Researchers concluded that ownership by institutional blockholders positively influences firm value (it might approve the assumption of institutional entities as better monitors). Moreover, authors suggested that allocation of ownership (both between insiders and institutional blockholders) plays more important role in low-growth firms, where debt negatively affects value. It could be needed for balancing underinvestment costs of debt by governance mechanisms. Blockholders assure in-depth monitoring, and insider ownership provides an alignment described prior. However, mediating power of this governance mechanism is inconclusive.

Agrawal and Knoeber (1996) found no significant impact of managerial ownership on firm value using two stage least-squares regression, while the effect was positive and significant when using ordinary least squares model (and measuring the influence of managerial ownership separately from other mechanisms). Insider ownership had a positive significant impact on leverage in OLS model. Although, as in the previous study, it could not be concluded that there was some sort of evidence for complementarity. Hence, we cannot conclude if there was a mediatory role of insider ownership. Ownership concentration (by five largest shareholders) did not have any significant impact on Tobin's Q (neither estimated in OLS, nor in 2SLS). Although, when considering the simultaneous influence of leverage and corporate governance mechanisms on Tobin's Q, the significance of leverage coefficient vanished (in contrast to OLS model).

Demsetz and Villalonga (2001) studied the effect of ownership concentration on firm value on 223 random US companies from Demsetz and Lehn (1985) sample (511 randomly selected US companies from Corporate Data Exchange and Fortune-500 for the period of 1976-1980). Authors used fraction of shares owned by 5 largest shareholders as a proxy for ownership concentration. Using OLS, authors discovered a negative relation between concentration and Tobin's Q. But when they estimated results with 2SLS, there was no significant effect of ownership concentration on firm value. To the point, no mediating impact on leverage-value relationship was found, because the influence of debt on Tobin's Q was insignificant. Authors also estimated the relation between insider ownership and value. Having implied OLS, authors found a negative impact of insiders' shareholdings. With 2SLS regressions researchers discovered no significant relation between fraction of shares owned by corporate

insiders (managers and board members) and Tobin's Q. Including financial leverage in the 2SLS estimation along with insider ownership, suggested that the influence of insider ownership became insignificant, which may serve as some sort of evidence for mutual exclusion of mechanisms. Nevertheless, the influence of financial leverage on value was negative.

Alonso et al., (2005) evidenced a positive relation between insider ownership and Tobin's Q, which authors interpreted as a convergence of interests of owners and managers. This effect was positive and significant among high-growth firms, which was explained as the evidence of signaling to the market to notice their growth options. Also financial leverage positively and significantly influenced value of low-growth companies, which may serve as evidence for complementarity of corporate governance and debt for value maximization. Pindado and de la Torre (2009) found that alignment of interests reduced overinvestment in 135 listed Spanish firms. Next to this, leverage was positively related with value of high-growth firms, which could be the illustration of possible convergence between two control mechanisms.

Authors discovered that high concentration of shares by one major shareholder has a negative effect on value of high-growth companies. Authors explained that it takes place because when majority shareholder imposes too much control, it could impede growth of the firm thereby reducing the value. The same effect was seen for low-growth companies, where expropriation effect of one largest shareholder could have appeared, making the leverage an effective cure against overinvestment. Alonso et al., (2005) evidenced a positive relation between ownership by financial institutions and Tobin's Q among high-growth companies. Considering here a negative impact of leverage, we may follow conclusions of Pindado and de la Torre (2009), who discovered that monitoring by blockholders (including financials) reduces underinvestment, while debt only exacerbates this problem. Shareholdings by financials and value of low-growth firms were interrelated negatively, due to the possibility of expropriation effect. In this case, for solving overinvestment, leverage was probably more effective.

Ruan et al., (2011) found non-linear relation between insider ownership and Tobin's Q for a sample of 197 Chinese listed firms (over 2002-2007). Their findings were close to that of Morck, Schleifer and Vishny (1988). There were two turning points of 18 and 46%: Tobin's Q rises when insider ownership grows from 0 and until it reaches 18%, then Tobin's Q declines. When ownership reaches 46%, Tobin's Q grow again. Ruan et al., (2011) explain that these points are higher than those of Morck, Schleifer and Vishny (1988) (authors of previous research used Fortune 500 data and found these points to be 5 and 25% respectively)

due to the fact that in developing economies alignment of interests begins when managers own more shares of the company than in developed countries. In OLS model, managerial ownership was positively influencing Tobin's Q and negatively affecting capital structure. In the value equation of 3SLS model, insider ownership lost its significance, which was interpreted as substitution effect of two mechanisms and due to greater significance of leverage in solving agency problems.

Yermack (1996) examined 452 large US industrial firms in the period 1984 – 1991 (3438 observations). As the source for the data, author used annual Forbes magazine rankings of 500 largest US corporations. Author used OLS and fixed-effects model and discovered in both models an inverse relation between size of the board and firm value (Tobin's Q). Yermack (1996) remarked thus the effectiveness of small boards. Although in turn, size depends on maturity of the company and its complexity. Coles et al., (2008) examined 8165 firm-year observations from Compact Disclosure database from 1992 to 2001. Authors evidenced "U-shaped" relation between board size and Tobin's Q (firm value). It could mean that very large or very small size of the board is optimal, but there are differences in the complexity of the firm. Guest (2009) reviewed the impact of board size on firm performance on the sample of 2746 listed firms in UK. Authors implied OLS regression analysis and board size had a negative impact on value, and results were stronger for companies of larger size (that also had larger boards of directors). Effectiveness of the boards was undermined by problems of miscommunication.

Arslan, Karan and Eksi (2010) examined non-financial Turkish firms listed on Istanbul Stock Exchange (data was collected on the official website of ISE). In total there were 999 firm-year observations in the period from 1995 to 2006. Authors implied logistic regression methodology and discovered that board size positively influenced firm value, measured in Tobin's Q. Topak (2011) investigated the relation between size of the board and firm value in Turkey, among 122 companies over 5 years: 2004-2009. Researcher applied pooled OLS regression analysis and found no relation between the variables. As for Dutch evidence, De Jong (2002) found a negative effect of board size on Tobin's Q. Although evidence on board size does not allow to conclude about its mediatory role in leverage-value relationship, we may see that it could be an effective governance mechanism alleviating agency costs and also assuring its prevention. We will make it clear in the next section.

## Chapter 3. Hypotheses

### 3.1. Leverage, value and investment

The balance sheet of a firm consists of two general items: assets and liabilities. We may say, on one hand, that firm value is the sum of cash flows to its owners and creditors, which are liabilities – equity and debt respectively. On the other hand, raised capital is invested in assets: these, which are already in place, and those on which the firm spent cash today, but will receive return in the future. Barclay et al., (2006) noted that the current value of the firm is composed of values of its assets in place and investment opportunities. Consequently, the relation between growth opportunities and value will be positive, according to Lang, Ofek and Stulz (1996). This fact is approved by prior research, regardless of the measure of growth. Growth opportunities were measured differently along prior research: by ratio of capital expenditures to total assets; by sales growth; price/earnings ratio; and ratio R&D expenditures to total assets or market-to-book value. In every empirical study that was analyzed, these proxies of growth were positively related to value (Tobin's Q).

As the goal of the current paper is to test the effect of leverage on value of firms based and listed in the Netherlands, it is decided to include only firm- and industry-specific determinants of the relationship. None of special country determinants is used, as there will be no international comparisons. It is done in accordance with the studies that tested the leverage-value effect within the settings of one country: US in McConnell and Servaes (1995), Aggarwal and Zhao (2007); UK in Dessi and Robertson, (2003); Jordan in Zeitun and Tian (2007), Egypt in Ebaid (2009), Iran in Saeedi and Mahmoodi (2011) etc.

**Overinvestment:** According to Jensen (1986) managers tend to increase size of their firms. As it was noticed, there are two reasons for that: first, they have more resources under their control, which gives them more power. Second, growth of sales (proxy of size) leads to increase of managerial compensation. Stulz (1990) explained that managers of larger firms have “greater visibility”, are able to promote employees within the firm and have more perks to dispense among employees – as reasons of investment behavior. The more firm expands the less profitable growth opportunities become available. Some firms eventually may even shrink (Jensen, 1986).

However, in pursuit of growing empire, managers can invest below the cost of capital – in projects with negative net present value. And, as the term “negative” specifies, there will be no returns from such projects in the future. This problem is especially serious for

organizations that generate substantial amount of free cash flow, but have low growth. Such investment behavior may harm firm's shareholders: they had invested funds in the company, but returns will be negative due to lossmaking investments (Barclay et al., 2006). The latter implies conflicts between managers and owners, which represent agency costs of equity that may decrease the value of the firm.

Free cash flow is produced on the basis of assets in place. As well, these assets have high collateral value and hence allow companies to easily issue debt. Obligatory payouts to creditors reduce the amount of cash flow available to managers (that could be wasted otherwise on invaluable investments or other inefficiencies discussed earlier). In this way managers are committed to paying out future cash flows because they recognize the threat of bankruptcy in case these obligations are not met. This threat serves as an incentive mechanism that motivates managers for being efficient rather than wasteful. This function of leverage is, as said, peculiar to the companies that generate large amount of cash and have low growth. First of all, we assume that overinvestment is value-destroying phenomenon within Dutch listed firms. Next, we may expect a disciplining effect from leverage: a positive influence on the value of overinvesting firms.

**Hypothesis 1:** *Financial leverage has a positive influence on value of overinvesting firms.*

De Jong (2002) examined 132 Dutch companies listed on Amsterdam stock exchanges from 1992 to 1997. Researcher constructed two-staged least squares regression, where in equations leverage was dependent on Tobin's Q, corporate governance components, tangibility, size, non-debt tax shields and earnings volatility. Tobin's Q in turn, was determined by leverage, corporate governance, free cash flow (as indicator of overinvestment), size, and growth opportunities. Author found that leverage influenced value of overinvesting companies positively. However, author concluded that Dutch companies avoided using debt for controlling agency problems. The reason probably lies in avoiding bankruptcy costs associated with debt, which corresponds to Zwiebel's (1996) framework.

De Jong and Van Dijk (2007) examined results of 102 questionnaires that they collected from CFOs of non-financial firms listed on AEX. Their study concerned agency problems: over- and underinvestment. Researchers remarked that the significance of the overinvestment problem was relevant for Dutch companies. However, they discovered that when such a problem raised, companies did not issue extra debt. Authors found no direct relation between leverage and agency problems (as suggested also by previously discussed research). This signals that the role of leverage as of disciplining device is minor among listed firms in the

Netherlands. These results are going in line with previously discussed study of De Jong (2002) and that of Brounen et al., (2006) who also investigated related issues in the Netherlands.

**3.2. Underinvestment:** Of course, increasing leverage also incurs costs: the more debt is issued the more bankruptcy costs are entailed. Let us then consider another side of debt. As in previous example, firm value is partially explained by the options to make future investments. According to Myers (1977), growth option can be considered as a call option on a real asset: when a company exercises an option, it pays a price for acquiring some asset in the future. Thus, corporate value is not a simple book value of all firm's assets that are in place today. Value of all assets in the future also account for the present firm value, and depends on investments of the firm. These investments could be of different kind: new buildings or technology, advertisement, expenditures on marketing campaigns or on new type of materials etc. Hence, the firm value is a going concern, a continuous set of investments, described above.

The decision whether to exercise any kind of these investments depends on the amount of free cash flow and amount of obligations to company's creditors. Investment opportunities have lower collateral value than assets in place. When the amount of growth option increases (implying no change in assets in place), the level of debt needed to fund investment projects declines, according to Barclay et al., (2006) who found that the level of debt which maximizes firm value decreases when there is an increase in firm value due to growth opportunities.

Investing behavior of the firm with large debt will differ from that of the firm with little or no debt. If a company is imposed by too much debt obligations, at some point company will simply pass up valuable investment projects (that projects which add up to firm value). Therefore, shareholders may anticipate that all cash will be paid out to creditors. In this case owners of the firm are left without any return. First of all, we assume that underinvestment is value-destroying phenomenon within Dutch listed firms. Hence, when an organization is growing (and thus has many valuable investment projects and little or no free cash flow) issuing debt will negatively influence its value.

**Hypothesis 2:** *Financial leverage is negatively related to value of underinvesting firms.*

De Jong and Van Dijk (2007) discovered that there are no agency conflicts between shareholders and bondholders in the Netherlands - no evidence of underinvestment. Due to low levels of insider ownership (and nevertheless high levels of managerial entrenchment),

managers have no incentives (and also they feel no pressure from shareholders) for expropriation of wealth from creditors. Besides, companies are involved in long-term relationships with financial institutions, especially banks. Financial institutions play different roles: financing through both debt and equity, different financial services and representation in the board. Therefore, authors specify that due to strong positions of banks and managers, underinvestment problem is not relevant for Dutch listed companies. Pindado and de la Torre (2009) concluded that monitoring of large blockholders is especially effective for solving underinvestment problem. De Jong (2002) and De Jong and Van Dijk (2007) remarked insignificance of this problem in the Netherlands, hence – unclear role of blockholders in the Dutch settings. Besides, both studies did not report about the mediating effect of this governance mechanism through financial leverage, motivating that only the whole set of governance controls may have such influence (not one mechanism taken apart).

Aggarwal, Kyaw and Zhao (2011) found overall negative leverage-value relationship among Dutch companies (703 year-observations of 184 firms). When authors subdivided companies into samples according to their growth (by quartiles), this study documents that leverage was negatively and significantly related to value among high-growth firms (25% of observations), and negatively (but not significant), among low-growth firms (another 25%). Hence, results might suggest a certain evidence of disciplinary role of debt in case of overinvestment problem. But there is no such evidence of disciplining role in presence of underinvestment. In general, disciplining role of debt was evidenced in countries with dispersed ownership (US and UK), while in countries where concentrated ownership predominates, there was a lack of such evidence (European Union settings and countries with emerging economies), according to McConnell and Servaes (1995); LaPorta et al., (1999); De Jong (2002); Harvey et al., (2004); Alonso et al., (2005); De Jong and Van Dijk (2007); Aggarwal, Kyaw and Zhao (2011).

### **3.2. The role of corporate governance in leverage-value relationship**

Prior studies suggest that if effective governance mechanisms are involved, the disciplining role of leverage diminishes. Arping and Sautner, (2009) compared 40 Dutch non-financial firms listed on AEX with 206 firms from other countries, listed on other stock exchanges over the period 2000-2007. It allowed them to create control and treatment groups, as they studied the influence of newly established corporate governance code on the significance of debt as disciplining device. Arping and Sautner (2009) evidenced lowering leverage in the Netherlands: first, in the periods from 2000 to 2002 there was an increase in average book



leverage among non-financial Dutch companies listed on AEX from 30 to 35%. Since 2003 (until 2007) the average book leverage was declining gradually from 35 till 25% (relatively to control group).

Authors investigated this change and concluded that it was due to establishment of the new Corporate Governance Code in 2004. Listed companies must comply to this code, and in their annual reports it should be reflected to what extent they follow established corporate governance principles and best practice provisions. Among other things, new governance code concerns: terms and conditions of appointment of board members; level and composition of their remuneration and its disclosure; requirements over professional qualification of board members; responsibilities of shareholders of the company; internal and external audit and other information (Dutch Corporate Governance Code, 2008). Akkermans et al., (2007) surveyed managers of more than 200 largest Dutch listed and non-listed companies in 2005 and noted that compliance with the code was at high level, especially among firms listed on AEX. Let us review the mediatory influence of governance mechanisms.

**Insider ownership:** McConnell and Servaes (1995), Harvey et al. (2004) indicate, the root of the overinvestment problem lies exactly in the separation of ownership and control. It goes in accordance with the agency theory of the firm, presented by Jensen and Meckling, (1976). As discussed earlier in Chapter 2, the more shares of the company manager possesses (especially if the proportion of equity he holds equals 100%), the more he acts like an owner of the company. In this way, it is likely to expect that manager will do all best in the interest of the firm, as thus he follows his own interests. At this point, interests of managers and shareholders will converge, and there will be less need in using financial leverage as disciplining device. Consequently, significance of debt (as of control mechanism) declines.

However, if a firm needs financing and external equity is issued, managerial ownership stake becomes less. The less becomes expected managerial dedication to the interests of other shareholders. And it induces agency problems that are negatively reflected in the value of the company. Harvey et al. (2004) found that increase in separation between ownership and control negatively influences value, as predicted in agency theory of Jensen and Meckling (1976). For solving these agency problems debt is expected to be an effective mechanism. Considering non-linear relationship between insider ownership and value, at some point managers that own large percentage of shares may become entrenched, which induces agency problems and leads to decline in value. In case when interests of owners and agents are not aligned, the significance of financial leverage as control mechanism rises.

**Hypothesis 3:** *Leverage has less disciplining effect on value of overinvesting Dutch companies if insider ownership in these companies is value-maximizing.*

**Concentration of ownership:** Managerial ownership is not the only way to reduce the costs of agency problems (and definitely, not the only way to induce them). Study of Demsetz and Villalonga (2001) shown that the fraction of shares owned by insiders is below 3% in 138 of 223 US firms and below 10% for 195 firms. For instance, De Jong in his study of 2002 showed that on average, shareholdings of insiders of Dutch firms were around 3%. Authors state that empirically, insiders hardly possess the amount of shares that make them significant blockholders. Otherwise, it is more likely that big shareholdings are represented by managers' family members, which also may belong to the board of the company. Hence, if most of the companies are not fully controlled by their "pure" managers, they are under control of other entities: blockholders - financial institutions, industrial companies, government or private individuals etc. that own 5% or more of the firm's equity. And the value of the company is influenced by the distribution of ownership between these entities. Jensen (1986) proposed that ownership concentrated among few shareholders gives more incentives to monitor managers and their actions. Similarly, Alonso et al., (2005) suggested that concentration presumes more thorough monitoring. In this situation control of agency problems is assured by blockholders that effectively monitor managers and do not let them overinvest. Hence, leverage as a control mechanism forfeits its importance.

When ownership is widely dispersed, a free-rider problem may arise. And effectiveness of monitoring varies: the higher the proportions of shares owned, the higher the degree of effectiveness is expected and vice versa. Demsetz and Villalonga (2001) noticed that concentration of shares in hands of outsiders induces the higher effectiveness of monitoring and disciplining the managers. But in case of high concentration, owners of significant blockholdings may start expropriating wealth from minority shareholders, which induces agency costs that in turn negatively affect value. So, we have to keep in mind the opposite effect of ownership concentration. In this case, when value is negatively affected by high ownership concentration, the role of leverage is expected to be more significant in resolving agency problems.

**Hypothesis 4:** *Leverage has less disciplining effect on value of overinvesting Dutch companies if ownership concentration in these companies is value-maximizing.*

**Identity of the shareholders:** Ruiz-Mallorquí and Santana-Martín (2011) remarked two possible scenarios for the countries of Continental Europe and others where ownership is

concentrated and protection of minorities is weak. Shareholdings for companies in these countries are relatively stable over time, and blockholders are more likely to be insiders in the firms. Thus they have incentives to assure better governance and influence value in a positive way, which happens under “enhanced control” scenario (that resembles active monitoring). Negative impact on value is under the second scenario: “self-dealing control” – when dominant shareholder involves managers to “appropriate firm wealth”. In a similar way as with ownership concentration, we may expect positive relation between financial shareholdings and value (due to effective monitoring), thereby expecting less significant effect of leverage on value. In the opposite situation, when the influence of ownership is negative (when financial institutions begin to expropriate value), leverage is expected to be more powerful disciplining device.

**Hypothesis 5:** *Leverage has less disciplining effect on value of overinvesting Dutch companies if shareholdings by financial institutions in these companies are value-maximizing.*

**Board size:** All Dutch listed companies have two-tier board, which is represented by executives (*Raad van Commissarissen*) and supervisors (*Raad van Bestuur*). Executives basically run the company: they are responsible for day-to-day operations. Supervisors are independent, non-executive directors, which represent interests of shareholders, and employees: they govern the organization: establish policies, appoint executives and their compensations, report to stakeholders and so forth. All in all, board of directors is responsible for the performance of the corporation – they influence the value directly. The optimality of board structure depends on many factors, among them: size of the company, complexity of its operations, on the amount of debt in its capital structure (Coles et al., 2008). There are different consequences that may be expected from a board of big size: better monitoring or on contrary, the presence of free-riders. There might be too much control from a bigger board, impeding growth opportunities. On contrary, when company has no growth, small board is expected to be ineffective against overinvestment problem. This may mediate leverage-value relationship in the same way as other governance mechanisms.

**Hypothesis 6:** *Leverage has less disciplining effect on value of overinvesting Dutch companies if board size in these companies is value-maximizing.*

**Set of corporate governance mechanisms:** We also would like to test the effect of leverage on value in presence of all corporate governance mechanisms at the same time. It is known from the prior studies that these mechanisms are jointly determined together with firm value (e.g. Ghosh, 2007; Ruan et al., 2009). Partially, the interrelation between them is explained in

the theory by alleviating agency costs. As an example, reducing disciplining effect of debt in overinvestment companies due to value-maximizing effect of corporate governance elements, which we hypothesized earlier in this chapter (hypotheses 3 to 6).

On the other hand, debt and governance may be also value-maximizing in *preventing* agency conflicts or in *monitoring*. Thus, regardless of investment behavior firms will still have governance and debt and they will still experience a trade-off between costs and benefits of both monitoring devices. Therefore we assume that under any scenario (substitution - when governance negatively influences leverage; or complementarity – when the relation between them is positive) presence of governance mechanisms will reduce the effect of financial leverage on value.

**Hypothesis 7:** *The effect of leverage on value will be less influential due to the presence of corporate governance mechanisms.*

Results of the study of De Jong (2002) do not allow to conclude if companies relied on internal governance mechanisms when solving agency problems. Ownership by insiders and financial institutions and size of the board were negatively related to value, whereas the influence of large blockholders remained inconclusive. However, these firms did not increase financial leverage either. De Jong and Van Dijk (2007) showed that Dutch firms relied overall on inside corporate governance mechanisms when agency problems occurred. Presence of large shareholders increased overinvestment, but authors reported that precise role of blockholders as governance mechanism remained unclear in Dutch settings. Managerial ownership was found mitigating overinvestment whereas no disciplinary role of debt was evidenced.

Frijns et al., (2008) studied the relation between ownership structure and firm value within 100 Dutch companies listed on AEX. They estimated the relation between a total fraction of shares held by insiders on value by three-stage least squares regression (to control for endogeneity) and discovered a positive influence of insider shareholdings, while the influence of financial leverage on firm value remained insignificant, which may also serve as an evidence that leverage is not significant in its disciplinary role among Dutch firms. Frijns et al., (2008) also examined the relation between ownership concentration on hands of one largest blockholder and firm value, which authors evidenced to be positive and significant. Results suggest that ownership concentration may be an effective disciplining device that decreases need in debt.

There were no evidence discovered on the board size as being mediating variable between leverage and value. However, we may expect that as any of previously described governance mechanism, optimally chosen size of management board may be an effective device alleviating agency costs.

### **3.3. Control variables**

**Size of the company:** Size is frequently used as a determinant of leverage, but it could be also a determinant of value, as used in many studies: McConnell and Servaes (1995), Harvey et al., (2004) Aggarwal and Zhao (2007), Alonso et al., (2005), Zeitun and Tian (2007), Aggarwal, Kyaw and Zhao (2011) and others. Large companies are better known in the financial markets. Larger size makes it easy for the firms to borrow, which is a consequence of their better reputation (Alonso et al., 2005). It basically means that known company might be easier assessed by investors, thus reducing information asymmetry. Thus, size serves as an inversed proxy for bankruptcy probability (Ross, 1977; Zeitun and Tian, 2007). Hence, the bigger the size of the firm, the lower bankruptcy probability is. Consequently, the higher is expected to be the value. On the other hand, it is expected that when corporation becomes larger, it has fewer options for growth, and overinvestment problem occurs when managers strive to increase size at cost of value. In contrast, small companies have more options for growth, and as they increase their size they become more valuable. Therefore, we can suggest that size correlates with value positively in case of high-growth firms, but it relates to value negatively, when there is a lack of growth.

McConnell and Servaes (1995) discovered negative influence of size on Tobin's Q of both high-growth and low-growth US companies. Agrawal and Zhao (1996) found the same evidence. Zeitun and Tian (2007) evidenced negative relationship between size and growth, and as well between leverage and growth, implying that large companies tend to have large amount of debt and low growth opportunities. On the contrary, smaller firms have higher growth opportunities (this goes in line with Myers, 1977). Similarly, Harvey et al. (2004) found that size (logarithm of assets) is positively (and significantly) related to the value of firms with low Q, and negatively (but not significant) – to value of high Q firms. Aggarwal, Kyaw and Zhao (2011) evidenced negative relationship between firm size and value among all firms in 25 countries. What is remarkable, size was negatively and significantly correlated with value among low-growth firms. This could be interpreted as the evidence of overinvestment: in the absence of growth options, increasing the size of a firm will damage its value. As for high-growth firms, size was positively related to value, implying that the more

firm grows, the more valuable it becomes (of course, until a certain point, when there is a lack of good investment opportunities). Agrawal and Knoeber (1996) also found negative relation between firm size (assets) and value.

**Industry effects:** Prior research indicates that if industry patterns could be tracked in concern with debt financing, it is likely that industry also influences value. Therefore, we should control for industry effect in value equation as well. In several studies (e.g. Lang, Ofek and Stulz, 1996; Agrawal and Knoeber, 1996; Aggarwal and Zhao, 2007; Aggarwal, Kyaw and Zhao, 2011) authors reviewed firms considering the effect of industry on corporate value. Many of these studies were concentrated on US companies, and authors therefore used SIC industry codes classification. It allowed researchers to group companies within industries, according to a certain code. Finally, they calculated average value within each industry.

For example, Aggarwal and Zhao (2007) reviewed leverage-value relationship, while taking into account industry effects. Authors state that industry conditions define the level of competitiveness in the market and cycles of demand, and firms within the same industry tend to have similar capital expenditures and structure of assets. Therefore, industry determines the optimal amount of debt for a firm – that one which allows for solving overinvestment problem and at the same time does not cause underinvestment. It is the amount of debt that accounts for maximal firm value. To control for industry effects, authors included in empirical model the average industry value (as measured by Tobin's Q) as one of determinants of firm value. Some studies (Zeitun and Tian, 2007; Alonso et al., 2005; Ruan et al., 2011) used industrial sectors as dummy variables – they assigned “1” if a company belonged to a certain industry and “0” otherwise. In either way, both methods allow testing the industry effect.

## **Chapter 4. Data and research methodology**

### **4.1. Data**

**Data sources:** There are two basic sources of data for this thesis. First of all, from the Reach database, which is available for the University of Twente, recent financial indicators of Dutch listed companies will be collected. In particular, the following data was obtained from Reach: total assets (as well as fixed and current assets), EBIT, total debt (and also current and long-term liabilities), book value of equity, number of ordinary shares outstanding and free cash flow. The main advantage of the database is that it significantly helps to save time of research. Because it contains data taken from companies' annual reports, therefore is preferred to reports taken separately. However, the subscription of the University does not allow to gather information on corporate governance variables: ownership structure, and insider shareholdings. These data was collected directly from annual reports of the companies listed on Amsterdam Euronext Stock Exchange. Additionally, there were some missing numbers in the database, which were fulfilled from annual reports. Annual reports were collected via websites: [analist.nl](http://analist.nl), [jaarverslaag.com](http://jaarverslaag.com), [company.info](http://company.info), or official websites of the companies otherwise.

**Sample selection:** The intended period of observation is 2007-2011 and the total number of companies included in the sample is 78. Here is the procedure of selection described. We filter Dutch companies by the set of criteria: firms should be listed and active (not in bankruptcy) over this 5 year period. In total, Reach database shows data on 204 Dutch listed companies that are located in the Netherlands and active (not in bankruptcy). What we see is they all are listed on different Stock Exchanges (LSE, NASDAQ, Boerse Berlin etc.). Hillier et al, (2008); Leach and Melicher, (2012) suggest that Stock Exchanges require companies to have certain asset size, number of shareholders or value of listed shares – parameters that vary depending on the Stock Exchange. Different rules can also be applied to companies due to country regulations, as information asymmetry is lower in debt market (because when borrowing, company discloses all its prospects to creditor) than in stock market. Stock exchanges are located in different countries (e.g. LSE – UK, Boerse Berlin – Germany, Euronext Paris – France etc.) De Jong (2005) suggested that listing outside the Netherlands e.g. in UK or US, requires companies to disclose more information on company and compensation policies than on AEX. According to Aggarwal, Kyaw and Zhao (2011), different information asymmetry could be expected in countries with developed stock market or with developed banking system.

Hence, to avoid these issues, we would like to concentrate only on one stock exchange – Amsterdam Euronext, based in Amsterdam, the Netherlands and on 93 Dutch companies, listed there during the intended period. Also, 14 of the companies were dropped out - financial firms. The reason not to include them in the sample is because of the different ways of valuation of the balance sheet. Non-financial firms have a clear delineation between assets (e.g. machinery) and liabilities (e.g. loans). For financial firms the line between assets and liabilities is more blurred since deposit accounts are considered to be liabilities and issuance of loans are considered to be assets. But at the same time the deposit accounts are considered to be loans since they are not owned by the bank, but by the individual clients. For three companies there is no data on certain years: Fornix – had no balance sheet for 2011; Cryo Save – became listed on AEX since 2009, AMG - became listed on AEX since July, 2007. Pharming in 2008 and 2011, Vivenda Media in 2011 and Witte Molen in 2007 and 2009 did not present data on taxes - consequently we can't calculate tax rate and free cash flow variables. Therefore, we omitted these year-observations, and our panel is not balanced. All in all, sample consists of 78 Dutch companies (381 year-observations) listed on Amsterdam Euronext Stock Exchange.

**Industry classification:** To take into account industry factor, companies will be grouped into industries based on 9 major industry sectors according to Euronext Stock Exchange classification (Basic Materials, Consumer Goods, Consumer services, Industrials, Healthcare, Oil and Gas, Technology, Telecommunication and Utilities). In turn, Euronext industry classification is based on ICB sectorial classification (developed by Dow Jones and FTSE and used by stock exchanges all over the world – e.g. NASDAQ, NYSE, Euronext). There were no firms representing “Utilities” sector, leaving therefore companies in the sample distributed among 8 industries.

There are several classifications to control for industry factors, i.e. separate companies in the sample according to industries they belong to. Reach database allows to aggregate companies according to US (or UK) SIC industry classification. It is an American Standard Industrial Classification, that was established by US government in 1937. The classificatory has 4-digit codes that are assigned to companies, the first three digits represent industry group, and the first two – a major group. All in all, there are 10 major groups (Agriculture, Forestry and Fishing; Mining; Construction; Manufacturing; Transportation and Public Utilities; Wholesale Trade; Retail Trade; Financial, Insurance, Real Estate; Services; and Public Administration).



Also there is a possibility to use NAISC – North-American Industry Classification System, that has (to a certain extent) replaced SIC in 1997 and has 20 major groups.

In fact, according to Hillier et al., (2008) industry codes are far from perfect. Some companies may have divisions that are involved in different types of business and in the end it is difficult to assign a certain code to the company in such case. Therefore we treat ICB and SIC as being equal. The ICB classification is used in order to save time of research, because all the companies are already grouped into sectors. In case with SIC, it would have cost time to group them. Besides, both classifications have the same amount of sectors. Considering size of the sample, using SIC instead of ICB might have resulted in similar distribution. NAISC in turn, has twice more sectors (20), which makes it unreasonable to apply on such a narrow sample.

The sample of Dutch firms listed on AEX is significantly smaller than that used in the prior research (US or UK firms), and the number of industries is 8 (excluding financials and utilities), which is substantial considering the size of the sample. Four of eight industries from our sample: Basic Materials, Healthcare, Oil and Gas and Telecommunication contain only from one to five companies. According to Lang, Ofek and Stulz (1996), industry is not represented well, when there are less than 5 companies. Consequently, the estimations of industry effect on value (within each industry) could be biased. In this case, most of the industries are not represented well. However, we may expect a certain effect from three industries that are represented by larger number of companies. i.e. Industrials, Technology and Consumer Goods. A more detailed representation of companies by industries is presented in the Appendix 1.

**Table 1. Representation of industries, according to ICB classification**

<b>Industry</b>	<b>Number of companies</b>	<b>Percentage from total</b>	<b>Number of observations</b>
Industrials	31	39%	155
Consumer Goods	10	13%	48
Consumer Services	7	9%	35
Telecommunication	1	1%	5
Healthcare	4	6%	21
Basic Materials	3	4%	14
Oil and Gas	3	4%	15
Technology	19	24%	93
<b>Total:</b>	<b>78</b>		<b>381</b>

**Samples:** There will be two general samples. First sample contains data on financial leverage and value (and their determinants). It represents 381 observations of 78 companies for the 5-year period over 2007-2011. Using data of this sample, we will test influence of debt on investment behavior of companies: overinvestment and underinvestment hypotheses (1 and 2); and the involvement of corporate governance variables as mediatory devices that alleviate agency costs and thereby influence leverage-value relationship (hypotheses 3, 4, 5 and 6). Because the effect of debt on value is expected to be different depending on investment behavior of the firm (i.e. levels of growth opportunities and free cash flow), the key relationship should be estimated within overinvestment and underinvestment categories of companies.

We perform it by splitting observations into subsamples, following the methodology of De Jong (2002). If an observation has both: above median cash flow and below median growth opportunities (measured by Tobin's Q) – we label this observation as potential overinvestor (and dummy variable “over” = 1 is assigned, otherwise it equals 0 for observations that do not belong to overinvestors category). Therefore, we have a subsample of 49 observations that are potential overinvestors. Compared with 322 companies that are non-overinvestors, we test hypothesis 1 – the disciplining effect of debt. We test hypothesis 2 within another distribution of observations: in case when cash flow is below median and Tobin's Q is above the median – observation is declared as underinvestor (and dummy variable “under” = 1 is assigned, 0 otherwise when observation does not belong to underinvestors category). We have therefore 49 underinvesting observations, while 322 are non-underinvestors.

Other options for splitting sample were implemented in the next studies: McConnell and Servaes (1995), Harvey et. al., (2004), Alonso et al., (2005) and Aggarwal and Zhao (2007), Aggarwal, Kyaw and Zhao (2011) which proposed to divide observations into equal groups (three or four) according to the value of growth opportunities. The disadvantage of such separation is that the level of growth by itself is not the only indicator of investment behavior. The second condition to consider is the level of cash flow. Only with two of the conditions observed, we can define the company's investment behavior (Jensen, 1986; De Jong, 2002).

Hypotheses 3 to 6 suggest the influence of corporate governance devices (taken separately) on disciplining capacity of debt. Hypotheses are tested within a subsample of 49 observations - overinvesting firms, because the disciplining effect of leverage on value may be only observed in presence of overinvestment (De Jong, 2002). From these 49 observations, all 49

have data on board size, 38 have data on insider ownership, 39 – on ownership concentration and 33 on shareholdings by financial institutions.

Finally, we test hypothesis 7 within a sample of 166 observations: observations that include all corporate governance variables available simultaneously together with determinants of leverage and value. In this hypotheses we would like to test if presence of corporate governance mechanisms changes the influence of debt on value. It might have a resemblance with hypotheses 3 to 6, but this time we do not consider disciplining properties of governance or debt. Thus, observations are not split into over- or under-investment. Besides, we take into account all corporate governance instruments at the same time. Now we discuss the composition of this sample.

According to Dutch Law on Disclosure of Shareholdings, blockholders are obligatory to notify the Netherlands Authority for Financial Markets each time when they pass ownership thresholds of 5, 10, 15, 20, 25, 30, 40, 50, 60, 75 and 95% of shares. It is not obligatory to inform on shareholdings below 5% and accordingly, information on such shareholdings was in many cases absent. Consequently, several companies did not report any data in this regard. Besides, several firms are not informed on the exact percentage of shareholdings – they state in their reports that a certain entity owns from 5 to 10% of shares, or 30 to 40%. Eventually, only annual reports of 65 companies contained precise information on ownership concentration.

Insider ownership was not evidenced in all the firms of the sample: only insiders of 55 companies (members of supervisory or management board, or both) owned a certain percentage of company shares. Besides, not all the companies that disclosed information on insider shareholdings disclosed at the same time data on significant blockholders and vice versa. Therefore, the number of firms on which data is available for both ownership indicators simultaneously is 43. Also, when making correlation analysis further, estimations will be biased due to different number of observations (381 for Tobin's Q, leverage, M/B ratio, liquidity, profitability, size, board size and tangibility; 260 for insider ownership; 327 for ownership concentration, 280 for financial institutions as blockholders and 166 observations for all corporate governance variables included simultaneously with determinants of leverage and value).

## 4.2. Measuring dependent and explanatory variables

**Value:** Firm value is a key variable of this thesis. In a broad sense, when we speak about value, we mean some category of firm performance. Earlier it was said that value represents a sum of cash flows that pertain to creditors and shareholders. It is true, but if we go further, this capital which a firm has issued (whether by borrowing or issuing shares), was invested in some fixed assets, capital expenditures, advertising, in R&D department or some new profitable projects. It was spent on supporting today's operations and also for assuring that of tomorrow. And we may say that what brings profit in the future, also represents firm performance today.

Performance is a multidimensional construct, and it can have therefore several meanings. There are numerous studies that reviewed the effect of leverage on corporate performance. In these studies "performance" is reflected in accounting indicators, such as return on assets and return on equity (among others are Zeitun and Tian, 2007; Ebaid, 2009; Saeedi and Mahmoodi, 2011; San and Teh, 2011). Also, gross and profit margins are applied in some of these studies. These measures reflect profitability, so financial performance of the company. However, if a firm is profitable, it does not mean that cash flows available to this firm will cover all its liabilities and at least creditors will be paid. From the finance literature (Hillier et al, 2008; Leach and Melicher, 2012; and Merchant and Van der Stede, 2007) we know that accounting measures, such as ROI, and profitability do not really reflect the value of the company, therefore they are not used in the current thesis.

Berger and Di Patti (2006) reviewed agency costs hypothesis within banking industry and provided different approach in measuring firm performance – by using profit efficiency: "how close firm's profits are to the benchmark of a best-practice firm facing the same exogenous conditions". Positive leverage-performance relationship was found by authors. Practically similar to previous authors, Margaritis and Psillaki (2008) selected "X-efficiency" (productive efficiency) as a measure of firm performance, that reflects industry "best practices" in order to have a standard for comparing firm efficiency. Authors found that high leverage leads to an increase in productive efficiency, which translates into firm performance. Profit and productive efficiency are used as inversed proxies for agency costs. These measures also reflect financial and operational performance, but not the value. Besides they require sophisticated calculation and collection of extra data, which makes them not reasonable due to time limitations of the current research.

In the current thesis performance is reviewed from corporate finance point of view – the value of the company. The ultimate goal of any corporation is increasing value. It presumes that shareholders' benefits are maximized. Shareholders have residual claim on company's assets after all obligations are paid – they are paid last. So if they are satisfied, then creditors are satisfied per se. As a measure of value, we intend to use Tobin's Q, which is a mixture of market and accounting measures: the sum of *market value of equity* and *book value of total debt* divided by *book value of total assets*). First of all, it considers market value of the firm while other alternatives, reviewed before, do not. It is important, because it is the way how market sees corporate performance, not the accountants of the company, who make financial statements. Market value therefore is a "fair", not biased indicator of firm performance. Next to this, according to De Jong (2002), Tobin's Q allows measuring and comparing "managerial efficiency and abilities that generate additional value from existing assets by producing goods and services efficiently" between companies.

**Leverage:** Financial leverage relates to long-term solvency ratios that "address the firm's long run ability to meet its obligations" (Hillier et al., 2008). Financial leverage is usually determined by *total debt ratio*, and in empirical literature it is measured by dividing *book value of total debt* by a *book value of total assets*. Basically, leverage is a proportion of debt in the capital structure. There are variations such as short-term leverage, long-term leverage (as ratios of *short- or long-term debt* to book value of total assets) and market leverage (as a ratio of *book value of total debt* divided by *market value of total assets*).

Consistently with Fama and French, (2002) different results could be expected from including market and book leverage in the empirical model. For instance, market leverage has a market value of total assets in denominator, while Tobin's Q (a measure of firm value) has market value of assets in the numerator. Lang, Ofek and Stulz (1996), De Jong (2002), Dessi and Robertson (2003) as well as Aggarwal, Kyaw and Zhao (2011) state that this could create a negative bias on the leverage coefficient. Therefore, in accordance with prior research we intend to use book leverage in the current thesis.

While testing the robustness of results, we can of course use different proxies of leverage, including market measure. Besides, some authors, e.g. Zeitun and Tian (2007), Saeedi and Mahmoodi (2011) used short-term debt and long-term debt as measures of leverage. They motivated their choice by the fact that not only the proportions of leverage matters, but also debt maturity influences firm value (due to the banking credit policy). So, large firms (less risky and of low growth) prefer to issue long-term debt. In line with this, Aggarwal, Kyaw

and Zhao (2011) found that in countries with high developed banking, firms have long-term relationships with banks, which allows for renegotiation of debt to avoid bankruptcy or default. Zeitun and Tian (2007) assumed that short-term debt negatively influences value, as companies become exposed to the risk of refinancing. However, Myers (1977) suggested shortening the maturity of debt as a way for mitigating shareholder-bondholder conflicts (underinvestment and wealth transfer). A more detailed information on these measures and other variables is presented in Appendix 2.

### **4.3. Research methodology**

**Description of the research methods:** The aim of the current thesis is to examine the relationship between financial leverage and value of Dutch listed firms. Most studies that investigated leverage-value relationship were cross-sectional and at the same time involved short time series (from 5 to 20 years). Researchers who examined this relationship, and whose articles were studied in this thesis, followed panel data methodology (among others, see Agrawal and Knoeber (1996), Dessi and Robertson (2003), Harvey et al., (2004), Alonso et al., (2005), Zeitun and Tian (2007), Aggarwal and Zhao (2007), Ebaid (2009), Saeedi and Mahmoodi (2011), Aggarwal, Kyaw and Zhao (2011)).

The analysis of panel data allows researchers to examine the change of parameter among different entities and within a certain period of time. Such a combination benefits the quality of results due to the fact that a certain parameter is studied across two dimensions: time and space. It could be argued that similar conclusions obtained by different researchers could not be treated as equal. Each study followed a specific empirical model, and due to differences in research methods, we could not broadly generalize findings of prior studies. Besides, conclusion always depends on country of the research, number of observations, periods of time, variables included in the models etc. In studies, there were two main alternatives of research methods used by authors.

**Multivariate regression:** This method allows reviewing the relationship between value and debt together with the rest of control variables. There are two alternatives, used in prior study: pooled ordinary least squares regression and fixed effects model. More detailed, pooled OLS allows explaining the variations of value between companies. Fixed effect model devotes its attention to variation of value within companies. Each firm has a set of its unique factors (e.g. the way it is run by managers, the impression it makes on the market, etc., according to Alonso et.al. 2005) that diversify from firm to firm. It is called *unobserved heterogeneity*, and although being unobserved, it may significantly influence the results. Fixed effects model

(FEM) takes these factors (that are different across firms, but remain constant over time) into account, while pooled OLS regression omits these factors, making thus estimations biased. Besides, FEM considers differences between cross-sectional groups (different industries or years, estimated as dummies). However, FEM eliminates time-invariant factors, whereas OLS allows to consider industry effects (accounted for as dummies). In either case all variables are treated as exogenous. Hence, if the interdependence of variables needs to be taken into account (e.g. the relation between such control mechanisms as ownership structure and debt: Agrawal and Knoeber, 1996; or reciprocal interrelation between debt and value: De Jong , 2002), these methods fail in such estimation.

**Two stage least squares regression:** De Jong (2002) stated that unbiased estimates are only obtained when the error term does not correlate with the explanatory variables (consequently, all explanatory variables need to be exogenous, which is not the case with Tobin's Q and leverage). Error of the first equation may correlate with Tobin's Q, while error in the second equation – with leverage. OLS will produce biased estimates in this case, while 2SLS considers endogeneity of both variables and corrects this misspecification of OLS. The main advantage of this method is that the analysis may represent a more complete picture: we consider factors that influence leverage and we control reverse causality. Besides, we are able to test the involvement of corporate governance variables in leverage-value relationship. The disadvantage of this method lies in the identification of instrumental variables that only influence leverage, not value.

**Empirical models:** There are several empirical models. First of all, we test the predictions of hypotheses 1 and 2 regarding leverage-value relationship dependent on the investment behavior of the firm. Observations will be divided into overinvestment and underinvestment groups according to the principle described earlier in this section. We test these hypotheses on the sample that consists of 381 year-observations (leverage sample). In accordance with the prior research, the model used for estimation leverage-value relationship within each firm is:

$$(1) q_{it} = \beta_0 + \beta_1 \times lev_{it} + \beta_2 \times mb_{it} + \beta_3 \times size_{it} + ind_j + \varepsilon_{it}$$

Where  $\beta_0$  is the intercept,  $i$  refers to the firm, and  $t$  refers to the year of observation ( $i = 1...78; t = 1...5$ ),  $ind$  – is an industry dummy, where  $j$  represents a certain industry,  $\varepsilon_{it}$  is the error term, and betas are coefficients. Q is Tobin's Q, lev is leverage, mb is market-to-book ratio.

As we know from several studies (Agrawal and Knoeber (1996), De Jong (2002), Dessi and Robertson (2003), Harvey et al. (2004), Alonso et al., (2005), Aggarwal, Kyaw and Zhao (2011), Ruan et al., (2011)), OLS regression does not reflect the full picture, and therefore

obtained results could not be fully relied upon. Therefore, we test our hypotheses with two-stage least squares regression:

$$(2) \text{fitlev}_{it} = \beta_{10} + \beta_{11}\text{liq}_{it} + \beta_{12}\times\text{prof}_{it} + \beta_{13}\times\text{tang}_{it} + \beta_{14}\times\text{fcf}_{it} + \beta_{15}\times\text{tax}_{it} + \text{ind}_j + \varepsilon_{1it}$$

In the second stage we use estimated leverage in the value equation:

$$(3) q_{it} = \beta_{20} + \beta_{21}\times\text{fitlev}_{it} + \beta_{23}\times\text{mb}_{it} + \beta_{24}\times\text{size}_{it} + \text{ind}_j + \varepsilon_{2it}$$

Where  $\beta_{10}$  and  $\beta_{20}$  are intercepts, *liq* is liquidity, *prof* is profitability, *tang* is tangibility, *fcf* is free cash flow, *tax* is tax rate;  $\varepsilon_{1it}$  and  $\varepsilon_{2it}$  are the error terms and  $\beta$  are coefficients.

Next, we test hypotheses 3 to 6, which predict that the effect of leverage on value will be less influential due to effectiveness of corporate governance mechanisms (which, as assumed, influence value positively and therefore the need in leverage as in disciplining device decreases). We perform OLS and 2SLS regressions on the observations from sample of 49 overinvestors.

**OLS:** (4)  $q_{it} = \beta_0 + \beta_1\times\text{lev}_{it} + \beta_2\times\text{mb}_{it} + \beta_3\times\text{size}_{it} + \beta_4\times\text{gov}_{kit} + \varepsilon_{it}$

**2SLS:** (5)  $\text{fitlev}_{it} = \beta_{10} + \beta_{11}\text{liq}_{it} + \beta_{12}\times\text{prof}_{it} + \beta_{13}\times\text{tang}_{it} + \beta_{14}\times\text{fcf}_{it} + \beta_{15}\times\text{tax}_{it} + \beta_{16}\times\text{gov}_{kit} + \varepsilon_{1it}$

$$(6) \text{Tobinq}_{it} = \beta_{20} + \beta_{21}\times\text{fitlev}_{it} + \beta_{23}\times\text{mb}_{it} + \beta_{24}\times\text{size}_{it} + \beta_{25}\times\text{gov}_{kit} + \varepsilon_{2it}$$

Where  $\beta_{10}$  and  $\beta_{20}$  are the intercepts, *i* refers to the firm, and *t* refers to a year of observation ( $i = 1 \dots 78$ ;  $t = 1 \dots 5$ ), *ind* – is an industry dummy, where *j* represents a certain industry. *gov* represents corporate governance variables, where *k* varies from hypothesis to hypothesis and stands for insider ownership, shareholdings by 1,3 and 5 major blockholders, shareholdings by financial institutions or board size), influence of which will be tested separately;  $\varepsilon_{1it}$  and  $\varepsilon_{2it}$  are the error terms. Finally,  $\beta$  are coefficients.

After all, we test the hypothesis 7 on the sample of 169 firm-year observations, without categorization by investment behavior. We will test models prior and after inclusion of all corporate governance variables simultaneously. And again, there will be two types of regressions: OLS and 2SLS.

**OLS:** (7)  $q_{it} = \beta_0 + \beta_1\times\text{lev}_{it} + \beta_2\times\text{mb}_{it} + \beta_3\times\text{size}_{it} + \beta'_4\times\text{gov}_{it} + \text{ind}_j + \varepsilon_{it}$

**2SLS:** (8)  $\text{fitlev}_{it} = \beta_{10} + \beta_{11}\text{liq}_{it} + \beta_{12}\times\text{prof}_{it} + \beta_{13}\times\text{tang}_{it} + \beta_{14}\times\text{fcf}_{it} + \beta_{15}\times\text{tax}_{it} + \text{ind}_j + \beta'_{16}\times\text{gov}_{it} + \varepsilon_{1it}$

$$(9) \text{Tobinq}_{it} = \beta_{20} + \beta_{21}\times\text{fitlev}_{it} + \beta_{23}\times\text{mb}_{it} + \beta_{24}\times\text{size}_{it} + \beta'_{25}\times\text{gov}_{it} + \text{ind}_j + \varepsilon_{2it}$$

Where  $\beta_{10}$  and  $\beta_{20}$  are the intercepts, *i* refers to the firm, and *t* refers to a year of observation ( $i = 1 \dots 78$ ;  $t = 1 \dots 5$ ), *ind* – is an industry dummy, where *j* represents a certain industry. *gov* consists of corporate



**governance variables: insider ownership, shareholdings by 1,3 and 5 major blockholders, shareholdings by financial institutions and board size);  $\varepsilon_{1it}$  and  $\varepsilon_{2it}$  are the error terms. Finally,  $\beta$  are coefficients and  $\beta'$  are vectors of coefficients.**

**Robustness tests:** In order to check robustness of the results, we also use different proxies of financial leverage. As said before, it may be described by its short-term, long-term debt or market alternatives. Besides, we use a fixed-effects model as a third type of empirical model for robustness test. It allows us to control for unobserved heterogeneity. Thus, we estimate all the prior models with fixed effects method. One major difference is that FEM eliminates all the time-invariant factors (in our case these are industries).

## Chapter 5. Data analysis

### 5.1. Summary statistics:

The first remark to be made is about the number of observations – it is lower in the corporate governance sample due to the fact corporate governance mechanisms were not present in all the companies at the same time. The fact that we have two different samples will be reflected as in summary statistics as in subsequent correlation and regression analyses: together with changing number of observations, the representation of companies will differ. Eventually, in the first sample we have 381 observations, whereas in the second there will be 166. As was described, managers of some companies didn't hold any shares at all or in some years. It could be explained by different facts: first, the remuneration policy could have differed from year to year, and for example, managers were not eligible to hold company shares in 2007, but they became in 2008. Next, directors are elected for a certain period – those who were owning company shares could have been displaced by newcomers (who apparently did not hold shares). The same relates to ownership concentration – some companies are not informed if shareholdings are lower than 5%. Mostly, blockholders are financial institutions. We also searched for other identities of shareholders, but the number of companies where industrials had stake was low and therefore not included.

**Table 2. Descriptive statistics for leverage sample.**

	Mean	Median	Standard Deviation	Minimum	Maximum
<b>q</b>	1.3304	1.1961	0.5983	0.4426	5.1655
<b>lev</b>	0.5406	0.5412	0.1617	0.1042	0.9237
<b>mb</b>	1.8567	1.4974	1.3374	0.2165	9.9748
<b>liq</b>	1.4531	1.2948	0.8739	0.2102	7.3366
<b>prof</b>	0.0472	0.0701	0.1418	-1.3804	0.6278
<b>tang</b>	0.5281	0.5449	0.1898	0.0777	0.9434
<b>fcf</b>	0.0332	0.0570	0.1328	-1.3743	0.5874
<b>tax</b>	0.2969	0.2356	0.5651	0.0011	7.7000
<b>sizeta</b>	3248.09	530.00	7266.80	4.40	48000.00

In table 2 we observe descriptive statistics for data in leverage sample. Starting from Tobin's Q variable, companies on average (over 2007-2011) had Q of 1,3304 which means that company's market value was higher than its book value by one-third, or 33%. It evidences of the effectiveness of resources that company possesses to produce market value. We may compare our results for Dutch listed firms to that of De Jong (2002), Tobin's Q over 1992-

1997 was 1.434. If we look at values of Tobin's Q throughout the period (Table 3), we may see that maximal value of average Tobin's Q was in 2007. These values of Q are explained by the fact that many companies had high share prices in this year. Supposedly, due to the financial crisis of 2008, these prices substantially fell within one-year period and for some companies this decrease continued for the whole period of observation, which partially explains minimal values of Tobin's Q. Share prices of some firms, on the opposite, increased during the 5-year period.

**Table 3. Average Tobin's Q for the period 2007-2011.**

year	2007	2008	2009	2010	2011
q	1.7662	1.1110	1.2754	1.3334	1.1704

Maximal value of Q (5.1656) belongs to DPA in 2007: share price of the company (7,26 Euro) and the number of outstanding shares (41777492) were especially high that year. For instance, share price declined and it was 2.82, 2.30, 2.30 and 0.90 Euro next four years, while number of shares declined till 17762495 in 2008 and was 10524262 in 2011. Minimal value was evidenced in 2011 for Crown van Gelder: 0.4427, due to decline of share price (from 15.25 in 2007 to 3.60 Euro in 2011), having the rest components of Tobin's Q nearly at the same level throughout the period. Market-to-book ratio (as a measure of growth opportunities) had a maximum of 9.9748, which belongs to DPA in 2007. As was already noticed, this effect was due to large number of shares outstanding and relatively (to consecutive years) high share price. Similar to Tobin's Q, minimal M/B belongs to Crown van Gelder in 2011 (0,2166).

Next, average leverage ratio is 0.5449 which means that capital of Dutch listed companies in the sample consisted on average of debt on 54.49%. Minimum is evidenced in Fornix (2009) – it was financed on 10,43% by debt. In fact, this company was never (over 2007-2011) financed more than 17% by debt. Maximal value belongs to Reed Elsevier in 2008, which was financed on 92,37% by debt. Arping and Sauter (2009) report 30% as an average leverage ratio over 2000-2007.

Profitability reflects the effectiveness of firm's assets in generating profit (in this case, earnings from operations). On average, Dutch firms made almost 5 cents of profit on every Euro of total assets. Maximum value is evidenced in 2010 - Fornix: 0.6278, which means that company makes almost 63 cents on every euro of total assets. Such high value is explained by the fact that operating profit of Fornix remained consistent over the period, whereas the change occurred due to decreasing of total assets by almost three times. The loss of AND

International in 2011 counted up to 1.38 euro per euro of total assets – the minimal value of profit (although not the only one which is negative). Average free cash flow is 0.033 (a similar result was evidenced in De Jong, 2002). Minimal level of free cash flow belongs to AND International in 2011 (-1.3743), due to operating loss of 13375000 Euros (which was large in comparison with results of previous years). Maximum is 0.5874 (Fornix, 2010).

Liquidity of Dutch companies listed on AEX in 2007-2011 was, on average 1.4531. It could be explained that observed firms are financially strong in short-term. Minimal value of 0.2103 (Wegener, 2011) may indicate problems with short-term financial obligations. In fact, after 2007, current ratio of Wegener fell from 0.5115 to 0.2791 in 2008 and decrease continued within the whole period. Whereas extremely high value of 7.3366 (Fornix, 2009) might be an evidence that the company does not use its current assets efficiently, which may be an issue of poor managing of working capital. Although, Fornix issued relatively small amount of short-term debt, having substantial current assets. Due to the nature of business (Healthcare), it could be assumed that inventories amounted a decent percentage of Fornix's current assets. Size of the company measured in millions (Euro) of total assets was on average 3248.09 m. for a period of observation. Minimal size was in 2007 – Vivenda Media (4.4 m.), and the maximum was 48000 m. (Unilever, 2011). Similar size was evidenced in De Jong, 2002 (3299 m.).

Tangibility here reflects the collateral value of assets. On average, Dutch listed firms had 52.81% tangible assets. The maximum percentage of tangible assets to total assets (94,35%) belonged to Vivenda Media in 2010. Minimal value of this indicator is 7.77% and belongs to Brunel in 2011. That means 92.3% of assets are intangible and if we speak about collateral value, it might be difficult for Brunel to issue debt due to such a low percentage of fixed assets. Tax is measured as absolute of taxes divided by earnings before taxes. On average, Dutch companies listed on AEX paid out 29.69% of their earnings as taxes. Maximal value of tax rate is evidenced in 2009 (Porceleyne Fles): there was a tax relief of 77000 Euro, whereas earnings before tax were 10000 Euro. Minimal value was in 2009 (RoodMicrotec): with operating loss before taxes of -1744000 Euro, there was a tax relief of 2000 Euro.

What is also interesting – percentage of overinvestment observations (with both below median Tobin's Q and above median free cash flow) was almost 13% (49 out of 381 firm-year observations). The same number of observations belonged to underinvestment category. We also performed compared summary statistics of overinvestment versus non-overinvestment firms and underinvestment versus non-underinvestment. Although it is not

reported, we can present the means: leverage ratio of overinvestors was 45.08% while that of non-overinvestors was 10.3% higher (55.38%). If we compare other subsamples, we notice that leverage of non-inderinvestors and that of underinvestors were almost at the same level (53.7% and 55.90% respectively). These findings contradict with the idea of the overinvestment and underinvestment behavior – first type of firms should have more debt in their capital structures than the second.

**Table 4. Descriptive statistics for corporate governance sample.**

	Mean	Median	Standard Deviation	Minimum	Maximum
<b>q</b>	1.4162	1.2752	0.6483	0.5265	4.5982
<b>lev</b>	0.5482	0.5556	0.1685	0.1085	0.9237
<b>mb</b>	2.1436	1.8250	1.4970	0.3193	8.5979
<b>liq</b>	1.4683	1.2877	0.8837	0.4901	7.2876
<b>prof</b>	0.0537	0.0816	0.1705	-1.3804	0.3924
<b>tang</b>	0.5243	0.5379	0.1998	0.1428	0.9068
<b>fcf</b>	0.0363	0.0667	0.1642	-1.3743	0.2947
<b>tax</b>	0.2704	0.2341	0.4632	0.0030	5.8203
<b>inown</b>	0.0603	0.0069	0.1314	0.0000001	0.8210
<b>own5</b>	0.4350	0.4270	0.1953	0.0497	0.9340
<b>own3</b>	0.3632	0.3407	0.1806	0.0497	0.8830
<b>own1</b>	0.2087	0.1570	0.1506	0.0430	0.8210
<b>fin</b>	0.3534	0.3260	0.2145	0.0213	0.8500
<b>sboard</b>	8.0236	8	2.6635	3	14
<b>sizeta</b>	2910.47	610.00	5874.61	6.60	27000.00

Let us review now corporate governance sample, which consists of 166 firm-year observations. Although, the variables which we reviewed in the previous sample differ from that of the current one, we will describe only corporate governance variables. The proportion of insider ownership on average was 6.03% from company shares – nearly the same percentage as discovered in De Jong (2002). Percentage of insider shareholdings of Reed Elsevier’s managers was minimal in 2011: it substantially declined from 15.6% (in 2007) to 0.0001%. The most significant shareholdings were held by managers of Hydratec Industries: 82.1% in 2009 and 2010; and of Hunter Douglas (81.18% without change). Each of these companies had one major shareholder, who was the member of the board. Besides, when we review ownership concentration, we consider major shareholder regardless of their identity (they can be banks, individuals, insiders or industrial companies). Therefore, these large inside shareholders will also be considered.

Thus, maximal value for own1 variable (concentration of shares on hands of 1 shareholder) was 82.1% - Hydratec Industries. On average, one large blockholder held 20.87% of shares in Dutch companies listed on AEX (36.33% and 43.50% for 3 and 5 blockholders' concentration respectively). DE Jong (2002) discovered that own1 and own3 variables for Dutch firms in 1992-1997 were 24.03% and 39.93%. Five largest shareholders of Hydratec Industries' owned 93.4% of its shares in 2007, whereas 3 blockholders owned 88.3% in 2007-2010, and one largest – 82.1 in 2009 and 2010 (as mentioned - shareholdings by managers of the company). Minimal value of own5 variable is evidenced in 2007 – KPN's 5 significant blockholders disclosed their ownership of 4.97% in total, the same amount being valid for minimum of own3 variable in the same year. 4,3% of Reed Elsevier's shares owned one largest shareholder in 2010. Average size of the board (including managers and supervisors) was 8 people (as in De Jong, 2002), with maximum at Ahold in 2011, and minimum 3 at AND International in 2007 and in 2009. Financial companies owned on average 35.34% of Dutch firms' shares. 2.13% is a minimum within the period (Heineken, 2009), while 85% is a maximum (Stern in 2007).

Prior to making correlation and regression analyses, it is important to check if there are for extreme values among observations - outliers. According to Hawkins (1980), outliers could be observed due to typographical errors, measurement errors or contaminated distribution. Data collected from Reach database was verified against that from annual reports. Besides, companies publish values of previous year in the current annual report (for comparison), which eliminates typographical errors. All the values belong to a certain group of companies – Dutch firms listed on AEX, which to a certain extent eliminates contaminated errors (however, some threat is still there – because companies within the pool belong to different market-capitalization groups). Finally, measurement error may be present, because we use only certain measures of variables, and even using multiple proxies it would have been difficult to define the correct one.

Literature (Wilcox, 2010; Cramer and Howitt, 2004) provides examples of several rules that are applied to identify outliers. Among them are two- and three-sigma rules (also known as 68-95 and 68-95-99,7 rules), which declares an observation that lies at a distance of two (three) standard deviations from mean as an outlier. This rules of thumb imply that for the normal distribution, 95% (99,7%) of observations lie within the abovementioned range, and what is beyond – should be pearled off. These techniques are often used in research although they are even more often criticized for “rough” identification. Tukey (1997) and Hoaglin et

al., (1986) proposed another technique, which is called an outlier “labeling” rule – which also allows to define lower and upper boarders, but is based on 25<sup>th</sup> and 75<sup>th</sup> percentile of observation, standing away from median. After identification, there are two ways of dealing with outliers: trimming and winsorizing. In the first case, extreme values are simply deleted, while in the second – they are substituted by values that are closest to the upper or lower boundaries (without exceeding it). When we trim, some data is lost and therefore, we lose statistical significance, while winsorizing is more desirable, especially for small samples.

As we may see from summary statistics tables (Tables 2 and 3), most of the variables are skewed with some of them skewed rather extreme. These distributions also have tails, whether left, right or both and extreme values are far from the mean (or median). It can be the case that all the values are legitimate, and presence of extreme values is just a nature of data set, not a result of any error. In principle, there is no rigid statistical definition of an outlier and the decision on whether an observation should be treated this way is rather subjective. Besides, abovementioned methods are used for normal distributions and nevertheless using them, we may discover outliers even within normally distributed data. Eventually, it is decided to keep the data as it is.

## 5.2. Correlation analysis

**Table 5. Pearson correlation coefficients matrix for leverage sample.**

	q	lev	mb	liq	prof	sizeta	tang	fcf	tax	ind	goods	tech
q	1											
lev	-.054	1										
mb	.888**	.167**	1									
liq	.018	-.544**	-.103*	1								
prof	.271**	-.084	.217**	.235**	1							
sizeta	.031	.220**	.186**	-.133**	.107*	1						
tang	-.077	.031	.030	-.542**	-.233**	.252**	1					
fcf	.220**	-.074	.174**	.212**	.989**	.110*	-.193**	1				
tax	-.054	.041	-.062	-.022	.022	-.033	-.052	.036	1			
ind	-.130*	.063	-.176**	.063	.063	-.144**	-.265**	.077	.021	1		
goods	.163**	.018	.137**	-.013	.123*	.200**	-.017	.104*	.137**	-.314**	1	
tech	.030	-.143**	-.009	-.043	-.203**	-.184**	.046	-.203**	-.052	-.474**	-.217**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 5 presents Pearson correlation coefficients for variables in leverage sample. The relation between Tobin’s Q and leverage is negative, although weak and not significant (-0.054). As expected from previous studies (e.g. Stulz, 1990; McConnell and Servaes, 1995; Aggarwal and Zhao, 2007), there is a strong and positive significant correlation between

Tobin's Q and M/B ratio - between value and growth opportunities (0.888). Hence, with the increase in growth opportunities, value of the company will rise. Free cash flow and profitability both have positive and significant correlation with Tobin's Q. The coefficients are 0.22 and 0.271 respectively. It may be a sort of evidence that operating performance has a positive relation with firm value: increase in operating performance will be positively reflected in corporate value. Or it may be vice versa (high value stimulates operating performance), as correlation analysis does not allow to distinguish causality.

Industry factors have a certain influence on value and growth. For example, dummy variable of Consumer Goods industry has a positive and significant relation with both Tobin's Q (0.163) and M/B (0.137). It can be interpreted as companies in this sector are more pertained to growth and, as a consequence it increases their value. Industrials' dummy correlation coefficient is negative and significant (-0.130 with Tobin's Q and -0.176 with M/B), pertaining that companies in this industry may have lower growth and consequently lower value. Size is positively, although weak and not significantly (0.031) correlated with Tobin's Q.

M/B ratio is positively and significantly correlated with leverage (0.167). This, however, goes not in accordance with agency theory assumptions. As we know from Barclay, (2006) the level of debt which maximizes firm value decreases when there is an increase in firm value due to growth opportunities. Also, according to underinvestment theory (Myers, 1977), debt has a negative relationship with growth. However, as Stulz (1990) remarked, firms may borrow even more in order not to lose any growth opportunity. Size is positively and significant related to leverage (0.22): which can be an evidence that for bigger firms it is easier to borrow (Fama and French, 2002; Gungoraydinoglu and Öztekin, 2011). Free cash flow has a negative relationship with leverage. We might have seen the approval of pecking order theory's assumptions, but the coefficient is not significant (-0.074). Liquidity has a strong negative correlation with leverage (-0.544), which follows predictions of pecking order theory: the more company has liquid assets the less it will borrow (e.g. Deesomsak et al., 2004; Janbaz, 2010). Tangibility and taxes do not have significant relation with leverage. The coefficients are 0.031 and 0.041, although in previous studies there was a strong relation (e.g. De Jong, 2002; Deesomsak et al., 2004).



**Table 6. Pearson correlation coefficients matrix for corporate governance sample.**

	q	lev	mb	liq	prof	sizeta	tang	inown	own5	own3	own1	fin	fcf	tax	sboard	ind	goods	tech
q	1																	
lev	0.002	1																
mb	.857**	.273**	1															
liq	-0.074	-.562**	-.187*	1														
prof	.316**	-0.015	.218**	0.046	1													
sizeta	0.059	.409**	.342**	-.268**	0.121	1												
tang	-0.083	0.061	0.061	-.525**	-0.117	.444**	1											
inown	-.230**	-.307**	-.267**	.366**	-0.055	-.193*	-0.068	1										
own5	-.159*	-.394**	-.343**	.199**	0.032	-.350**	-.167*	.465**	1									
own3	-.187*	-.399**	-.334**	.230**	-0.012	-.255**	-0.097	.557**	.951**	1								
own1	-.197*	-.322**	-.269**	.199**	-0.08	-0.084	0.049	.624**	.735**	.865**	1							
fin	-0.012	-.170*	-0.151	-0.052	0.003	-.332**	-0.056	-0.131	.472**	.382**	0.141	1						
fcf	.256**	-0.005	.171*	0.043	.992**	0.143	-0.088	-0.042	0.039	-0.003	-0.072	0.01	1					
tax	-0.047	0.029	-0.077	-0.032	0.052	-0.059	0.03	0.003	-0.004	-0.038	-0.049	0.074	0.062	1				
sboard	0.069	.415**	.230**	-0.146	0.146	.576**	0.151	-.266**	-.407**	-.374**	-.280**	-.216**	.159*	-0.024	1			
ind	-.213**	.208**	-.207**	0.082	-0.142	-.239**	-.213**	.183*	.174*	0.118	0.044	.261**	-0.122	.171*	-0.133	1		
goods	.294**	0.007	.217**	0.004	.227**	0.074	-0.112	-.163*	-0.051	-0.062	0.003	-0.078	.193*	-0.03	0.068	-.254**	1	
tech	0.015	-.409**	-0.104	0.133	-0.149	-.254**	-0.115	0.051	.177*	.193*	0.111	-0.036	-.155*	-0.074	-.215**	-.444**	-.276**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

In corporate governance sample (Table 6) we notice nearly identical direction and strength of correlation coefficients between variables that were described in a previous matrix. Therefore, we review only corporate governance elements. Insider ownership has a negative (and significant) influence on Tobin's Q (-0.23): the more shares are owned by corporate insiders, the less will be value of the company. It may be interpreted as a consequence of the entrenchment effect, described prior (Stulz, 1990; De Jong, 2002). Negative and significant relation was also evidenced between value and all ownership concentration proxies: concentrated ownership is negatively correlated with Tobin's Q. The coefficients for the variables own 5, own3 and own1 are: -1.59, -1.87 and -1.97. Such relationship could be probably explained by the expropriation effect (e.g. Ruiz-Mallorquí and Santana-Martín, 2011). In the study of De Jong (2002), this effect was also negative, albeit not significant. Shareholdings by financial institutions did not have a significant correlation with value (only -0.012), as well as in De Jong (2002). Board size has also no significant relation with value, the correlation coefficient is 0.069.

Leverage is negatively and significantly correlated with all ownership measures. Ownership by 5, 3 and 1 major blockholders have next correlation coefficients: -0.394, -0.399 and -0.322. De Jong (2002) found no significant relation between leverage and concentration proxies. Shareholdings by financial institutions have negative and significant correlation with leverage (-0.170), which also was evidenced by De Jong (2002). Such correlations may be an evidence of substitution effect which the two controls (debt and governance) are expected to have on each other (e.g. Jensen, 1996; De Jong, 2002). Also, there is a significant negative correlation between Technologies' dummy and leverage (-0.409). Probably, technological companies borrow less. Size of the board and leverage have positive significant relationship (opposite to findings of De Jong, 2002).

In the first sample (leverage sample), there is a strong positive correlation between profitability and free cash flow variables (0.989). When two independent variables are strongly correlated – it may lead to multicollinearity between them (when independent variables of regression model have high linear relation). According to Dong and Su (2010), we may test if independent variables have a strong relationship with each other, using tolerance score or variance inflation factor (VIF). In practice, VIF greater than 10 (although in some research, there is a threshold of 20) or if tolerance is less than 0.05, than we may experience problems with multicollinearity. After estimation of first stage (leverage equation), VIF-scores of **fcf** and **prof** variables were below the threshold (results are not reported). We

may also notice a strong correlation between **own3** and **own5** variables (0.951), which may be a signal of multicollinearity. In the second sample, variables **own3** and **own5** show great VIF scores (30.28 and 18.42 respectively). It means that they are likely to induce multicollinearity. The reason may be (as in previous case) in the estimation of these variables: i.e. concentration on hands of 5 largest blockholders is the same as concentration of hands of 3 largest blockholders in case when there are only 3 such blockholders and so on. It is decided to drop **own3** variable (one with higher VIF). After the exclusion of **own3**, VIF scores of **own5** lowered significantly (became lower than 5). The VIF-scores of the rest variables are also below 5.

### 5.3. Regression analysis

First of all, we performed the OLS and 2SLS regressions (equations 1,2 and 3) for the whole sample of firms (381 firm-year observations) **without** dividing observations by investment behavior (results are reported in the Appendices 3 and 4) and findings were similar to prior research: leverage negatively affected value (see among others Aggarwal, Kyaw and Zhao, 2011; De Jong, 2002 for the Dutch evidence; Harvey et al., 2004; Zeitun and Tian, 2007; Aggarwal and Zhao, 2007 for the international evidence). More important, this allowed us to test if overinvestment and underinvestment problems were relevant for Dutch listed companies and whether they influenced value of these firms. We see that in both OLS and 2SLS models overinvestment negatively influences value. Therefore, it is a relevant problem for Dutch companies listed on AEX. Underinvestment does not have significant influence on Tobin's Q, which makes it not an actual issue for companies that we examine. Our findings correspond to those of De Jong (2002) and De Jong and Van Dijk (2007).

Table 7 represents the results of ordinary least squares regression for leverage sample, in which we test hypotheses 1. These results show that leverage has no significant influence on value of Dutch listed firms that tend to overinvest. Hypothesis 1 predicts a positive effect of leverage on the value of firms that overinvest due to disciplinary capacities of debt. Using OLS, we find no support for this hypothesis. It goes in line with the evidence from Dutch studies (De Jong, 2002; Frijns et al., 2008) that leverage has no disciplining effect on value of overinvesting firms. Besides, only market-to-book ratio has a positive significant (at 0.01 level) influence on value among overinvestors, whereas the effect of the other independent variables is not statistically significant.

The influence of leverage on value is negative (-1.7225) and significant (at 0.001 level) among underinvestment companies, as predicted in hypothesis 2 (see Table 8). It goes in line

with Myers' (1977) predictions of negative effect of leverage on value of high-growth firms with low amounts of cash. Thus, companies that have high growth options and low cash flow may destroy their value when issuing debt due to its bankruptcy costs. As for other determinants (except for market-to-book ratio discussed earlier), Consumer Goods industry dummy has a positive effect on value of underinvesting companies, suggesting that this industry is value-enhancing for firm with high growth and low cash flows.

The effect of leverage on value is negative and significant among non-overinvestment companies (-0.8524) – see Table 7. It may be partially explained by strong negative influence on value of underinvestment companies (that are among non-overinvestors). However, we may observe the same effect in the subsample of non-underinvestment firms (Table 8). It goes in line with our findings that debt has overall negative influence on value (except for value of overinvestment companies, on which it has no influence).

**Table 7. Coefficient estimates from ordinary least squares regressions of firm value (Tobin's Q) and determinants among overinvestment and non-overinvestment Dutch listed firms.**

Independent variables	Overinvestment firms	Non-overinvestment firms
<b>lev</b>	<b>0.0104</b>	<b>-0.8524 ***</b>
<i>p</i>	0.8313	0.0000
<b>mb</b>	<b>0.4680 ***</b>	<b>0.4142 ***</b>
<i>p</i>	0.0000	0.0000
<b>logsize</b>	<b>-0.0047</b>	<b>-0.0333 *</b>
<i>p</i>	0.6375	0.0490
<b>ind</b>	<b>-0.0147</b>	<b>0.1391 ***</b>
<i>p</i>	0.4229	0.0000
<b>goods</b>	<b>-0.0211</b>	<b>0.1749 ***</b>
<i>p</i>	0.3989	0.0000
<b>tech</b>	<b>-0.0323</b>	<b>0.1109 *</b>
<i>p</i>	0.0957	0.0120
<b>cons</b>	<b>0.5518 ***</b>	<b>1.2159 ***</b>
<i>p</i>	0.0000	0.0000
Adj R-squared	0.8858	0.8419
Number of obs.	49	332

Results of ordinary least squares regression for testing hypothesis 1, equation 1. 381 observations are split into two groups: if both free cash flow is above the median and Tobin's Q is below the median, observation is assigned to overinvestment category; otherwise - to non-overinvestment. The dependent variable is **q** (Tobin's Q). Independent variables are: **lev** (financial leverage), **mb** (market-to-book ratio), **logsize** (size of the firm), **ind** (dummy for industrial sector), **goods** (dummy for consumer goods sector), **tech** (dummy for technological sector). Letter *p* represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

Size negatively influences value of non-overinvestment and non-underinvesting Dutch firms. Overall it corresponds to the results of De Jong (2002). The assumption that firm size decreases bankruptcy costs is thus not approved. Next, we may see a positive and significant

influence of all industry dummies on Tobin's Q (within both abovementioned subgroups, except for over- and underinvestors). These results are similar to that for full sample of 78 Dutch listed firms (381 observations) without categorizing companies to investment behavior (Appendices 3 and 4).

Next, we discuss two-stage least squares regression results (Table 9). In the first stage we estimate leverage with a set of instrumental variables that only determine leverage and control variables that also determine value. It allows to control for endogeneity, thus making results more reliable. In the first stage equation we estimate leverage, and in the second – we test value equation with fitted leverage. We do not report and omit discussion of the first stage equations, as they are not relevant for the hypotheses 1 and 2. As in OLS, there is no support for hypothesis 1, due to insignificant effect of leverage on value of overinvesting firms. Also, as in OLS estimation, there is a positive significant influence of growth opportunities (M/B ratio), while other variables did not affect Tobin's Q of overinvestors.

**Table 8. Coefficient estimates from ordinary least squares regressions of firm value (Tobin's Q) and determinants among underinvestment and non-underinvestment Dutch listed firms.**

Independent variables	Underinvestment firms	Non-underinvestment firms
<b>lev</b>	<b>-1.7225 ***</b>	<b>-0.5761 ***</b>
<i>p</i>	0.0000	0.0000
<b>mb</b>	<b>0.3872 ***</b>	<b>0.4189 ***</b>
<i>p</i>	0.0000	0.0000
<b>logsize</b>	<b>-0.0396</b>	<b>-0.0384 *</b>
<i>p</i>	0.1797	0.0320
<b>ind</b>	<b>0.0920</b>	<b>0.1225 ***</b>
<i>p</i>	0.2398	0.0010
<b>goods</b>	<b>0.3348 **</b>	<b>0.1355 **</b>
<i>p</i>	0.0026	0.0040
<b>tech</b>	<b>0.1357</b>	<b>0.0898 *</b>
<i>p</i>	0.0883	0.0370
<b>cons</b>	<b>1.8107 ***</b>	<b>1.1084 ***</b>
<i>p</i>	0.0000	0.0000
Adj R-squared	0.8735	0.8377
Number of obs.	49	332

Results of ordinary least squares regression for testing hypothesis 2, equation 1. 381 observations are split into two groups: if both free cash flow is below the median and Tobin's Q is above the median, observation is assigned to underinvestment category; otherwise - to non-underinvestment. The dependent variable is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), ind (dummy for industrial sector), goods (dummy for consumer goods sector), tech (dummy for technological sector). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

Results of 2SLS for underinvestment companies (Table 10) showed basically the same evidence as that of OLS (Table 8). Only the coefficient of leverage became more negative (-

2.2150) at 0.01 level. It presumes that with an increase of financial leverage on 1 unit (Euro), Tobin's Q will decrease on 2.2150 units. Again, there is a positive and significant influence of M/B ratio (0.3921) and Consumer Goods industry dummy (0.3277) with the rest of independent variables having no significant effect on value of underinvestors. As for groups of non-overinvesting and non-underinvesting companies, results are nearly the same as from OLS regression. Only the influence of Industrials sector dummy on value of non-overinvestors vanished.

**Table 9. Coefficient estimates from the second stage of two stage least squares regressions of firm value (Tobin's Q) and determinants among overinvestment and non-overinvestment Dutch listed firms.**

Independent variables	Overinvestment firms	Non-overinvestment firms
<b>lev</b>	<b>-0.0045</b>	<b>-0.8293 ***</b>
<i>p</i>	0.9342	0.0000
<b>mb</b>	<b>0.4706 ***</b>	<b>0.4139 ***</b>
<i>p</i>	0.0000	0.0000
<b>logsize</b>	<b>-0.0033</b>	<b>-0.0347 *</b>
<i>p</i>	0.7305	0.0510
<b>ind</b>	<b>-0.0133</b>	<b>0.1386</b>
<i>p</i>	0.4402	0.0000
<b>goods</b>	<b>-0.0208</b>	<b>0.1751 ***</b>
<i>p</i>	0.3634	0.0000
<b>tech</b>	<b>-0.0317</b>	<b>0.1106 **</b>
<i>p</i>	0.0713	0.0110
<b>cons</b>	<b>0.5434 ***</b>	<b>1.2167 ***</b>
<i>p</i>	0.0000	0.0000
R-squared	0.8447	0.8999
Number of obs.	49	322

Results of the second stage of two stage least squares regression for testing hypothesis 1, equation 3. Results of the first stage (equation 2) are not reported. 381 observations are split into two groups: if both free cash flow is above the median and Tobin's Q is below the median, observation is assigned to overinvestment category; otherwise - to non-overinvestment. The dependent variable is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), ind (dummy for industrial sector), goods (dummy for consumer goods sector), tech (dummy for technological sector). \* Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

Let us next test hypotheses 3 to 6 which predict decreasing of disciplinary effect of financial leverage on value of overinvesting firms, if corporate governance mechanisms assure value-maximization (therefore decreasing the need in leverage as disciplinary device). First, we estimate OLS in the subsample of 38 firm-year observations that are overinvestors and that have insider ownership as corporate governance mechanism. Next, we estimate 2SLS to see if the change in the effect of leverage on value was caused by insider ownership. Following, we do the same for hypotheses 4, 5 and 6. Only this time we use ownership concentration, financial shareholdings and size of the board as corporate governance mechanisms.

Subsamples of overinvesting firms with these governance mechanisms consist of 39, 33 and 49 observations respectively.

**Table 10. Coefficient estimates from the second stage of two stage least squares regressions of firm value (Tobin's Q) and determinants among underinvestment and non-underinvestment Dutch listed firms.**

Independent variables	Underinvestment firms	Non-underinvestment firms
<b>lev</b>	<b>-2.2150 ***</b>	<b>-0.3955 **</b>
<i>p</i>	0.0000	0.0020
<b>mb</b>	<b>0.3921 ***</b>	<b>0.4169 ***</b>
<i>p</i>	0.0000	0.0000
<b>logsize</b>	<b>-0.0292</b>	<b>-0.0534 **</b>
<i>p</i>	0.3161	0.0060
<b>ind</b>	<b>0.0891</b>	<b>0.1131 **</b>
<i>p</i>	0.2411	0.0020
<b>goods</b>	<b>0.3277 **</b>	<b>0.1318 **</b>
<i>p</i>	0.0015	0.0050
<b>tech</b>	<b>0.1477</b>	<b>0.0856 *</b>
<i>p</i>	0.0547	0.0460
<b>cons</b>	<b>1.9837 ***</b>	<b>1.1520 ***</b>
<i>p</i>	0.0000	0.0000
R-squared	0.8746	0.8387
Number of obs.	49	322

Results of the second stage of two stage least squares regression for testing hypothesis 2, equation 3. Results of the first stage (equation 2) are not reported. 381 observations are split into two groups: if both free cash flow is below the median and Tobin's Q is above the median, observation is assigned to underinvestment category; otherwise - to non-underinvestment. The dependent variable is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), ind (dummy for industrial sector), goods (dummy for consumer goods sector), tech (dummy for technological sector). \* Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

From the OLS regression (Table 11) we may see that leverage has no influence on value of overinvestment firms that have insider ownership as corporate governance mechanism. Neither insider ownership significantly influences value. Results of 2SLS are similar. Moreover, we may see in the first stage equation (Table 12) that insider ownership does not have influence on leverage. Thus, we find no evidence for the hypothesis 3, and we cannot conclude whether leverage has no disciplinary effect because of value-enhancing effect insider ownership.

Results of the OLS regression (Table 13) suggest that leverage has no influence on value of overinvestment firms that have ownership by significant blockholders as corporate governance device. Also ownership concentration (on hands of five or one largest blockholders) does not affect value of overinvesting companies, which is the same in 2SLS model (Table 14). Corporate governance variable does not have any significant influence on

leverage. Thus, we find no support for the hypothesis 4. It means that we cannot conclude whether disciplinary function of debt is not relevant due to involvement of value-maximizing ownership by blockholders.

**Table 11. Coefficient estimates from the ordinary least squares regressions of firm value (Tobin's Q) and determinants among overinvestment Dutch listed firms that have insider ownership as corporate governance mechanism.**

Independent variables	Coefficients
<b>lev</b>	<b>-0.0096</b>
<i>p</i>	0.8640
<b>mb</b>	<b>0.4571 ***</b>
<i>p</i>	0.0000
<b>logsize</b>	<b>0.0026</b>
<i>p</i>	0.7950
<b>inown</b>	<b>-0.0462</b>
<i>p</i>	0.3220
<b>cons</b>	<b>0.4969 ***</b>
<i>p</i>	0.0000
Adj R-squared	0.8520
Number of obs.	38

Ordinary least squares regression for testing hypothesis 3, equation 4. Subsample includes only overinvestment observations that have insider ownership as corporate governance device. The dependent variable is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), inown (insider ownership). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

In Table 15 we have OLS results for overinvesting companies with ownership by financial institutions as corporate governance variable. Leverage has no effect on value of these firms. Neither does the ownership by financials. 2SLS model (Table 16) allows to see whether ownership by financials affects leverage, but the coefficient is not significant. Eventually, we have no support for hypothesis 5. It means that we are not able to state that leverage has no disciplinary effect on value of overinvesting Dutch companies due to the ownership of financial institutions.

Finally, in Table 17 we observe the mediatory role of the board size on the leverage-value relationship among overinvesting Dutch listed companies. Leverage has no effect on value as well as the size of the board. And size of the board has no influence on leverage (Table 18). Results suggest that we found no support for hypothesis 6 and we cannot conclude whether leverage loses its disciplinary effect due to involvement of such value-maximizing governance characteristic as size of the board.



**Table 12. Coefficient estimates from two stage least squares regression of firm value (Tobin's Q) and determinants among overinvestment Dutch listed firms that have insider ownership as corporate governance mechanism.**

Independent variables	First stage equation	Independent variables	Second stage equation
<b>mb</b>	<b>0.1690</b> *	<b>lev</b>	<b>-0.0263</b>
<i>p</i>	0.0220	<i>p</i>	0.6760
<b>logsize</b>	<b>0.0658</b> **	<b>mb</b>	<b>0.4619</b> ***
<i>p</i>	0.0020	<i>p</i>	0.0000
<b>inown</b>	<b>0.0880</b>	<b>logsize</b>	<b>0.0039</b>
<i>p</i>	0.3320	<i>p</i>	0.6860
<b>liq</b>	<b>-0.0721</b> ***	<b>inown</b>	<b>-0.0435</b>
<i>p</i>	0.0000	<i>p</i>	0.3150
<b>prof</b>	<b>-1.2953</b>	<b>cons</b>	<b>0.4877</b> ***
<i>p</i>	0.1620	<i>p</i>	0.0000
<b>tang</b>	<b>-0.1445</b>		
<i>p</i>	0.1270		
<b>fcf</b>	<b>1.3810</b>		
<i>p</i>	0.1670		
<b>tax</b>	<b>0.2351</b> *		
<i>p</i>	0.0110		
<b>cons</b>	<b>-0.1201</b>		
<i>p</i>	0.5630		
R-squared	0.7432	R-squared	0.8676
Number of obs.	38	Number of obs.	38

First and second stage of two stage least squares regression for testing hypothesis 3, equations 5 and 6. Subsample includes only overinvestment observations that have insider ownership as corporate governance device. Dependent variable in the first stage is lev (financial leverage). Instrumental variables are: liq (liquidity), prof (profitability), tang (tangibility), fcf (free cash flow), tax (tax rate). Control variables are logsize (size of the firm) and inown (insider ownership). The dependent variable in the second stage is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), inown (insider ownership). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

**Table 13. Coefficient estimates from the ordinary least squares regressions of firm value (Tobin's Q) and determinants among overinvestment Dutch listed firms that have ownership concentration as corporate governance mechanism.**

Independent variables	Coefficients
<b>lev</b>	<b>0.0538</b>
<i>p</i>	0.4160
<b>mb</b>	<b>0.4588</b> ***
<i>p</i>	0.0000
<b>logsize</b>	<b>-0.0069</b>
<i>p</i>	0.6440
<b>own5</b>	<b>-0.0998</b>
<i>p</i>	0.1800
<b>own1</b>	<b>0.0710</b>
<i>p</i>	0.2830
<b>cons</b>	<b>0.5678</b> ***
<i>p</i>	0.0000
R-squared	0.8918
Number of obs.	39

Ordinary least squares regression for testing hypothesis 4, equation 4. Subsample includes only overinvestment observations that have ownership concentration as corporate governance device. The dependent variable is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), own5 and own1 (ownership concentration proxies). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

**Table 14. Coefficient estimates from two stage least squares regression of firm value (Tobin's Q) and determinants among overinvestment Dutch listed firms that have ownership concentration as corporate governance mechanism.**

Independent variables	First stage equation	Independent variables	Second stage equation
<b>mb</b>	<b>0.0569</b>	<b>lev</b>	<b>-0.0096</b>
<i>p</i>	0.3520	<i>p</i>	0.9020
<b>logsize</b>	<b>0.0921</b> **	<b>mb</b>	<b>0.4666</b> ***
<i>p</i>	0.0010	<i>p</i>	0.0000
<b>own5</b>	<b>-0.0172</b>	<b>logsize</b>	<b>0.0009</b>
<i>p</i>	0.9040	<i>p</i>	0.9510
<b>own1</b>	<b>0.0078</b>	<b>own5</b>	<b>-0.0997</b>
<i>p</i>	0.9530	<i>p</i>	0.1430
<b>liq</b>	<b>-0.1095</b> ***	<b>own1</b>	<b>0.0729</b>
<i>p</i>	0.0000	<i>p</i>	0.2300
<b>prof</b>	<b>-4.2112</b> *	<b>cons</b>	<b>0.5224</b> ***
<i>p</i>	0.0130	<i>p</i>	0.0000
<b>tang</b>	<b>-0.2571</b> *		
<i>p</i>	0.0120		
<b>fcf</b>	<b>4.5823</b> *		
<i>p</i>	0.0320		
<b>tax</b>	<b>0.5744</b> **		
<i>p</i>	0.0030		
<b>cons</b>	<b>-0.1148</b>		
<i>p</i>	0.6420		
R-squared	0.7008	R-squared	0.9033
Number of obs.	39	Number of obs.	39

First and second stage of two stage least squares regression for testing hypothesis 4, equations 5 and 6. Subsample includes only overinvestment observations that have ownership concentration as corporate governance device. Dependent variable in the first stage is lev (financial leverage). Instrumental variables are: liq (liquidity), prof (profitability), tang (tangibility), fcf (free cash flow), tax (tax rate). Control variables are logsize (size of the firm) and own5 and own1 (ownership concentration proxies). The dependent variable in the second stage is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), own5 and own1 (ownership concentration proxies). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

**Table 15. Coefficient estimates from the ordinary least squares regressions of firm value (Tobin's Q) and determinants among overinvestment Dutch listed firms that have ownership by financial institutions as corporate governance mechanism.**

Independent variables	Coefficients
<b>lev</b>	<b>0.1516</b>
<i>p</i>	0.6260
<b>mb</b>	<b>0.4259 ***</b>
<i>p</i>	0.0000
<b>logsize</b>	<b>-0.0102</b>
<i>p</i>	0.4430
<b>fin</b>	<b>0.0191</b>
<i>p</i>	0.5740
<b>cons</b>	<b>0.5468 ***</b>
<i>p</i>	0.0000
R-squared	0.8947
Number of obs.	33

Ordinary least squares regression for testing hypothesis 5, equation 4. Subsample includes only overinvestment observations that have ownership by financial institutions as corporate governance device. The dependent variable is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), fin (ownership by financials). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

**Table 16. Coefficient estimates from two stage least squares regression of firm value (Tobin's Q) and determinants among overinvestment Dutch listed firms that have ownership by financial institutions as corporate governance mechanism.**

Independent variables	First stage equation	Independent variables	Second stage equation
<b>mb</b>	<b>-0.0163</b>	<b>lev</b>	<b>0.1478</b>
<i>p</i>	0.7900	<i>p</i>	0.6440
<b>logsize</b>	<b>0.1066 ***</b>	<b>mb</b>	<b>0.4263 ***</b>
<i>p</i>	0.0000	<i>p</i>	0.0000
<b>fin</b>	<b>0.0531</b>	<b>logsize</b>	<b>-0.0097</b>
<i>p</i>	0.4450	<i>p</i>	0.4570
<b>liq</b>	<b>-0.1412 ***</b>	<b>fin</b>	<b>0.0191</b>
<i>p</i>	0.0000	<i>p</i>	0.5350
<b>prof</b>	<b>-6.1500 **</b>	<b>cons</b>	<b>0.5442 ***</b>
<i>p</i>	0.0090	<i>p</i>	0.0000
<b>tang</b>	<b>-0.4106 **</b>		
<i>p</i>	0.0010		
<b>fcf</b>	<b>8.3123 **</b>		
<i>p</i>	0.0050		
<b>tax</b>	<b>1.1638 **</b>		
<i>p</i>	0.0010		
<b>cons</b>	<b>-0.2884</b>		
<i>p</i>	0.1840		
R-squared	0.7397	R-squared	0.9078
Number of obs.	33	Number of obs.	33

First and second stage of two stage least squares regression for testing hypothesis 5, equations 5 and 6. Subsample includes only overinvestment observations that have ownership by financial institutions as corporate governance device. Dependent variable in the first stage is lev (financial leverage). Instrumental variables are: liq (liquidity), prof (profitability), tang (tangibility), fcf (free cash flow), tax (tax rate). Control variables are logsize (size of the firm) and fin (ownership by financials). The dependent variable in the second stage is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), fin (ownership by financials). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

**Table 17. Coefficient estimates from the ordinary least squares regressions of firm value (Tobin's Q) and determinants among overinvestment Dutch listed firms that have two-tiered board as corporate governance mechanism.**

Independent variables	Coefficients
<b>lev</b>	<b>-0.0001</b>
<i>p</i>	0.9980
<b>mb</b>	<b>0.4694 ***</b>
<i>p</i>	0.0000
<b>logsize</b>	<b>0.0096</b>
<i>p</i>	0.4960
<b>sboard</b>	<b>-0.0034</b>
<i>p</i>	0.4530
<b>cons</b>	<b>0.4406 ***</b>
<i>p</i>	0.0000
R-squared	0.8846
Number of obs.	49

Ordinary least squares regression for testing hypothesis 6, equation 4. Subsample includes only overinvestment observations that have two-tiered board as corporate governance device. The dependent variable is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), sboard (size of the board). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

**Table 18. Coefficient estimates from two stage least squares regression of firm value (Tobin's Q) and determinants among overinvestment Dutch listed firms that have two-tiered board as corporate governance mechanism.**

Independent variables	First stage equation	Independent variables	Second stage equation
<b>mb</b>	<b>0.0951</b>	<b>lev</b>	<b>-0.0331</b>
<i>p</i>	0.0970	<i>p</i>	0.5620
<b>logsize</b>	<b>0.0674 *</b>	<b>mb</b>	<b>0.4747 ***</b>
<i>p</i>	0.0250	<i>p</i>	0.0000
<b>sboard</b>	<b>0.0017</b>	<b>logsize</b>	<b>0.0134</b>
<i>p</i>	0.8600	<i>p</i>	0.3370
<b>liq</b>	<b>-0.0785 ***</b>	<b>sboard</b>	<b>-0.0038</b>
<i>p</i>	0.0000	<i>p</i>	0.3720
<b>prof</b>	<b>-1.2377</b>	<b>cons</b>	<b>0.4209 ***</b>
<i>p</i>	0.1880	<i>p</i>	0.0000
<b>tang</b>	<b>-0.1728</b>		
<i>p</i>	0.0600		
<b>fcf</b>	<b>1.3157</b>		
<i>p</i>	0.1950		

<b>tax</b>	<b>0.2429</b>	<b>**</b>		
<i>p</i>	0.0090			
<b>cons</b>	<b>-0.0252</b>			
<i>p</i>	0.9120			
R-squared	0.6813		R-squared	0.8930
Number of obs.	49		Number of obs.	49

First and second stage of two stage least squares regression for testing hypothesis 6, equations 5 and 6. Subsample includes only overinvestment observations that have two-tiered board as corporate governance device. Dependent variable in the first stage is lev (financial leverage). Instrumental variables are: liq (liquidity), prof (profitability), tang (tangibility), fcf (free cash flow), tax (tax rate). Control variables are logsize (size of the firm) and sboard (size of the board). The dependent variable in the second stage is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), sboard (size of the board). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

Finally, we review the second sample consisting of 166 observations: companies having at the same time data on four corporate governance elements and also determinants of leverage and value. First, we run OLS regressions: before and after inclusion of corporate governance variables (to see if inclusion of the set of governance variables brings a difference in the relationship between debt and Tobin's Q). From the Table 19 we see that leverage influences value negatively in both models. Before taking into account corporate governance, the coefficient of leverage is -0.8388 significant at 0.001, while afterwards it changed to -0.8012 (with the same significance), so became less negative. Although we cannot conclude from these results whether the change was substantial or not. The effect of ownership concentration on hands of one shareholder is negative (-0.6574 at 0.05 level) presumably due to the assumption that dense concentration induces the expropriation effect, which destroys the value of the company. These findings are contrary to that of De Jong (2002), where author discovered positive and significant influence. At the same time, concentration on hands of five blockholders influences value positively (0.5233 at 0.05 level), suggesting that presence of more significant shareholders assures better control that influences Tobin's Q positively. However, even with the presence of value-enhancing concentration on hands of 5 largest blockholders, the effect of leverage on value did not decrease. The effect on value of other corporate governance variable is not statistically significant. Eventually, we have not found the support for hypothesis 7 in ordinary least squares model.

Next we review the results of two stage least squares regression on the second sample in order to test hypothesis 7 (Table 20). First of all, these results show that as before as after the inclusion of corporate governance variables, leverage had no significant impact on value. Thus, our findings from 2SLS do not allow to conclude whether corporate governance variables have an effect on the key relationship. It means that the support was not found for the hypotheses 7. These findings are true for 169 observations that have simultaneously four

corporate governance characteristics next to determinants of leverage and value. However, we cannot generalize these results to all 78 Dutch companies (381 observations).

**Table 19. Coefficient estimates from ordinary least squares regressions of firm value (Tobin's Q) and determinants among Dutch listed firms prior to and after controlling for corporate governance.**

Independent variables	Before inclusion of corporate governance variables	Independent variables	Aftrer inclusion of corporate governance variables
<b>lev</b>	<b>-0.8388 ***</b>	<b>lev</b>	<b>-0.8012 ***</b>
<i>p</i>	0.0000	<i>p</i>	0.0000
<b>mb</b>	<b>0.3934 ***</b>	<b>mb</b>	<b>0.3951 ***</b>
<i>p</i>	0.0000	<i>p</i>	0.0000
<b>logsize</b>	<b>-0.0368</b>	<b>logsize</b>	<b>-0.0138</b>
<i>p</i>	0.2318	<i>p</i>	0.7868
<b>cons</b>	<b>1.2878 ***</b>	<b>inown</b>	<b>-0.0216</b>
<i>p</i>	0.0000	<i>p</i>	0.9378
		<b>own5</b>	<b>0.5233 *</b>
		<i>p</i>	0.0179
		<b>own1</b>	<b>-0.6574 *</b>
		<i>p</i>	0.0176
		<b>fin</b>	<b>0.0969</b>
		<i>p</i>	0.5100
		<b>sboard</b>	<b>-0.0046</b>
		<i>p</i>	0.7756
		<b>cons</b>	<b>1.0010 *</b>
		<i>p</i>	0.0123
Adj R-squared	0.7987	Adj R-squared	0.8093
Number of obs	166	Number of obs	166

Results of ordinary least squares regression for testing hypothesis 7, equations 7 and. Sample consists of 166 observations that have, besides determinants of leverage and value, four corporate governance characteristics simultaneously. The dependent variable is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), inown (insider ownership), own5 (ownership by 5 largest blockholders), own1 (ownership by 1 largest blockholder), fin (shareholdings by financial institutions), sboard (size of the board). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

As for the other variables, findings are similar to that in OLS: own5 variable is related to value positively, whereas own1 concentration proxy has a negative effect. There is no statistically significant effect from board size, shareholdings by financial companies and insider ownership. Results of the first stage regressions could have been of importance if in the second stage we have had observed a statistically significant influence of leverage on value. But even before controlling for corporate governance, leverage did not impact Tobin's Q. Thus, we do not see neither the substitution nor the complementary role of corporate governance mechanisms on the relationship between leverage and value. Consequently, there is no use in explaining the factors that influenced leverage, as leverage by itself do not explain value of companies that have four governance characteristics simultaneously.

**Table 20. Coefficient estimates from two stage least squares regressions of firm value (Tobin's Q) and determinants among Dutch listed firms prior to and after controlling for corporate governance.**

Before inclusion of corporate governance variables				After inclusion of corporate governance variables			
Independent variables	First stage equation	Independent variables	Second stage equation	Independent variables	First stage equation	Independent variables	Second stage equation
<b>mb</b>	<b>0.0203</b> ***	<b>lev</b>	<b>-0.3749</b>	<b>mb</b>	<b>0.0168</b> **	<b>lev</b>	<b>-0.4055</b>
<i>p</i>	0.0010	<i>p</i>	0.1110	<i>p</i>	0.0050	<i>p</i>	0.0848
<b>logsize</b>	<b>0.0741</b> ***	<b>mb</b>	<b>0.3827</b> ***	<b>logsize</b>	<b>0.0488</b> *	<b>mb</b>	<b>0.3886</b> ***
<i>p</i>	0.0000	<i>p</i>	0.0000	<i>p</i>	0.0250	<i>p</i>	0.0000
<b>liq</b>	<b>-0.1228</b> ***	<b>logsize</b>	<b>-0.0660</b> *	<b>inown</b>	<b>-0.0449</b>	<b>logsize</b>	<b>-0.0187</b>
<i>p</i>	0.0000	<i>p</i>	0.0416	<i>p</i>	0.6270	<i>p</i>	0.7076
<b>prof</b>	<b>-0.9466</b> *	<b>_cons</b>	<b>1.2994</b> ***	<b>own5</b>	<b>-0.1519</b> *	<b>inown</b>	<b>0.1009</b>
<i>p</i>	0.0240	<i>p</i>	0.0000	<i>p</i>	0.0500	<i>p</i>	0.7141
<b>tang</b>	<b>-0.4176</b> ***			<b>own1</b>	<b>0.1804</b>	<b>own5</b>	<b>0.5377</b> *
<i>p</i>	0.0000			<i>p</i>	0.0700	<i>p</i>	0.0121
<b>fcf</b>	<b>0.7828</b>			<b>fin</b>	<b>-0.0919</b>	<b>own1</b>	<b>-0.6706</b> *
<i>p</i>	0.0680			<i>p</i>	0.0650	<i>p</i>	0.0124
<b>tax</b>	<b>0.0029</b>			<b>sboard</b>	<b>0.0039</b>	<b>fin</b>	<b>0.1531</b>
<i>p</i>	0.8600			<i>p</i>	0.5030	<i>p</i>	0.2930
<b>cons</b>	<b>0.3063</b> **			<b>liq</b>	<b>-0.1300</b> ***	<b>sboard</b>	<b>-0.0091</b>
<i>p</i>	0.0030			<i>p</i>	0.0000	<i>p</i>	0.5653
				<b>prof</b>	<b>-0.9583</b> **	<b>_cons</b>	<b>0.8400</b> *
				<i>p</i>	0.0180	<i>p</i>	0.0323
				<b>tang</b>	<b>-0.4313</b> ***		
				<i>p</i>	0.0000		
				<b>fcf</b>	<b>0.8632</b> **		
				<i>p</i>	0.0380		
				<b>tax</b>	<b>0.0035</b>		
				<i>p</i>	0.8230		
				<b>cons</b>	<b>0.5725</b> ***		
				<i>p</i>	0.0000		
R-squared	0.6894			R-squared	0.7204		
Adj R-squared	0.6694	R-squared	0.7968	Adj R-squared	0.6924	R-squared	0.816
Number of obs.	166	Number of obs.	166	Number of obs.	166	Number of obs.	166

First and second stage of two stage least squares regression for testing hypothesis 7, equations 8 and 9. Sample consists of 166 observations that have, besides determinants of leverage and value, four corporate governance characteristics simultaneously. For the first-stage equation the dependent variable is lev (financial leverage). Instrumental variables are liq (liquidity), prof (profitability), tang (tangibility), fcf (freecash flow) and tax (tax rate). Control variables are: mb (market-to-book ratio), logsize (size of the firm), inown (insider ownership), own5 (ownership by 5 largest blockholders), own1 (ownership by 1 largest blockholder), fin (shareholdings by financial institutions), sboard (size of the board). The dependent variable in the second equation is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), inown (insider ownership), own5 (ownership by 5 largest blockholders), own1 (ownership by 1 largest blockholder), fin (shareholdings by financial institutions), sboard (size of the board). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

After the estimation of all the abovementioned models, we performed different robustness tests of our results. First, we tested all the equations using different measures of leverage: among them we have short-term leverage, long-term leverage and market leverage, the alternatives which were discussed earlier in this thesis. All the rest robustness test models with different leverage proxies are not presented, thus here we discuss only the most important points. After testing all the abovementioned models with three different proxies of financial leverage, there was no support found on any of the predictions hypothesized in the current thesis. None of the leverage proxies showed significant impact on Tobin's Q among the estimated regression equations.

Second, we used one extra type of regression model: fixed effects model, that allows to control for unobserved heterogeneity, and which eliminates all time-invariant factors (which means that industry variables will be eliminated). We performed all the equations using fixed-effects estimator. Both OLS and 2SLS regression with fixed effects estimators suggested the similar results as were evidenced by previous regression models. Briefly: no significant relation between debt and value of overinvestment firms, and statistically significant negative influence of debt on the value of underinvestment companies. There was negative and significant influence of leverage on value of companies that have four corporate governance characteristics simultaneously, as estimated by OLS before and after inclusion of these characteristics. Using 2SLS with fixed-effects estimator we found insignificance of leverage as a determinant of value as before as after controlling for corporate governance. Coefficients in fixed-effects models were nearly identical to that estimated earlier (in Tables 7 to 20) with the same direction of relationship at the same levels of significance (where appropriate).

There is one important remark to make: the explanatory power of models is very high: adjusted R squared is very high (from 0.6 to 0.9), whereas in most of the prior studies R squared did not exceed 0.3 (e.g. De Jong, 2002, Frijns et al, 2008; Aggarwal, Kyaw and Zhao, 2011 and others). This effect was brought by M/B ratio: it was positively and significantly related to Tobin's Q in every model (within any tested sample and subsample). Also as we see in the correlation matrices (Tables 5 and 6), this variable was correlated significantly with all the rest ones. And in fact, the significance of other variables in the regression model was also brought by M/B ratio. We tried including variables stepwise and also tried excluding M/B ratio from regressions. Results are not reported, but the evidence is remarkable: with the exclusion of M/B ratio from regression models, significance of absolutely all other variables vanishes, and the explanatory power of model declines drastically: R-squared falls to level of 0.15 – 0.25. Perhaps, the reason lies in the measure of M/B ratio, which is close to that of Tobin's Q. But despite similarity of measurement and high positive correlation between these two variables (see Tables 5 and 6), there was no collinearity or multicollinearity caused by these two variables (as said before in this chapter, VIF or tolerance scores were below the threshold). Besides, in many studies researchers included M/B ratio as measure of growth opportunities in their models, but such effect was not evidenced.



## 5.4. Summary

First of all, we found that overinvestment is a value-destroying problem that is relevant for Dutch companies listed on AEX. Hypothesis 1 predicts a positive influence on leverage on value of overinvestment companies due to its disciplining effect. Based on the results of the OLS and 2SLS regressions that have been analyzed, we found no support for disciplining role of leverage in overinvesting firms, because coefficient was not statistically significant. It is in line with the results of De Jong (2002) and Broenen et al., (2006) who concluded that financial leverage does not play a disciplining role in Dutch listed companies.

Hypothesis 2 predicts a negative influence of debt on value of underinvesting companies. It makes this category of firms losing growth opportunities (and therefore decreasing value) due to paying out cash to creditors. Previous studies mostly categorized underinvestment companies as having high level of growth options (e.g. McConnell and Servaes, 1995; Aggarwal and Zhao, 2007), whereas researchers omitted the second important condition – low levels of cash flow. The second condition was considered by De Jong (2002). Author however, reviewed only overinvesting companies, because he discovered that underinvestment is not a relevant problem for Dutch listed companies (also in De Jong and Van Dijk, 2007). Although we have found a support for hypothesis 2, we cannot conclude if underinvestment is relevant for the firms that we examined. Besides, there are basically no other studies with which we could compare our results for Dutch underinvesting firms, complying to both conditions of investment behavior.

Next, in hypotheses 3 to 6 we predicted that disciplining effect of leverage on value of overinvesting companies will be decreased due to the involvement of corporate governance mechanisms. Among such mechanisms we tested insider ownership, concentration of ownership by one and five largest blockholders, ownership by financial institutions and size of the board. We tested the mediatory role of each governance mechanism separately and from results of OLS and 2SLS models we found no influence of leverage or any governance mechanism on value of overinvesting companies. Besides, none of the governance variables influenced leverage significantly. Based on our results, we may not conclude that disciplinary role of debt is decreased by any of tested corporate governance characteristics.

In hypotheses 7 we reviewed the simultaneous influence of four corporate governance devices on the leverage-value relationship. We tested our regression models on the sample of 166 firm-year observations that had all the governance variables at the same time, next to determinants of leverage and value. In comparison with hypotheses 3 to 6, this time we did

not consider disciplinary effect of leverage on overinvestors, hence sample was not split by investing behavior. OLS regression showed that as before as after controlling for corporate governance, leverage had a negative influence on value. Albeit the influence has not substantially changed after the inclusion of governance variables. Besides, only ownership concentration proxies influenced value: by 1 blockholder negatively and by 5 blockholders positively. However, results does not allow us to conclude whether effect of leverage on value was driven by these variables. 2SLS regression showed that leverage did not influence value significantly as before as after inclusion of governance variables. All in all, we cannot make conclusions about mediatory role of corporate governance in leverage-value relationship. At least, this role was not evidenced.

## **Chapter 6. Conclusion**

### **6.1. Discussion**

Modern corporate finance theory suggests that the relationship between leverage and value excites minds of researchers at least since 1958 - the year when Modigliani and Miller amazed the financial world with their contradictory assumption. The famous researchers stated that value of the company is not dependent on the financing source in the perfect capital market. Later, this assumption was adjusted and tax benefits of debt were considered, suggesting that a company financed entirely by debt will achieve the peak – its maximal value. However, perfect market is a theory and later these theorems were adjusted to the real world. Consecutive researchers formulated different theories which proposed multiple factors to be taken into account when one is looking for the solution of the leverage-value puzzle. For the moment, contemporary scholars suggest that not only tax-shield properties of debt may benefit the company, but also its ability to discipline investment behavior of managers. Besides, debt has a twofold impact that was not considered back in 1958: costs of financial distress which rise with borrowing. Finally, there is an element involved, which is presumed to have a direct impact on both leverage and value, and indirect influence on value through its effect on leverage. It is the corporate governance. All in all, when we speak about the relationship between leverage and value, we have a multitude of factors and relations to be reasoned with.

In this thesis we attempted to grasp all the complexity of leverage-value relationship into a theoretical framework and consequently - into an empirical model. We reviewed the effect of financial leverage (measured as total debt to total assets and by other proxies) on corporate value (measured as Tobin's Q). The effect was tested within 78 Dutch companies listed on Amsterdam Euronext Stock Exchange for the 5 year period over 2007-2011. Apart from abovementioned variables, we took into account other factors that are involved into the key relationship, namely: industry sectors, size of the company, growth opportunities and investment behavior. To make the model even closer to the real world, we controlled factors that have influence on capital structure. We used several empirical models, that are similar to those applied in the prior research. Specifically, these are ordinary least squares regression, two stage least squares regression, and fixed-effects model. Data on companies was collected from Reach database and annual reports of the companies, hence its reliability is assured.

Based on the analysis of the data, it can be concluded that leverage has overall a negative influence on value of Dutch firms, listed on AEX for 2007-2011. Overinvestment is a relevant

problem for companies, because it destroys the value. However, financial leverage is not used as a disciplinary device to alleviate this problem. The latter was determined regardless of the empirical approach: in ordinary least squares regression, two stage least squares regressions and fixed-effects model. Debt has a negative effect on underinvestment companies – those with low cash and high growth opportunities. Nevertheless, we found that underinvestment problem did not influence value of Dutch listed firms, suggesting that for Dutch firms listed on AEX this problem is not actual. These findings correspond to existing evidence from the Netherlands, obtained in recent years.

We tried to investigate whether the absence of debt's disciplinary role was driven by involvement of corporate governance mechanisms which may have assured value-maximization thereby reducing the need in leverage as disciplinary device. No support was found within overinvesting companies. When effect of governance mechanisms was tested regardless of investment behavior, results also showed no support of mediatory role of corporate governance in leverage-value relationship. Financial leverage was measured according to prior studies: as a ratio of total debt to capital. Besides, different proxies were applied, albeit their relationship with Tobin's Q remained statistically insignificant.

## **6.2. Limitations and recommendations for future research**

**Limitations:** The choice of the theoretical framework, research method and determinants is partially limited by restricted amount of time and financial support. For instance, to cover more potential determinants of leverage-value relationship, author could have collected qualitative data. Author is convinced that by surveying the companies we could have obtained data on managerial behavior or decision-making, or other factors which (by judgment of managers) influence key relationship. Of course, richer data allows to get more complete picture. However, process of surveying requires substantial time. Approximately, one week for composition of survey, another week for sending questionnaires to offices or e-mail addresses of 78 Dutch companies that represent the sample. Data collection and analysis might have taken around one month, considering the time that respondents need to answer questions and send their replies back. Due to unknown response rate it wise to assume a probability of unwillingness to participate of some respondents, resulting in a narrowed sample. Eventually, to significantly save time of the research, a quantitative data (accounting indicators from Reach database and annual reports) was only used. Next to this, substantial body of annual reports (from which author collected data on ownership variables) was only present in Dutch language. Consequently, in many cases it was difficult to define whether a

company did not have data on insider ownership or ownership concentration by blockholders and financial institutions or the company did not have these governance mechanisms at all.

**Recommendations:** First of all, this study tests the relationship between financial leverage and value within Dutch companies that are listed on Amsterdam Euronext Stock Exchange only. Therefore, results could not be generalized on all the population of the Dutch listed companies. According to the data from Reach database and from international stock exchanges, there are more than 200 Dutch companies listed on different exchanges (against 78 that are reviewed in this thesis). Future researchers may take this fact into consideration, and substantially enhance the sample, imparting a better representation and economic significance to the results. Second, each company may have its own specific value-maximizing strategy that is not observed by examination of quantitative data, therefore making the estimations biased. Even leaving the population as it is (78 AEX companies), an individual approach might be applied to each company in order to enhance the base of information. As in the study of Broenen et al., (2006), future researchers may interview managers of the companies to get for instance more knowledge about firms' relationships with financial institutions, government and another parties.

Next, we reviewed companies over 2007-2011 – a five years period. For instance, a new Corporate Governance Code was established in 2004, so we were observing companies, already operating under this code for several years. What would we conclude about the mediating role of corporate governance in leverage-value relationship before the implementation of the code? Yet, in the study of La Porta et al., (1999), Dutch companies in the 1990s were to a great extent owned by families, government and industrial companies, while in the 2000s they became owned mostly by financial institutions. Does it all change the way how capital structure affects value? Anyway, a longer period of observation is desired to observe changes in capital structure and governance decisions, as well as other significant economic events (such as financial crisis of 2008) that directly or indirectly influence value of the company. Finally, we strived to represent the most complete picture of leverage-value relationship, but ended up with an unsolved puzzle. Perhaps, different elements should be included in the model to make it close to the real world. There is an age of the company, number of employees, more detailed examination of management board composition, working capital management and innumerable factors that may have completely different effect on leverage-value relationship. Perhaps, these factors are not yet considered by existing

theories but the evolution of corporate finance science may lead new researchers to shed light on leverage-value puzzle from completely different points.

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**Appendix 1. List of companies according to ICB sectorial distribution.**

<b>№</b>	<b>Company name:</b>	<b>Industry:</b>	<b>№</b>	<b>Company name:</b>	<b>Industry:</b>
1	Aalberts Industries	Industrials	40	KPN	Telecommunication
2	ACCEL Group	Consumer Goods	41	Lbi	Technological
3	AHOLD	Consumer Services	42	Macintosh	Industrials
4	AJAX FC	Consumer Services	43	MediQ	Health
5	Akzo Nobel	Basic Materials	44	Nedap	Industrials
6	AMG	Basic Materials	45	Nedsense	Technological
7	Amsterdam Commodities	Industrials	46	Neways	Industrials
8	AND INT	Technological	47	Nutreco	Consumer Goods
9	ARCADIS	Industrials	48	Oranjewoud	Industrials
10	ASM INT. N.V.	Technological	49	Ordina	Technological
11	ASML Holding	Technological	50	Pharming	Health
12	Ballast Nedam	Industrials	51	Philips	Industrials
13	BAM	Industrials	52	Porceleynne Fles	Consumer Goods
14	Batenburg	Industrials	53	Qurius	Technological
15	BE Semiconductor	Technological	54	Randstad	Technological
16	BETER BED	Consumer Goods	55	Reed Elsevier	Consumer Services
17	Boskalis	Industrials	56	RoodMicrotec	Technological
18	Brill	Consumer Services	57	Roto Smeets	Industrials
19	Brunel	Industrials	58	Royal Imtech	Industrials
20	Crown van Gelder	Industrials	59	SBM offshore	Oil and Gas
21	Cryo Save	Health	60	Simac Techniek	Technological
22	CSM	Consumer Goods	61	Sligro	Consumer Goods
23	CTAC	Technological	62	Stern	Industrials
24	Docdata	Industrials	63	Telegraaf	Consumer Services
25	DPA	Industrials	64	Ten Cate	Industrials
26	DSM	Basic Materials	65	Tie Holding	Technological
27	Exact	Technological	66	TKH Groep	Industrials
28	Fornix	Health	67	TomTom	Technological
29	Fugro	Oil and Gas	68	Unilever NV	Consumer products
30	Grontmij	Industrials	69	Unit4	Technological
31	Heijmans	Industrials	70	USG People	Industrials
32	Heineken	Consumer Goods	71	Vivenda Media	Technological
33	Hes	Industrials	72	Vopak	Oil and Gas
34	HITT	Technological	73	Wavin	Industrials
35	Holland Colours	Industrials	74	Wegener	Consumer Services
36	Hunter Douglas	Industrials	75	Wessanen	Consumer Goods
37	Hydratec Industries	Industrials	76	Witte Molen	Consumer Goods
38	ICT	Technological	77	Wolters Kluwer	Consumer Services
39	Kendrion	Industrials	78	Xeikon	Industrials

We assign dummy variables only for the next sectors: Industrials, Consumer Goods and Technological. The rest of the sectors: Oil and Gas, Health, Consumer Services, Telecommunication and Basic Materials are considered as miscellaneous (there was no expected impact on firm value).

## Appendix 2. Measuring of variables.

Variable	Definition	Proxy	Measure	References
Q	Value		Tobin's Q - ratio of total assets minus book value of equity plus market value of equity to book value of total assets	De Jong (2002); Dessi and Robertson, 2003; Zeitun and Tian, 2007; Aggarwal, Kyaw and Zhao, 2011; Saeedi and Mahmoodi, 2011
LEV	Leverage	LEV	The ratio of company's total debt to total assets	Harvey et al., 2004; Zeitun and Tian, 2007; Kayo and Kimura, 2010; Saeedi and Mahmoodi, 2011
		STLEV	The ratio of company's short-term debt to total assets	Harvey et al., 2004; Zeitun and Tian, 2007; Saeedi and Mahmoodi, 2011
		MLEV	The ratio of company's total debt to the sum of book value of total assets and market value of equity	De Jong (2002); Fama and French (2002);
		LTLEV	The ratio of company's long-term debt to total assets	Zeitun and Tian, 2007; Saeedi and Mahmoodi, 2011
MB			The ratio of market value of equity to book value of equity	Alonso et al., 2005; Barclay et al., 2006
SIZE	Size	ASSET	Natural logarithm of total assets	Zeitun and Tian, 2007; Aggarwal, Kyaw and Zhao, 2011
		SALES	Natural logarithm of total sales	Jensen, 1986; Dessi and Robertson, 2003; Zeitun and Tian, 2007
LIQ	Liquidity		The ratio of current assets to current liabilities	Rajan and Zingales, 1995; Deesomsak et al, 2004; Janbaz, 2010
PROF	Profitability		The ratio of earnings before interest and tax to total assets	Rajan and Zingales, 1995; Barclay et al., 2006; Kayo and Kimura, 2010; Aggarwal, Kyaw and Zhao, 2011
TANG	Tangibility		The ratio of total fixed assets to total assets	Deesomsak et. al., 2004; Harvey et al., 2004; Zeitun and Tian, 2007; Kayo and Kimura, 2010
IND	Industry dummy		Equals 1 if company belongs to a certain industry; equals 0 otherwise	Alonso et al., 2005; Zeitun and Tian, 2007; Ruan et al., 2011
INOWN	Insider ownership		Percentages of shares owned by insiders (managers and supervisory board members)	McConnell and Servaes (1995); Demsetz and Lehn, 1985; Demsetz and Villalonga, 2001; McConnell and Denis, 2003
OWN5	Ownership concentration		Fraction of shares owned by 5 largest blockholders	Demsetz and Lehn, 1985; Morck, Schleifer and Vishny, 1998; Demsetz and Villalonga, 2001; Davies et al., 2005; Frijns et al., 2008
OWN3	Ownership concentration		Fraction of shares owned by 3 largest blockholders	De Jong, 2002; Alonso et al., 2005
OWN1	Ownership concentration		Fraction of shares owned by 1 largest blockholder	De Jong, 2002; Alonso et al., 2005; Jung-Wha and Zhang, 2010
SBOARD	Board size		Number of board members (supervisory and executive)	De Jong, 2002; Arslan, Karan and Eksi, 2010; Ruan et al., 2011
FIN	Shareholdings by financial institutions		Fraction of shares owned by financial institutions	De Jong, 2002; Alonso et al., 2005; Coles et al., 2008; Ruiz-Mallorquí and Santana-Martín 2011
FCF	Free cash flow		The ratio of the difference between EBIT and taxes by total assets	De Jong, 2002
TAX	Taxes		The ratio of tax expense over EBT	Booth et al., 2001; De Jong et al., 2008

**Appendix 3. Coefficient estimates from ordinary least squares regressions of firm value (Tobin's Q) and determinants among Dutch listed firms.**

Independent variables	Coefficients
<b>lev</b>	<b>-0.7262 ***</b>
<i>p</i>	0.0000
<b>mb</b>	<b>0.4128 ***</b>
<i>p</i>	0.0000
<b>logsize</b>	<b>-0.0312 *</b>
<i>p</i>	0.0470
<b>ind</b>	<b>0.1172 ***</b>
<i>p</i>	0.0010
<b>goods</b>	<b>0.1557 ***</b>
<i>p</i>	0.0000
<b>tech</b>	<b>0.0847 *</b>
<i>p</i>	0.0310
<b>over</b>	<b>-0.0754 *</b>
<i>p</i>	0.0440
<b>under</b>	<b>-0.0056</b>
<i>p</i>	0.8830
<b>cons</b>	<b>1.1498 ***</b>
<i>p</i>	0.0000
Adj R-squared	0.8396
Number of obs.	381

Ordinary least squares regression for testing the assumptions about the effect of overinvestment and underinvestment problems on the value of Dutch listed companies (not hypothesized). Sample includes 381 firm-year observations without grouping by investment behavior. The dependent variable is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), ind (dummy for industrial sector), goods (dummy for consumer goods sector), tech (dummy for technological sector), over (dummy for overinvestment), under (dummy for underinvestment). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level

**Appendix 4. Coefficient estimates from two stage least squares regression of firm value (Tobin's Q) and determinants among overinvestment Dutch listed firms.**

Independent variables	First stage equation	Independent variables	Second stage equation
<b>mb</b>	<b>0.0158</b> **	<b>lev</b>	<b>-0.6028</b> ***
<i>p</i>	0.0020	<i>p</i>	0.0000
<b>logsize</b>	<b>0.0668</b> ***	<b>mb</b>	<b>0.4115</b> ***
<i>p</i>	0.0000	<i>p</i>	0.0000
<b>ind</b>	<b>-0.0172</b>	<b>logsize</b>	<b>-0.0397</b> *
<i>p</i>	0.2960	<i>p</i>	0.0180
<b>goods</b>	<b>-0.0287</b>	<b>ind</b>	<b>0.1133</b> **
<i>p</i>	0.1610	<i>p</i>	0.0010
<b>tech</b>	<b>-0.0358</b> *	<b>goods</b>	<b>0.1552</b> ***
<i>p</i>	0.0470	<i>p</i>	0.0000
<b>over</b>	<b>0.0198</b>	<b>tech</b>	<b>0.0831</b> *
<i>p</i>	0.2880	<i>p</i>	0.0320
<b>under</b>	<b>0.0051</b>	<b>over</b>	<b>-0.0665</b> *
<i>p</i>	0.7770	<i>p</i>	0.0390
<b>liq</b>	<b>-0.1296</b> ***	<b>under</b>	<b>-0.0086</b>
<i>p</i>	0.0000	<i>p</i>	0.8210
<b>prof</b>	<b>-0.8354</b> **	<b>cons</b>	<b>1.1606</b> ***
<i>p</i>	0.0070	<i>p</i>	0.0000
<b>tang</b>	<b>-0.4126</b> ***		
<i>p</i>	0.0000		
<b>fcf</b>	<b>0.6928</b> **		
<i>p</i>	0.0320		
<b>tax</b>	<b>0.0107</b>		
<i>p</i>	0.2910		
<b>cons</b>	<b>0.3672</b> ***		
<i>p</i>	0.0000		
Adj R-squared	0.5510	Adj R-squared	0.8421
Number of obs.	381	Number of obs.	381

Two stage least squares regression for testing the assumptions about the effect of overinvestment and underinvestment problems on the value of Dutch listed companies (not hypothesized). Sample includes 381 firm-year observations without grouping by investment behavior. The dependent (estimated) variable in the first stage is lev (financial leverage). Instrumental variables are: liq (liquidity), prof (profitability), tang (tangibility), fcf (free cash flow), tax (tax rate). Control variables are logsize (size of the firm), ind (dummy for industrials sector), goods (dummy for consumer goods sector), tech (dummy for technology sector). The dependent variable is q (Tobin's Q). Independent variables are: lev (financial leverage), mb (market-to-book ratio), logsize (size of the firm), ind (dummy for industrial sector), goods (dummy for consumer goods sector), tech (dummy for technological sector), over (dummy for overinvestment), under (dummy for underinvestment). Letter p represents significance where \* significant at 0.05 level, \*\* at 0.01 level, and \*\*\* at 0.001 level