Master Thesis Financial Management

MSc Business Administration

Master Thesis

'Comparing the differences in investment behaviour between public and private firms in The Netherlands'

Enschede

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Abstract

This thesis evaluates differences in investment behaviour between public and private firms in The Netherlands in the period 2004-2010. A sample matched on size of 150 public and 150 private firms form data source Bureau van Dijk is used. The results of this study indicate that public firms invest more but react less to investment opportunities in relation to private firms. The bank crisis has had a big impact on the investment levels of public and private firms. Both show a big downfall in investments. Public firms show an even bigger decline in investment levels and investment opportunities than private firms. This suggest that pubic firms are more disadvantaged by the bank crisis.

Acknowledgement

Almelo, July 2014

With this thesis I complete a 7,5 year period of studies. With Business Administration the most challenging and learning of all. Even though I have written this thesis individually, I would like to thank the people that played an important role for me to finish this thesis. Prof. Dr. Rezaul Kabir and Dr. Harry van der Kaap for their support, insights and very valuable advices given to me. My girlfriend Michelle, for the unconditional love, support and smiles she gives me every day. My in-laws, they offered me a warm home and a place to finish this thesis. My mother, for her love. And my friends for the good times and relaxation.

Now it is time for me to test how well my knowledge can be applied in practice.

Bas Alberink

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1.   Introduction

Will two firms operating in the same industry, one public, one private, invest in a similar way? It is useful for investors to understand the differences in investment behaviour between public and private firms. And more specifically, what drive those differences? Does the management of a firm acts to the best of shareholders' interests or not? Do shareholders have the same information about a company as the management of the same company or not? Are the investments made by the management of good quality or just for satisficing the shareholder? Just some questions that can be asked whether a firm has a good investment policy.

This master thesis compares the possible differences in investment behaviour between public and private firms in The Netherlands before and after the global mortgage crisis that started in august 2007 (e.g. Duchin, Ozbas & Sensoy, 2010; Kahle & Stulz, 2010).

Ever since Berle and Means (1932) discussed the economic differences between public and private firms this topic has been subject of considerable research in corporate finance. Most of the research done about corporate investment is based on evidence from public firms (see for example Duchin, Ozbas, & Sensoy, 2010; Tong & Wei, 2008, amongst others) and a smaller group on private firms (e.g. Akbar and Gao, Harford & Li, 2013; Badertscher, Shroff & White, 2012). There are only a few thousand public companies worldwide, private firms on the other hand form a substantial part of the entire economy; only 0.005% of the Dutch companies are public (cbs.nl; kvk.nl; AEX.nl). Few private firms are obligated to disclose financial data, therefore little is known about how private firms invest and it becomes difficult to compare public and private firms on investment behaviour. So far, only few studies analyse possible differences in the investment behaviour of public and private firms. Asker, Mensa & Ljunqvist (2011) compare the investment behaviour in the U.S. from 2001 to 2007 and Mortal

& Reisel compare the same for European non-financial firms from 1996 to 2006. Both studies investigate investment behaviour short before the global mortgage crisis started in 2007, which leaves room for research how public and private companies have invested during and after the global crisis.

Furthermore it must be pointed out that The Netherlands has not been investigated comprehensively on investment behaviour of public and private firms. It would be very interesting to know whether the findings and conclusions for the U.S. firms correspond with those for the Dutch public and private firms. In other words, this study would like to explore if this master thesis can come to similar conclusions looking at the Dutch market. Both the origin of the firms (Dutch) and the focus of investment on after the mortgage crisis make this research unique. Hopefully, the results can fill the gap in the existing literature or extend the results found in the U.S.

The financial crisis

The ongoing financial crisis that began in August 2007 as a result of consumer defaults on subprime mortgages in the U.S. has had dramatic effects on the worldwide financial sector. Several researchers state that this is the most severe financial crisis since the Great Depression (see for example, Melvin & Taylor, 2009; Mian & Sufi, 2009). The crisis has affected not only financial markets and institutions, but also goods markets and consumers all over the world. Majid & Kassim (2009) state in their paper that the crisis has not only affected the stock market performance of the United Kingdom and Japan but also emerging economies such as Malaysia and Indonesia. Also Dutch former minister of finance, Wouter Bos said this crisis is the worst since the Great Depression. In the Netherlands the effects of the financial crisis started around October 2008 with several defaults in the financial sector; e.g. the takeover of banks Fortis, ABN AMRO and NIBC (Elsevier). Also more than ever Dutch firms

went bankrupt as a result of the crisis. Banks gave entrepreneurs loans they needed for

starting a business very easily, without regarding if they could ever pay it back. Loaners

couldn't pay the loans back to the banks which resulted in more bankruptcies than ever

before. Figure 1 shows the defaults from businesses in The Netherlands from 2005 until 2011.

The blue line clearly shows a decline of defaults from 10.000 in 2005 to 7.000 in 2008 and a

peak of 10.500 in 2009 which indicate that businesses weren't able to pay their liabilities,

which include the loans they got from banks. The economic growth took a deep fall in the

years after the crisis. Where the growth was positive in the years before, it plunged after the

effects of the crisis became apparent in The Netherlands.
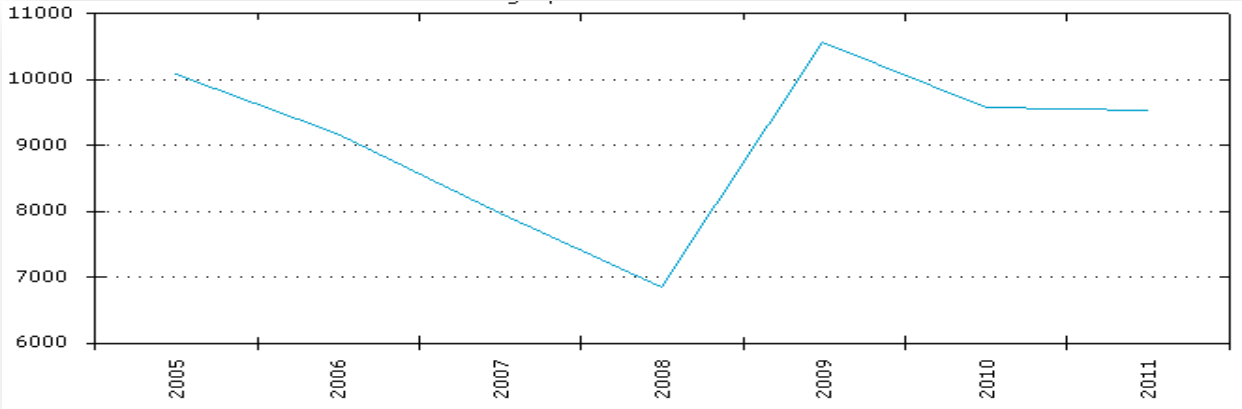
Figure 1 | Number of bankruptcies in The Netherlands (source CBS)

Figure 2 shows the economic growth and the negative effect the financial crisis had on it.

How economic growth is calculated see Appendix A. The economic growth rose from 2%

2005 to 4% in 2007. From that year it took a nosedive into the negative. The bankruptcies in

the financial markets and the defaults in the consumer markets increased the awareness of the

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Figure 2 | Economic growth in The Netherlands (source CBS)

significance of risk management on the part of financial institutions. This resulted in a

restrained possibility to acquire loans from financial institutions.

Campello et al.(2011) and De Haas & Van Horen (2013) proved that financial institutions'

terms and conditions for crediting loans were tightened. Much research has been done in

response to the crisis. Several researches explored the underlying causes of the crisis (e.g.

Crotty, 2009; Murphy, 2008;). Other researchers studied the impact and consequences of

the financial crisis (e.g. Greenlaw et al., 2008; Mian & Sufi, 2009). However, research on

what the impact was of the global crisis on firms' investment behaviour is very limited. The

literature available is mainly focused on large public firms (see for example, Duchin et al.,

2010; Tong & Wei, 2008). As for private firms, there is even more limited research done on

what impact the crisis had (Akbar, Rehman & Ormrod, 2012) and by my knowledge there is

no research done on comparing the differences in investment behaviour of public and private

firms after the financial crisis.

Structure of this thesis

The introduction, which is the first chapter, begins with the problem definition, objectives and relevance of this thesis. Afterwards it introduces the financial crisis of 2007.

The second chapter 'Literature review' gives an extensive study on investment and the several differences between public and private firms.

The third chapter discusses the hypotheses. It explains how the hypotheses are constructed and why these hypotheses are chosen.

The fourth chapter explains the methodology of this thesis. It begins with the research design. The second part contains the variable definitions and it ends with the sample construction and data source.

Chapter five present the empirical findings. The first part discusses the descriptive statistics; the second part addresses the analyses; and the third part gives the conclusions of this study

The last chapter gives a summary and the limitations of this study and the future research directions are given.

2. Literature review

This chapter presents the current state of literature regarding investment and public and private firms. Important topics on investment and theories explaining the differences in public and private firms are addressed here. The chapter is divided in 4 sections:, corporate investment, public vs. private firms, operations of public and private firms and financial policies of public and private firms. It must be pointed out that this thesis focusses on the differences in investment between public and private firms. Therefore the first section of the literature review focusses on the theory of investment; important parts of investment are discussed here. The last three sections addresses the operational and economic differences between public and private firms. The main focus here is to discuss the empirical differences between public and private firms.

Corporate investment

While aspects of finance, such as the use of compound interest in trading, can be traced back to the Old Babylonian period (c. 1800 BC), the emergence of financial management as a key business activity is a far more recent development. During the 20th century, financial management has evolved from a peripheral to a central aspect of corporate life. This change has been brought about largely through the need to respond to the changing economic climate. With continuing industrialisation in the Netherlands and much of Europe in the first quarter of the last century, the key financial issues centred on forming new businesses and raising capital for expansion and acquisitions. As the focus of business activity moved from growth to survival during the great depression of the 1930s, finance evolved by focussing more on business liquidity, reorganisation and insolvency. Successive Companies Acts, Accounting standards, and corporate governance mechanisms have been designed to increase investors'

confidence in published financial statements and financial markets. However the US accounting scandals in 2002, involving such giants as Enron and Worldcom, have dented this confidence. The 2007 credit crisis brought huge turmoil into the financial markets. This crisis resulted from banks expanding lending to sub-prime (i.e. riskier) borrowers and developed into a worldwide financial crisis that prompted comparisons with the Great Depression. The extent of the crisis resulted in the significant financial support provided to banks by governments.

Figure 3 shows the factors influencing the value of the firm. Every firm has his own set of goals and will be subject to underlying economic conditions, but one of the most important goals for each firm should be to maximize shareholders' value; managers should create as
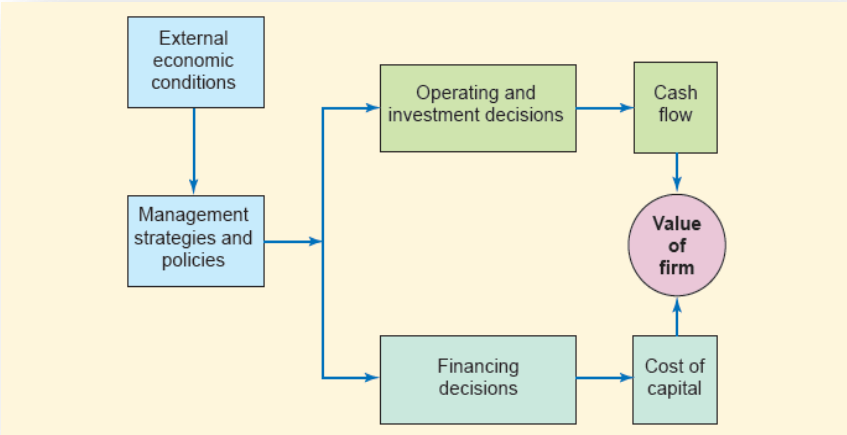
Figure 3 | Factors influencing the value of the firm (Pike et al., 2012).

much wealth as possible for the shareholders of the firm (Pike, Neale & Linsey, 2012). External economic conditions as interest rates, inflation and competitive forces apply to most of the firms in The Netherlands. And firms will develop its own set of goal and strategies. For this thesis these conditions are not important. Very important however are the operating, financing and investment decisions made by public and private firms in The Netherlands. Operating and investment decisions generate cash flows for the firm, while financing decisions influence the cost of capital.

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Early investment research, especially the work of Meyer and Kuh (1957) emphasized the importance of financial considerations in business investment. Much research in the 1960s and 1970s was done on which investment models firms should use for shareholders wealth (e.g. Dale, Jorgenson & Siebert, 1973; Hall & Jorgenson, 1967; Modigliani & Miller, 1958). These studies were the foundation for today's corporate investment theories.

According to Jorgenson (1963 of 1967), in the 1960s there was a great gap between investment literature and practice. He developed a model of investment behaviour in which the firm's desired capital stock was derived from the proportions of neoclassical economic theory.; *the neoclassical investment model*. This model represented a great innovation in investment theory because all earlier empirical models of investment behaviour focussed on profit maximization. This theory assumes that managers can acquire assets almost free of risk, because of the certain resale price. A just purchased asset can be sold when not convenient in the strategy and the cash can be reinvested right again. Jorgenson states that a firm is risk-neutral and the only risk comes from the cost of capital. And here is where the model receives some criticism. Gould & Waud (1973) state that Jorgenson's model mixes optimal conditions from comparative statistics with what is optimal in an uncertain setting, which is not realistic. Crotty (1992) formulates from the liquid theory and states that an investment is irreversible and mistakes would be costly. Still the model is one of the foundation models for corporate investment today (Gould & Waud, 1973). For a short review of the model see Appendix A. Other theories, as the liquidity theory (e.g. Baldwin & Meyer, 1979), internal funds theory (e.g. Jensen, 1986) and the Capital Asset Pricing Model (e.g. Pike et al., 2012; Sharpe, 1964) also received attention by many researchers as models for corporate investment. For my thesis it is not important which models the companies use, but how much they invested.

Avram et al.(2009) define corporate investment as *expenditure made now to make gains in the future*. A firm has to invest in new assets to survive in a growing competitive market (Virlics,

2013). When we would live in a perfect world with complete capital markets a firm's financial status would be irrelevant for real investment decisions. However, markets are almost always imperfect or incomplete (Cleary, 1999). A foundation for these market imperfections is provided by e.g. Greenwald, Stiglitz & Weiss (1984), Myers and Majluf (1984) and Myers (1984). They refer to asymmetric information problems in capital markets. Bernanke & Gertler (1990) and Gertler (1992) show that the agency issue can cause a premium on investment. The investment decisions of firms operating in such environments are sensitive to the availability of internal funds because they possess a cost advantage over external funds (Cleary, 1999). Fazzari, Hubbard & Petersen (1988) provide strong support for the existence of this financing hierarchy. Especially on firms with a high level of financial constraints. Firms are categorized according to their characteristics (such as age, size, dividend pay-out etc.) and measure the level of financial constraints the firms face. On the contrary, Kaplan & Zingales (1997) argue the conclusions from Fazzari et al. They classify the degree of financial constraint of firms according to their information obtained from annual reports. They find that the least financially constrained firms are the most sensitive to investment decisions.

Corporate investment is primarily concerned with investment and financing decisions and the interactions between them (Fazzari, 1988). These two broad areas lie at the heart of financial management theory and practice. The investment decision, is the decision to acquire assets. Most of these assets will be real assets employed within the business to produce goods or services to satisfy customer demand. These assets may be tangible (e.g. land and buildings, plant and equipment, replacement of assets and stocks) or intangible (e.g. patents, trademarks and knowledge from other firms). Sometimes a firm may invest in financial assets. Such investment does not form part of trading activity and may be in the form of short-term securities and deposits.

Investing has three basic questions to be asked (Harcourt, Karmel & Wallace, 1967):

1. In which projects should a company invest? (intangible or tangible, fixed or current etc.)

2. How much should a company invest?

3. Profit expectation and the cost of investment and how to finance it

The financing decision addresses the problems of how much capital should be raised to fund the firm's operations, and what the best mix of financing is. In the same way that a firm can hold financial assets (e.g. investing in shares of other companies or lending to banks), it can also sell 'claims' on its own real assets, by issuing shares, raising loans, undertaking lease obligations, etc. A financial security, such as a share, gives the holder a claim on the future profits in the form of a dividend, while a bond gives the holder a claim in the form of interest payable. Therefore financing and investment activities are closely related (Pike, Neale & Linsey, 2012). According to Modigliani & Miller (1958), it is worth investing in an asset if it will increase the net profit of the owners of the firm, or if it adds more to the market value of the firm. But the net profit will only increase if the expected rate of return, or yield, of the acquired asset exceeds the rate of interest.

The risk dimension

Risk comes with every investment that has more than one outcome (Belli, 1996). Risk is defined in many ways. For the investment theory Du Troit (2004) states that risk is the variability of the expected returns. According to Virlics (2013) risk arises from the uncertainty the costs of investment will be recovered and a profit will be gained.

The risk that comes with investing is analysed from the perspective of the decision maker; how do they make the decisions in the absence of perfect information (Chavas, 2004) and the orientation of an organization to take risks, expressed as risk culture by Horwitz (2004).

Risk and return tend to be related; the greater the perceived risk, the greater the return required by investors. Figure 4 shows this relation (Pike et al., 2012). When the finance manager of a firm needs to raise funds, potential investors measure the risks related to the intended use of the funds in terms of risk premium on the risk-free rate (R_f) that can be obtained from, say, government stocks to compensate the
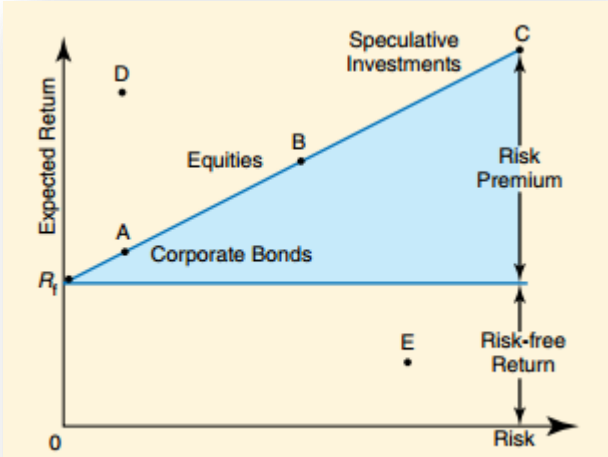
Figure 3 | The risk-return trade-off (Pike et al., 2012)

investors for taking the risk. Points A to E represents different investments that could be made and their risk it takes to finance them. E.g. point A could be a long-term bond, B; a portfolio of ordinary shares in major listed companies, and C; non-quoted shares. A financial manager wants to investment in high profitable opportunities with relatively little risk like point D. It offers returns better than those obtainable on the capital market. The reverse, like point E, is also possible. When a financial manager needs to deliver cash-flows to shareholders at rates above their cost of capital (Pike et al., 2012). The risk a firm takes and the investments it does with cash from shareholders are all in order to maximize shareholder value. A firm should create as much health as possible for the shareholders. When an investment decision increases the value of the shareholders' stake the decision is acceptable and the risk can be taken.

Public vs. private firms

In this thesis we compare the differences in investment behaviour between public and private firms. What is the difference between public and private firms? Privately-held firms are firms who are owned, in most cases, by the company's founders, family of the founders, management or a group of private investors. Private firms may issue stock and have shareholders. However, their shares do not trade on public exchanges and are not issued through an initial public offering (IPO). A private company does not have to meet strict requirements made by the Securities and Exchange commission (SEC) (investopedia.com). Private firms have the restriction that it can't invoke to public capital markets, and therefore must turn to private equity investing. This can boost the cost of capital and limit expansions (Sheen, 2009). A public company is a firm that has sold (a fraction of) itself to the public through an IPO. The firm has issued shares, meaning that people who own shares of the firm have a claim of the company's assets, profits and policies. Public firms must fulfil the strict regulations from the SEC. This includes the disclosure of detailed periodically financial statements and annual reports. Also detailed operating information as well as a management response to specific questions about the firm's operations (investopedia.com). With these strict regulations comes several advantages for public firms; easier access to capital, such as debt markets and selling future equity stock, for expansion and projects (e.g. Asker et al., 2012; Sheen, 2009). This thesis focusses on public companies who are exchanged on a stock market and companies who are not exchanged on a stock market but can transmit their stock to anyone the company wants. Also the issued shares does not have to be kept up in a share register like private companies have to (investopedia.com).

Public vs. private firms on investment

The literature on differences in investment behaviour between public and private firms is still very small but growing. Private firms do not have to include financials in their reports, so empirical research on this topic is difficult. But nowadays more and more databases, like Bureau van Dijk and Sageworks, include balance sheet and income statement information of private firms which makes it possible to explore the topic of investments made by private firms better, and more toward my topic comparing them to public firms. This thesis investigates the differences in investment behaviour between public and private firms in The Netherlands after the mortgage crisis of 2007 (Kahle & Stulz, 2010). An overview of earlier research written on the difference between public and private firms' investment is provided. Asker et al. (2012) compare the differences of stock market listed and privately held companies in the U.S. between 2001 and 2007 using a dataset provided by Sageworks and Compustat. Sageworks provided a new dataset that contains financial data of 250,000 private U.S. firms and Compustat of public firms in the U.S.. They paired public and private firms on size and industry by matching. Two conclusions emerge from this research. First, private firms invest substantially more than public firms of their size and industry. On average, private firms invest nearly 10 percent of total assets each year compared to only 4 percent among public firms. Second, private firms are 3.5 times more responsive to changes in investment opportunities than public firms are, especially in industries where stock prices are influenced by earnings news. These conclusions suggest that there is an important potential cost of publicly held firms, because the investment of public firms in their sample seems to be distorted relative to that of comparable private firms. The authors argue that the main reason for this difference is that going public weakens incentives for effective corporate governance because it leads to greater dispersion of ownership. As a result, a public firm manager who can benefit from his firms' share price may have an incentive to influence that price by

underinventing or how Asker et al. (2012) it calls 'managerial short-termism'. Sheen (2009) compared the investment behaviour of public and private firms in the chemical industry when they have near identical project opportunities between 1989 and 2006. The data comes from the volumes of the directory of chemical producers, published by SRI consulting. This annual publication gives the total U.S. capacity by firm and plant. His conclusions are complementary of those from Asker et al. (2012). He finds that private firms invest more efficiently than public firms. Private firms have a better understanding of negative demand shocks and how to avoid them, also how to take advantage of positive demand shocks. Why public firms invest less efficient the author explains due to agency issues and its related costs. Mortal and Reisel (2013) examined the difference in investment policies between public and private firms in Europe from 1996 to 2006. They used the 2007 version of Amadeus by Bureau van Dijk. Amadeus contains balance sheet and income statement data for public and private firms in Europe, the authors used the 250,000 largest firms in the database. Like Asker et al. (2012) they matched public and private firms on size, by matching it on country, industry code and total assets. Their main conclusion is that public firms' investment sensitivity to growth opportunities is higher than for private firms, especially in countries with well-developed stock markets. This because that well- developed stock markets allow public firms to make better investment opportunities than for private firms. This conclusion suggest that the benefits associated with being part of a well-developed stock market outweigh the agency costs associated with ownership dispersion. These conclusions are the opposite of those from Asker et al. (2012) and Sheen (2009).

Gilje and Taillard (2012) studied investment differences between 88 public and 369 private firms in the gas industry in the U.S. They used a slightly different approach for comparing private to public firms; they also matched firms on size but on their capital stock, which is defined as the proven reserves a company has. Investment is defined as the number of wells

for which drilling operations have been initiated in a given year which is obtained from the Schlumberger Corporation's Smith International Rig Count. This proxy differs from the other studies and seems to be only appropriate in the oil and gas industry. Their main finding is that private firms are 65% less sensitive to changes in investment opportunities. This complements on the findings by Mortal and Reisel (2013). The authors interpret the findings that private firms face higher financing constraints than public firms for real investments.

To the best of my knowledge the above papers are the only articles that investigate and compare the investment behaviour of public and private firms. Sheen (2009) and Asker et al. (2012) both find that public firms in the U.S. invest less efficient than private firms whereas Mortal and Reisel (2013) in their research find that public firms in Europe invest more efficient than private firms. In all the papers a matching method is used on size and industry, which is also used in this thesis. The articles from Sheen (2009) and Asker et al. (2012) are suggesting that the cause of the less efficient investing public firms show is that of agency issues. These issues are investigated in many papers started by Jensen and Meckling (1976) and will also be explored in this thesis. The three articles do not go further than the year 2007, in which the mortgage crisis began in the U.S.. This thesis will start from 2007 and end in 2010. Here is one contribution my thesis will make as the investment behaviour of public and private firms is not yet investigated in these years. More specifically, this thesis will contribute to the theoretical literature on investment policies of public and private firms originated by Berle and Means (1932), and further explored by e.g. Holstrom and Tirole (1993), Asker et al. (2012) and Mortal & Reisel (2013).

Duchin et al. (2010) examined the consequences of the financial crisis on corporate investment in the U.S., in the years 2006-2009, but the focus was on public firms. The authors used the 2009 version of Compustat which included 3,668 firms suitable for their research. They found that corporate investment significantly declines following the onset of the crisis.

Investment had declined by 6,4% of its mean. Firms with low cash reserves of high short-term debt show the greatest decline in investment. Also firms who operate in industries dependent of external finance are more constrained.

This is the only paper to the best of my knowledge who examines the consequences of the financial crisis on corporate investment, here this thesis also contributes to this issue in a way that there isn't research done for The Netherlands on this topic.

Agency issues

Private firms mostly are owned, managed and controlled by a few major shareholders. Public firms on the other hand have separation of management and ownership (Asker et al., 2012). Especially in larger public firms the ownership is widely spread. While the daily operational control of the public firm rests in the hands of a few managers, who own a relatively small portion of the total shares issued. Here, where ownership is separated from management potential conflict can arise in the form of what is termed 'managerialism' (Pike, 2012); self-serving behaviour by managers at the shareholders' expense. Examples of this self-serving behaviour include pursuing more additional extra's for the manager (splendid offices, expensive company cars etc.) and adopting low-risk-low return investment strategies and other 'satisficing' behaviour. Jensen and Meckling (1976) started exploring this phenomenon in 1976 and developed a theory of the firm under agency arrangements; a manager acts as an agent for the shareholders and is expected to act in their best interests. However shareholders receive, sometimes, too little information about the operational control of the firm and whether managers are acting in the best of their interests. Jensen and Meckling (1976) defined a firm as simply as a set of contracts and the most important contract is the one between shareholders and the firm. The principal-agent relationship is described in this contract, where the shareholders stands for the principals and the daily management the agents. Shareholders

want this contract to be as efficient as possible; the daily management must have full authority over use of the invested capital without the risk of abusing this authority. To encourage the management to act for the shareholders' best interests the contract contains appropriate bonuses for the management when targets are met. These 'encouragements' can be seen as agency costs. Agency costs can therefore be defined as the costs owners of firms have to incur in order to ensure that their managers make financial decisions consistent with their best interests (Pike, 2012).

Activities and Operations

This section discusses theories that explain the daily operational differences between public and private firms. Much research is done on this topic and two theories will be presented in this chapter. One of the most discussed theories is that of the agency issue which especially public firms have to cope with. Many authors agree that agency costs appear in almost every public company, here is where ownership mostly is diffused. But also other operational issues that received less attention, e.g. the transactional cost theory, and the issue of executive compensation will be discussed.

Agency costs

What would cause public and private firms to invest so differently? A logic place to look for an answer is in the agency literature. In contrast of the research done on possible differences in investment behaviour between public and private firms, there is much research done on agency costs, especially in public firms.

In contrast of the research done on possible differences in investment behaviour between public and private firms, there is much research done on agency costs, especially in public firms. Berle and Means (1932), started exploring this topic of research a build a foundation

for the theory of agency costs known today. Jensen and Meckling (1976) described in their article that public firms can benefit from investors' diversification provided from the liquidity the stock market offers to investors, but that a stock market listing can have two disadvantageous effects. First, agency issues arise more often because of the separation of ownership and control. Managers will have other interests than the owners of the firm and owners need to offer bonuses in order to let the managers act in the best of their interests. Second, shareholders can sell their stock when the firm they invest in shows signs of trouble, rather than monitoring the management actively- this practice is sometimes called the 'Wall Street walk' (Asker et al., 2012). This weakens incentives for effective corporate governance (Bhide, 1993). Private firms ,on the opposite, often have highly concentrated ownership, which encourages the owners to act at the best for their company because they will benefit from their achievements (Asker et al., 2012).

The agency literature argues on four strands that investment will be not optimal as a result:

- '*Managerial myopia' or 'short-termism'*

- *'Empire builders'*

- *'The quiet life'*

- *'Asymmetric information'*

First, models of '*managerial myopia' or 'short-termism'* explained by e.g. Palley (1997) and Shleifer (1990) argue public-firm managers who can derive utilities from the stock price of the company focus more on short-term investments rather than long-term value for the firm. Short-termism can come in two ways; overinvestment and underinvestment. When the manager has better information about the good prospects for his investment opportunities he will invest more than usual, resulting in overinvestment (Bebchuk & Stole, 1993). On the other hand when a public firm manager has little idea about how much and in which opportunities to invest underinvestment will be the result (e.g. Shleifer & Vishny, 1990; Von

Thadden, 1995). Ultimately, the manager underinvests to create the impression that the firm's current and future profitability is greater than it really is, hoping to boost today's share price (Asker et al., 2012).

Second, managers can invest regardless of the quality of the investment because they have a preference for scale. These managers are called '*empire builders*'. Jensen (1986) and Stulz (1990) also states that if shareholders let their managers raise funds too early for a good investment it will exhaust the good investment and invest in negative net present value projects which in turn will result in overinvestment costs.

Third, and this is the opposite of empire building, managers may want to avoid the costly effort involved in making investment decisions. This idea that leads to lower investments is called '*the quiet life*' (e.g. Betrand & Mullainathan, 2003; Coccorese & Pellecchia, 2010) and refers in this research to the understanding that when managers are poorly monitored they will pursue goals that are not in the shareholders' interests. Underinvesting can be the result of this poorly monitoring, which in turn will lead to wasting profitable investments. Ultimately, the overall productivity and profitability of the firm declines because of the managers' choice for the '*quiet life*'.

Fourth, Neoclassical theories on regulation of the firm assume that shareholders have full information about a regulated firm and its investment opportunities (e.g. Baron & Besanko, 1984; Dupuit, 1952). However, managers could have superior 'asymmetric' information about its assets and investment opportunities than their potential investors. As long as they invest in positive NPV projects they will act in the interest of their 'old' and 'new' investors. The information managers have could be so favourable that management, if it acts for the interest of the 'old' investors' interests, it will refuse to issue new shares, even if that means passing up a good investment opportunity. More specifically, the cost to 'old' shareholders of issuing shares at a bargain price may outweigh the project's NPV (Myers & Majluf, 1984).

Agency costs in family firms

As stated before agency costs arise in firms with conflicts of interest between owners and managers. Much empirical research is done between public and private firms. A small group of authors have done research on agency costs between private family and non-family controlled firms (e.g. Chrisman, Chua & Litz, 2004). Chrisman et al. (2004) examined 1,141 privately family and non-family controlled firms in the U.S. They added a unique aspect in the agency literature; in family controlled firms there is kinship among the family and this could lead to altruism. Although that altruism could mitigate some agency costs it could also lead to other agency costs, e.g. free riding by family members, entrenchment of ineffective managers and predatory managers (Chrisman et al., 2004). Altruism may therefore create agency costs that only occur in family firms because family relationships make it more difficult to resolve certain kinds of conflicts as stated above, this could lead to unproductive behaviour (Schulze, Lubatkin & Dino, 2003). Families find it difficult to replace ineffective family members, thus this makes it very plausible that family involvement has the potential to lower firm effectiveness (Chrisman et al., 2004). Introducing pay incentives, strategic planning and other agency control mechanisms could gain performance benefits for family controlled firms who face these agency issues (Schulze et al., 2003). One argument by Chrisman et al. (2004) is that not all the decreases in economic performance can be considered as agency costs. For example, when family business owners which to provide a minimum standard of living for relatives, then the decrease of economic effectiveness due to nepotism is not considered as an agency cost.

Executive compensation

The level of executive compensation and the differences has been widely examined by many researchers. Many of them for public firms (e.g. Mehran, 1995) and a smaller group for

private firms (e.g. Banghoj et al., 2010). Many researchers agree on the fact that executive compensation differ for public and private firms because of deviation of characteristics. As discussed in the agency chapter, public firms have a different governance structure (ownership separation). And public firms have better access to executives (Banghoj et al., 2010) These elements therefore tend to reduce the need for performance-related compensation, and owners of privately held firms should be more likely to employ a forcing hand with the penalty of dismissal. On the other hand, most owners in private companies are also member of the supervisory board. This will reduce the board's independence and may lead to inefficient compensation (Banghoj et al., 2010). Private firms don't have share prices which makes it likely that executive compensation contracts focus more on a fixed salary at the expense of performance-related pay (Ball & Shivakumar, 2005). The pay-to-performance structure is a topic that is most discussed in executive compensation theory. Managers in public firms show a tendency of risk adversity; the risk-compensation (Harris & Raviv, 1979) should promote managers to take well considered risk that are both good for shareholders as for the manager. Another theory by Jensen & Murphy (1990) suggests that manager's compensation should be equity-based; through incentive stock options. Hirshleifer & Suh (1992), agree with Jensen & Murphy and state further that managers are willing to take more risk with this compensation. For privately held companies the pay-to-performance theory doesn't hold as much that it does with public firms. Earnings are a relatively more noisy measure in private firms (Ball & Shivakumar, 2005). And performance-related pay is less common in privately held firms (Banghoj, 2010). Banghoj (2010) also found that education plays an important role for the variations in executive compensation. It seems that the agency issue for CEO compensation is not the same for public as it is for private firms.

Financial Policies

This thesis also relates to other empirical literature concerning corporate policies of public and private firms. The literature about this topic is still small but shows a growth in the last decade. Gianetti (2003) compares the capital structure of public and private European firms. Michaely and Roberts (2012) compare the dividend policy of British firms and show that private firms equal dividends less than public firms. Also for British firms, Saunders and Steffen (2009) show that public firms face lower borrowing costs than private firms. Badertscher, Shroff and White (2013) explain why private firms invest more when there are more public firms active in their industry and Brav (2009) shows that debt financing is the choice private firms make the most for financing decisions. As stated at the beginning of chapter 2, this section addresses the empirical research done on several financial policies of public and private firms. The goal here is to show *that there are differences* on several topics between public and private firms and *that there is empirical evidence* on this.

The Modigliani and Miller (1958) theorem states that capital structure and the financial decisions a firm makes are irrelevant in a perfect and frictionless market. However this theory is argued frequently, and undermentioned authors have found empirical evidence that capital structure and financial policies differ between public and private firms.

Creditor protection

Gianetti (2003) compares the creditor protection en debt maturity in eight European countries. He comes to several conclusions; both public and private firms, in countries with good creditor protection, that invest intensively in intangible assets are punished less for lack of collateral than in countries who have less good creditor protection. This creditor protection also helps to lengthen the debt maturity of a firm. Especially private firms can gain advantage for Improving their financing opportunities, as lack of collateral does not have a significant

effect on the financing decisions of public firms. Another pattern he finds is that firms in underdeveloped stock markets are highly indebted.

Dividend policies

Michaely & Roberts (2012) compare the dividend policies in the UK of public and private firms. For dividend policy it was discussed by Miller & Modigliani (1961), that it was irrelevant for firms when they are operating in perfect markets (where there are no agency conflicts and information asymmetry). But many researchers showed that dividend policy was anything but irrelevant for firms (e.g. Brav et al., 2005). Michaely & Roberts (2012) follow on this and found that ownership dispersion and incentives are important for dividend policy. More specifically, private firms with dispersed ownership, matched with public firms with similar characteristics, pay lower dividends. In their paper they also suggest that being public or private also determines the dividend structure; public firms smooth dividends much more than private firms do. Brav (2009) agrees with Michaely & Roberts (2012) and finds that the decision for private firms to pay dividend and the pay-out ratio is strongly related to firm performance.

Borrowing costs

Do private firms face higher borrowing costs in loan markets than public firms? That is what Saunders & Steffen (2009) examine for firms in the UK. According to Sander & Steffen there is little research done on this topic. Only two researchers have examined this. First, Pagano et al. (1998) investigated this question for Italian firms and found that borrowing costs significant decline after an IPO. This suggests that public firms face lower borrowing costs than private firms. Second, Schenone (2010) used a U.S. panel of firms that go public. She found evidence in the U.S. that public firms have higher bargaining power when it comes to getting loans form financial markets. The article of Saunders & Steffen (2009) expands on the

conclusions from Pagano (1998) and Schenone (2010) with the demonstration that private firms in the UK pay on average 27 basis points higher loan spreads when compared to public firms. The conclusions on the topic of borrowing costs all suggest that being public has advantages over private firms when a firm is higher leveraged. However Brav (2009) found that public firms in the UK chose significantly more equity than debt for financing than do private firms. More specifically, the debt ratios of public firms are much lower than those of private firms. Brav continues that control of a shareholder over a firm is valuable and therefore firms controlled by a major shareholder, mostly private firms, are reluctant to issue equity. This would give away part of the control of the major shareholder. This in turn leads to the conclusion that the cost of issuing equity (giving away control) is higher for private firms than it is for their public counterparts. Maintaining control is probably one of the main reasons to stay private (Brav, 2009). This principle was also surveyed in the U.S. by Brau & Fawcett (2006), who found that keeping the control spread over less than three shareholders is the main motivation for private firms to stay private. As a result agency problems are likely to be greater among public firms than among private firms (Asker et al., 2012). In addition, managers of public firms may rationally want to decrease the probability that any single shareholder will have control, which further increases the value of public managers' equity relative to managers equity of private firms (Brav, 2009).

Financial reporting

The overall financial reporting quality of public and private firms has got lot of attention the last years. Two hypotheses are mostly referred in this topic of research; the 'demand' and the 'opportunistic behaviour' hypotheses (Hope, Thomas & Vyas, 2013). The demand hypotheses suggests that the demand for high-quality public information is greater among public firms. Because of the ownership dispersion, information asymmetry arises, leading to shareholders

demanding for reliable and high quality information. For private firms, the demand for financial reporting is less obvious. Major shareholders often have inside access or are active in the daily management (Chen, Hope, Li & Wang, 2011). These close relations reduce the demand for information that is produced through financial statements (Ball & Shivakumar, 2005). In contrast to the demand hypothesis, the opportunistic behaviour hypothesis suggests that managers of public firms conceal true performance of the company by manipulating financial information (e.g. Givoly et al., 2010; Hope et al., 2013). Public firms are pressured to the capital market, which could increase their incentives to manipulate financial information to meet earnings targets. In addition, managers of public firms often have shares from the firm, which also adds to the contribution of influencing financial data. This in turn could lead to maintain a high stock price. Managers of private firms also could have shares of the firm but here there is no pressure from the capital market. Thus, private firms are expected to have reduced incentives to manipulate financial data (Hope et al., 2013). Empirical research done on comparing FRQ of public and private firms is contradictory. Several authors state that private firms have served better quality financial information (e.g. Beatty et al., 2002; Givoly et al., 2010). On the other hand, Ball & Shivakumar (2005) show that private U.K. firms report loss less timely compared to public companies. This is interpreted that private firms have lower demand for their quality of financial information.

All in all there are some major differences when comparing the financial policies of public and private firms. Empirical evidence on debt-equity financing, dividend pay-out and firm control show that public and private firms are two separate definitions to handle with. The theorem of Miller & Modgliani (1958) is therefore argued more (Brav, 2009).

3. Hypothesis development

The hypotheses that will be explained in this chapter have to test the investment behaviour of public and private firms before and after the bank crisis.

The research done on differences in investment behaviour between public and private firms is scarce. Until now only three articles were found who explained differences in investments made by these firms. Two of them were conducted in the U.S. (Asker et al., 2012; Sheen, 2009). These studies both found that private firms invest more and are more efficient investors. Asker et al. (2012) explain the difference that public firms have less incentives for effective corporate governance because of the greater ownership dispersion. A manager of a public firm can benefit of the high share price of that company and may have an incentive to underinvest, resulting in keeping the share price as high as possible. Sheen (2009) complements on this by stating that private firms have a better understanding of how to take advantage of positive demand shocks. Mortal & Reisel (2013) examined investment behaviour in Europe and concluded the opposite; public firms invest more and are more responsive to investment opportunities, especially in well-developed stock markets. The reason for this is that well-developed stock markets allow public firms to take better advantage of investment opportunities. This suggestion outweighs the agency costs of public firms.

This thesis also expects that public firms will invest more than private firms. The expectation that public firms invest more than private firms has several reasons. First, mortal & Reisel (2013) showed evidence that public firms invest more than private firms in Europe, especially in well-developed markets. This study focussed on the years before the crisis, 1996-2006. The Netherlands also has a well-developed stock market and public listed firms therefore will have better investment possibilities. Second, in the bank crisis years after 2008 private firms will have liquidity problems more than public firms do. Public firms have better access to

capital markets resulting in more possibilities for financing investments (Mortal & Reisel, 2013). Whether this capital will be used for investments is questionable, it could also be used for other issues like reorganisations. It must be pointed out that both public and private firms will invest more cautiously because of the bank crisis. Even good NPV projects could be put to the side; reducing costs during a crisis is very important, even for the larger firms. Nevertheless, the expectation that public firms invest more because of the better investment possibilities still holds. The evidence showed by Mortal & Reisel (2013) and the arguments mentioned above, the following hypothesis is developed:

Hypothesis 1a: Public firms invest more than private firms in the years 2004-2010.

The relation between investment and the global crisis is also a topic which hasn't received much attention. Especially for both public and private firms in one study. Duchin et al. (2010) studied corporate investment in the U.S. after the global crisis, in the years 2006-2009. This study found that corporate investment in the U.S. significantly declined after the mortgage crisis.

This thesis expects that the firms in the sample invest less after the bank crisis in 2008. The crisis represents an unexplored negative shock to the supply of external finance. More specifically, financial institutions represent tighter lending standards, which results in fewer options for firms to attract external capital, which in turn could lead to less investments made. Ivashina & Scharfstein (2008) indeed found that banks scaled back lending by 36%. This decline caused financial constraints for firms all over the world, and also for The Netherlands. During the times of a crisis these constraints are likely to grow. There is almost no evidence to follow, but it is almost a logical result that firms invest less after they have less possibilities

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of attracting capital. I am curious whether this logical relation really exists and applies for The Netherlands. Having said this the following two hypotheses are developed:

Hypothesis 1b: Both public and private firms invest less after the bank crisis in 2008.

Hypothesis 1c: Public firms have invested more than private firms after the bank crisis in 2008.

In addition to the above hypotheses, Asker et al. (2012) and Mortal & Reisel (2013) also examined the investment opportunities for both public and private firms. Investment opportunities are translated to sales growth; when a firm shows sales growth it should use this extra capital to invest. This increases the firm value. Again Asker et al. (2012) and Sheen (2009) found other evidence in the U.S. than Mortal & Reisel (2013) did for Europe. Public firms in the U.S. are less responsive to growth opportunities than private firms are; public firms in the U.S. don't use the extra cash from sales growth to invest as much as private firms do. Where Mortal & Reisel (2013) showed that public in Europe firms are more responsive to growth opportunities; public firms in Europe use the extra cash from sales growth to invest more than private firms do. Again there is little empirical evidence on this correlation. So it is hard to choose which study to follow. Because of the evidence showed in Europe before the crisis years by Mortal & Reisel (2013), this thesis expects that public firms in The Netherlands are more responsive to investment opportunities, which results in the following hypotheses:

Hypothesis 2a: The effect of sales growth on investment is bigger for public firms than for private firms in the years 2004-2010.

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Hypothesis 2b: The effect of sales growth on investment is bigger for public firms than for

private firms after the bank crisis in 2008.

Other studies regress several proxies as predictors for investment. Many variables could be of influence to investment, this study focusses on 4 of them: industry code, firm size, sales growth, and ROA. These four variables are used by Asker et al. (2012) and three of them (industry code, firm size and sales growth) by Mortal & Reisel (2013). As sales growth would be the biggest predictor for investment, which variables more could be of influence for investments made by public and private firms? The following hypotheses will test this.

Hypothesis 3a: Industry code, firm size, and ROA have a significant impact on the

investments made by public and private firms in the years 2004-2010.

Hypothesis 3b: Industry code, firm size, and ROA have a significant impact on the

investments made by public and private firms after the bank crisis in 2008.

4. Data & Methodology

This chapter is divided into three parts. The first part will explain how the three hypotheses are studied. The second part of this chapter addresses the choice of the test variables. The third, and last, part of this chapter discusses the sample of this study and the data collection.

Research design

Matching procedure

This thesis compares the investment behaviour of public and private firms. It is hard to compare the investment behaviour of two identical firms that differ only in their listing status. This would otherwise be an ideal situation. To get close to this situation paring public and private firms that are observably similar to each other would be a good solution. Matching is a good method to do so. Given the markedly different distributions of some of the variables among public and private firms, controlling for the effect of these variables (industry code, firm size, sales growth, and ROA) are investment in a linear regression setting would be a hopeless task (Asker et al., 2012). Matching on the other hand reduces the extraneous noise in the measurement system and improves the sensitivity of measurement of the hypothesized relationship (Pike et al., 2012). The studied literature that also examined this topic (Asker et al., 2012; Mortal & Reisel, 2013; Sheen, 2009) all used the same methodology for finding this difference. All three studies used a 'matching procedure' for their research design; public and private firms were matched on their total assets and industry code in the first year of the sample. The big advantage of matching on size is that it eliminates the confounding factor of the size of firms; bigger firms are able to invest more than smaller firms. Matching on industry code also brings an advantage; it eliminates the possibility that firms in other industries could show other investment possibilities and/or priorities. It is acceptable that

firms who are about as large, and operate in the same industry have the same investing possibilities.
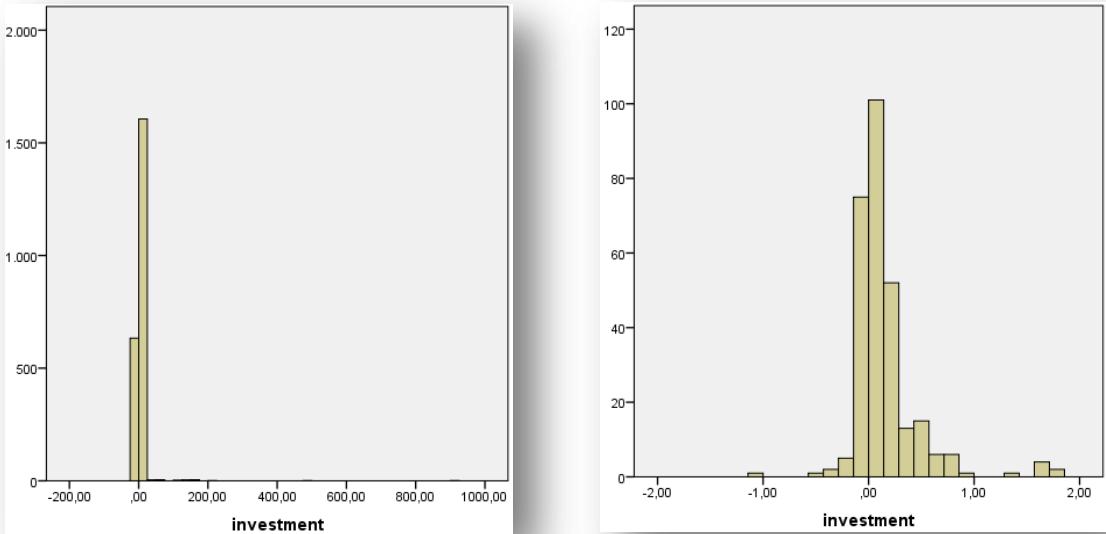
Figure 5 | Investment of firms before and after matching

Figure 5 shows the distribution of investments made by public and private firms before (left figure)and after (right figure) they were matched on size and industry code. The y-axis shows the number of firms and the x-axis shows the total relative investments made by the firms in the period 2004-2010. Investment is measured as the annual increase in gross fixed assets (aggregate amount of physical goods)divided by beginning-of-year total assets. The left figure shows that the majority of investments is made around 0 times the annual increase in gross fixed assets (aggregate amount of physical goods)divided by beginning-of-year total assets but it is highly skewed towards big investments with outliers near 1000 times. This could seriously bias this study (Asker et al., 2012). The right figure shows the investments made after the firms were matched on size and industry code. This figure shows a more normal distribution of the investment levels. Again the majority of investments is made around 0 times the annual increase in gross fixed assets (aggregate amount of physical goods)divided by beginning-of-year total assets but here there is not much effect of outliers.

Choice of matching variables

The preferred match will be based on size and industry, these are the two dimensions in which public and private firms differ the most and which, economically, likely affect investment (Asker et al., 2012). Size is by far the most important observable difference in the data from Bureau van Dijk. The NACE industry code is also given in the database, this fact makes it possible to compare the differences in investments by industry code.

Matching algorithm

When talking in the language of the matching literature (Imbens & Wooldridge, 2009), this thesis is using a nearest-neighbour match. For hypothesis 1 and 2a/b, in 2004 for each public firm the private firm that is closed in size (total assets) and that operates in the same four-digit NACE industry is matched. The match holds for the subsequent years to ensure the structure of the data remains intact. The match must require that the ratio of their total assets (TA) is less than 2 (i.e. max TA public/max TA private = <2) (Asker et al., 2012). Hypothesis 2a/b will test investment before (pre) and during the bank crisis in 2008; the pre-crisis period is 2004-2007 and the crisis period is 2008-2010. Hypothesis 1 and 2a/b will both show the mean of the investment level of public and private firms and their statistical significant difference. These differences are tested by a one sample *t*-test.

Regression analysis

To investigate the differences in public and private firms' sensitivity in investment this study uses a hierarchical regression. A hierarchical regression is the practice of building successive linear regression models, each adding more predictors. A hierarchical regression is used to control for the effects of the variables sales growth, size and ROA. This type of regression can test certain predictors independent of the influence of others. In which order the variables are added is decided by how they correlate to the dependent variable. The correlations are

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presented in table 5.2. The concerning hypotheses for the regression are hypothesis 1c, 2c and 2d. Regressions are used in many studies on investment (e.g. Almeida & Campello, 2007; Asker et al., 2012; Bakke & Whited, 2006; Fazzari et al., 1988; Mortal & Reisel, 2013). Hierarchical regressions are used by e.g. Robertson & Watson (2004) and Rai, Patnayakuni & Patnayakuni (1997). Investment is the dependent variable, where sales growth, ROA and total assets are used for predictors. Sales growth and ROA are used by Asker et al. (2012) to test the sensitivity of firms to investment opportunities. Mortal & Reisel (2013) use sales growth and cash flow to test this. ORBIS did not provide enough cash flow data for private firms to incorporate cash flow as a predictor into the sample. Another proxy this study uses is size. Size is seen as a variable of interest for investment by other authors (e.g. Almeida & Campello, 2007; Asker et al., 2012; Mortal & Reisel, 2013). In order to test the presence of autocorrelation in the data Durbin Watson statistics will be used.

The regression analyses in this study is based on the following equation:

Nr.1 : Investment $= \beta_0 + \beta_1$ Sales growth$_{it}+ \beta_2$ size$_{it} + + \beta_3$ ROA$_{it} + \varepsilon_{it}$.

Variable choice

In this section the variables will be discussed individually. In appendix B a table can be found giving information of how each variable is measured.

1. Investment

Firms can expand their assets by building new capacity (capital expenditure or CAPEX) or buying another firm's existing assets (mergers and acquisitions or M&A). The studies by Asker et al. (2012) and Mortal & Reisel (2013) focus on these two proxy's. Unlike public firms, private firms usually cannot pay for their M&A with stock so their overall investment is likely to involve relatively more CAPEX than that of public firms (Asker et al., 2012). To

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avoid biases both CAPEX and M&A is captured by modelling investment as the annual increase in fixed assets. Asker et al. (2012) and Mortal & Reisel (2013) use gross investment as their main investment measure, which is defined as the annual increase in gross fixed assets (aggregate amount of physical goods) divided by beginning-of-year total assets multiplied by 100%. This is a relative form of measuring investment; it is measured in percentages. Investment could also be measured in absolute form; the amount of dollars invested per year. Measuring in relative form is preferred because it shows less variance in the distribution and is therefore more convenient to measure (Asker et al., 2012). Fixed assets as a proxy is more convenient over total assets because of the fact a firm can sell a lot of its core products in a short time. This could bias the investment level of fixed assets, which is the main focus of the two studies above. Investments that exceed 200% in relation to the last year will be excluded from the sample. This could point to a big fusion or takeover and would bias the outcome (Mortal & Reisel 2013).Because the above two studies are the only benchmark for how to measure investment, this thesis will follow both Asker et al. (2012) and Mortal & Reisel (2013).

2. Investment opportunities

There are two ways to measure investment opportunities that is used in the investment literature. The first is Tobin's Q. Tobin's Q is widely used in the investment literature (e.g. Chung & Pruitt, 1994). Tobin's Q is constructed as the ratio of the firm's market value to book value of its assets. The second is sales growth (e.g. Almeida & Campello, 2007; Whited, 2006). Sales growth is calculated as (current sales – last years' sales) / last years' sales x 100%. Sales growth can be constructed at the firm level for any firm, whether public or private. Tobin's Q can only be calculated for firms for which the market value is observed. These are the public listed firms. Private firms are not traded on a stock exchange and therefore their market value cannot be calculated. Asker et al. (2012) and Mortal & Reisel

(2013) use sales growth as a proxy for investment opportunities because they examine public as well as private firms. Because this thesis also examines private firms Tobin's q is not appropriate. Thus sales growth will be used as proxy for investment opportunities. In the regression of this study the variable Return On Assets (ROA) is used as a proxy for the marginal product of capital. ROA is by some studies seen as a possible proxy for financing constraints. Especially private firms are more sensitive to financial constraints (e.g. Almeida & Campello, 2007; Asker et al., 2012).

Data collection

This section reports the sample construction and the data source.

1. Data source

The database where all the financial information is coming from is the Europe ORBIS database provided by Bureau van Dijk. This database is available to all students of the University of Twente. The Europe ORBIS database contains comprehensive financial information of 60 million public and private companies. The University of Twente has access to the financials of the medium and larger public and private firms; over 260.000 in total. The financial data is presented in standardized annual reports. This makes it easier to compare the different companies. Data that is gathered from ORBIS are e.g. fixed assets, total assets, turnover, industry code and number of employees.

2. Sample construction

The matched sample of this thesis will contain public and private firms in The Netherlands. Students of the University have access to financial data over 260.000 firms in The Netherlands. ORBIS provides many possibilities for conducting a sample. For identifying public firms used in the sample the function 'legal form' is used and public and private

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companies were checked here. All the firms in the sample had to fulfil several requirements; they must have annual data, every year, for the whole period on fixed assets, total assets, revenue and ROA. The companies had to be located in The Netherlands for the period 2004-2010. This thesis will exclude firms that have data problems, and firms with fewer than two years of complete data because this study wants to focus on within-firm variation (Asker et al., 2012). Financial firms (NACE code 64-66 and 68) and regulated utilities (NACE code 35-39) from both the public and private samples, this is in general use for research on this topic (e.g. Asker et al., 2012; Badertscher et al., 2012). Both the public and private samples cover the period from 2004 through 2010. This period is chosen because it covers the years before and after the bank crisis, which is discussed in chapter 2. After all the above requirements were satisfied the sample contains 262 public and 2020 private firms. Because there are less public than private firms in the sample each public firm will be matched to a private firm that has a ratio difference less than 2, as explained in the section matching algorithm. In this process 112 public and 1870 private firms were removed from the sample because the difference in total assets was too big. This leaves this study with a total sample of 150 public and 150 private firms. Appendix B and C show the firm names of public and private firms used in this study.

Table 4.1 | The NACE economic sector and number of firms 2004-2010

This table presents the number of firms used for the full sample and the matched sample. It also reports the NACE codes and the relating industry. The column 'number of firms matched sample' show the number of firms used in this study. The number in this column reports both the number of public and private firms used.

Economic sector	NACE codes	number of firms full sample		number of firms matched sample
		public	private	
Manufacturing	1011-3320	60	454	45
Wholesale and retail trade	4511-4799	29	468	27
Transportation and storage	4910-5320	15	114	12
Information and communication	5811-6399	24	60	18
Professional, scientific and technical activities	6910-7500	25	165	24
Remaining industries:[1]		37	383	24
Agriculture, forestry and fishing	0111-0322	1	16	1
Mining and quarrying	0510-0990	6	38	5
Construction	4110-4399	12	136	6
Accommodation and food service activities	5510-5630	3	22	1
Administrative and support service activities	7711-8299	6	88	5
Human health and social work activities	8610-8899	1	19	1
Arts, entertainment and recreation	9001-9329	7	17	4
Other service activities	9411-9609	1	10	1
Total		**220**	**2282**	**150**

Table 4.1 present the number of public and private firms in the full and matched sample. As it shows there are far more private than public firms who fulfilled the requirements mentioned in 'sample construction' (220 public and 2282 private).

Five industries provide an N of firms above ten in the matched sample, for eight industries it was not possible to match ten firms. This is due to the absence of enough public firms in the full sample. These industries with an N less than ten are combined into the group 'remaining industries' to create a larger N and therefore validate the outcomes of the research more (Shadish, Cook & Campbell, 2001).

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[1] The remaining industries are combined to one group because of the low N. The group consists of 24 public and private firms in total. The number of firms in each industry is mentioned under the total remaining industry.

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5. Empirical findings

In this chapter the descriptive statistics and empirical findings of this study are compared with the descriptive statistics and empirical findings of other studies on the literature differences in investment behaviour between public and private firms. It must be pointed out that three of three of the four relevant studies concerning this topic have focussed on years before the crisis. Only Asker et al. (2012) have included crisis years for the U.S. Therefore numbers in this study could differ from other studies.

Descriptive statistics

Table 5.1 reports the descriptive statistics of the relevant variables for this study: investment, total assets, sales growth and ROA. As table 5.1 shows, public firms are, before matching, larger than private firms in the Bureau van Dijk database. With total asset means of $1,904.78 million(public) compared to $314,91 million (private) respectively, public firms are more than 6 times larger than private firms. After matching the distributions are nearly identical. The mean total assets for public firms is now $462,82 million and for private firms $441,25 million. The difference is only $21,57 million. This difference is tested in a one sample *t*-test and showed no significant outcome. The same is done for sales growth. Although here the differences are not very large for the full sample. For public firms the mean is 9.3% and for private firms a little higher at 11.9%. Here the difference in sales growth is not significant. After matching the difference in sales growth has even more reduced: 6.3% for public firms and 6.7% for private firms. As suspected, because the difference is smaller, this is not significant as well. ROA is with 6.1% nearly 2% significant higher for private firms. After matching this difference of 0.9% is not significant anymore. These statistics are somewhat matching but also differ in some statistics with other studies. In the studies by Asker et al.

(2012), Mortal & Reisel (2013) and Gilje & Taillard (2012) public firms are also significantly larger than private firms are in their full sample ($1,364.4 million in total assets for public firms and $7.1 total assets for private firms in Asker et al., $2,787 million in total assets for public firms and $200 million in total assets for private firms in Mortal & Reisel, $244 million in total assets for public firms and $35.6 million in total assets for private firms in Gilje & Taillard (2012). The sales growth for the full sample is only given in Asker et al. (2012) they calculated a sales growth for their full sample of 18.3% for public firms and 17.7% for private firms with no significant difference. This is higher than this study shows (9.3% for public and 11.9% for private). After matching Asker et al. (2012) found a greater distribution for sales growth that was significantly different (25.6% for public and 32.7% for private) which is surprisingly unlike this study, where the distribution of sales growth was reduced after matching (6.3% for public and 6.7% for private). These figures do match more with Mortal and Reisel (2013) who found a sales growth for matched firms in The Netherlands of 8% for listed and 11% for unlisted firms. Why Mortal & Reisel (2013) found a higher sales growth could be explained that they focussed their study on the years 1996-2006, which are the years before the crisis. The 4.2% ROA is almost identical with the 6.4% in the study of Asker et al. (2012), but the 6.1% ROA for private firms does not match with the -11.8% for private firms in the U.S. The above comparisons with the descriptive statistics of the other studies on differences in investment behaviour shows that that the sample is somewhat comparable to the samples of the other studies. This studies matches most with the sample of the article of Mortal & Reisel (2013), which focussed on Europe and also The Netherlands. This indicates the validity of the sample of this study.[2]

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[2] The investments are discussed in the section 'investment levels 2004-2010'.

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Table 5.1 | Descriptive statistics

This table presents descriptive statistics for the full samples of public and private firms and for a size-and-industry matched sample over the period from 2004-2010. Chapter 4 gives an explanation how this study constructs the full samples from OSIRIS by Bureau van Dijk, details on the matching procedure and variable definitions and details of their constructions. The table reports means, medians, standard deviations and the percentiles of the key variables used in this empirical analysis as well as pairwise differences in means and medians, with *** and indicating a difference that is significant in a *t*-test (for means) or a pearson χ_2 (for medians) at the 5% level.

		Full Sample				Matched sample		
		Public firms	Private firms	Differences in means and medians		Public firms	Private firms	Differences in means and medians
Investments ($mln)[3]	median	0.0245	0.0080	0.0165***		0.0210	0.0055	0.0155
	st.dev	3.5238	5.6346			0.0873	0.0671	
	min	-0.13	-0.26			-0.11	-0.19	
	25th	-0.0038	-0.0049			-0.0072	-0.0089	
	75th	0.0778	0.0426			0.0778	0.0367	
	max.	57.04	122.67			0.56	0.36	
N		1834	14140			1050	1050	
Firm size								
Total assets ($mln)	**mean**	**1,904.78**	**314.92**	**1,589.86***		**462.82**	**441.25**	**21.57**
	median	190.74	48.53	142.21***		100.49	103.55	-3.06
	st. dev	7,316.48	1,736.66			993.92	887.15	
	min.	4.63	0.06			4.63	4.17	
	25th	46.60	23.57			35.45	33.88	
	75th	805.37	128.29			393.93	408.33	
	max.	92,844.89	54,302.49			684.05	551.99	
N		1834	14140			1050	1050	
Investment opportunities								
Sales growth	**mean**	**0,1180**	**0,1251**	**-0,0071**		**0.1858**	**0.2158**	**-0.030**
	median	0.0443	0.065	-0,0207***		0.2408	0.2748	-0.034
	st. dev	0.5014	0.3669			0.4356	0.4970	
	min.	-2.43	-0.27			-1.45	-1.54	
	25th	0.0100	0.0198			0.0115	0.0159	
	75th	0.1250	0.1247			0.4529	0.5660	
	max.	5.67	6.63			0.97	0.99	
N		1834	14140			1050	1050	
Firm characteristics								
ROA	**mean**	**0.0419**	**0.0610**	**-0.0191***		**0.0426**	**0.0523**	**-0.0097**
	median	0.0341	0.0487	-0.0146***		0.0342	0.0361	-0.0019
	st. dev	0.0741	0.0810			0.0818	0.0848	
	min.	-0.2875	-0.4421			-0.2867	-0.2189	
	25th	0.0065	0.0184			0.0148	0.0101	
	75th	0.0679	0.0940			0.0817	0.0799	
	max.	0.3807	0.6666			0.3807	0.3527	
N		1736	13846			910	910	

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[3] The mean for investments is not presented in this table, it is presented in table 5.4. This is because here it will be discussed.

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Correlations public and private firms

Table 5.2 shows the results of the correlation analyses of the matched sample for public and private firms. In this part both public and private firms are discussed and the results will be compared to other studies who compared similar correlations. For the correlations 910 observations are used (130 public and private firms over 7 years).

Both for public and private firms, sales growth, size and ROA (the variables of interest) are significant related to investment. All numbers are positive and ROA for private negative. Sales growth is even more correlated to investment for public (0.751) than for private firms (0.581). That sales growth correlates positive to investment is not surprising. Other studies also found positive relations between sales growth and firms expanding their assets (e.g. Hong, 2001, on inventories and Borisova & Brown, 2013, on R&D expenditure). Other studies on investment behaviour between public and private firms also stated that sales growth should be positively related to assets expenditure but these studies did not conduct a correlation analysis (e.g. Sheen, 2009; Gilje & Taillard, 2012).

The fact that size shows a higher correlation with investments for public firms (0.678) than for the private ones (0.239) could be the result of this study using bigger private firms and smaller public firms in the sample. It is interesting to note that ROA shows a negative relation to investment for public firms (-0.193) and a positive to private firms (0.266). This could imply that the smaller public firms are not using their assets to the most for creating profit and it could be questioned whether the management of the company is capable for creating value. The larger private firms on the other hand are using their assets very well; here management is creating much value with their assets.

One possible explanation for the difference could be the fact that public firms have higher ownership dispersion; private firms often has owners that is a big part of the daily management. The agency theory could apply to this result. Later in this chapter theory, and its relation, to public and private firms will be further discussed.

Table 5.2 | Correlations public and private firms

This table presents the correlations between the different variables from the matched sample of public and private firms. For variable definitions and their construction see Appendix B. ** and * indicate a significant correlation at the 1% and 5% level respectively.

Public firms	Invest	Sales	Size	ROA	Private firms	Invest	Sales	Size	ROA
Invest	1				Invest	1			
Sales	0.751**	1			Sales	0.581**	1		
Size	0.678**	0.673**	1		Size	0.239**	-0.0291	1	
ROA	0.266**	0.286**	0.147	1	ROA	-0.193*	-0.088	0.058	1

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Investment levels 2004-2010

In the following part the investment levels of the matched sample will be discussed and compared to other studies. Table 5.3 presents the investment levels of public and private firms for the matched sample for the full period, 2004-2010, 2004-2007, 2008-2010 and the annual investment. Also the investment levels per industry is presented, which are proxied as NACE codes. For a description of the NACE codes see appendix A. The table shows means, standard deviations, number of firms, the *t*-score and the p-value. First the empirical findings of this study will be discussed then follows the comparison with other studies.

Table 5.3 shows that public firms invest significantly more than private firms on average. The difference is substantial. Row 1 shows that in the full matched sample, public firms increase their fixed assets by an average of 4,35% of total assets a year, compared to 2,39% for private firms. The annual investment shows only 2 significant differences in investment levels of public and private firms . Only in 2005 and 2006 this difference was significant. This could indicate that both public and private firms invested less after the bank crisis. And that the bank crisis was the reason for this decline. When matched on size and industry, five of the six studied industries show the same tendency as for the full sample. These represent 123 of the 150 firms that are studied. Only a sample of 27 NACE codes 45-47 (wholesale and retail trade) show that private firms in this industry invest more than public firms. None of the differences in the matched industry samples were tested significantly. NACE industry 10-33 and 90-33 are close. An extra look to the investment levels at these industries were done; maybe there were high outliers who could bias the investment levels. This was not the case and the results remain not significant. Figure 6 shows the investment levels of public and private firms made in the whole period of 2004-2010. The graph clearly shows that public firms, on average, invest more than private firms.
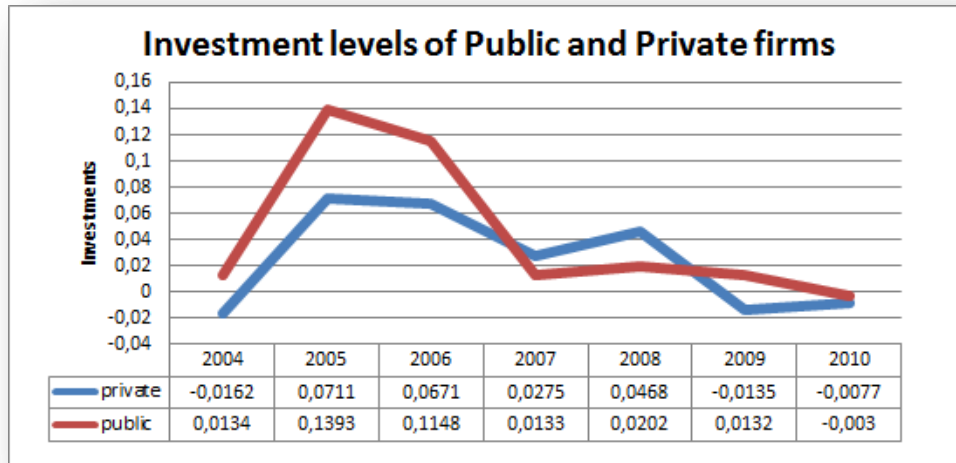
Figure 6 | Investment levels public and private firms 2004-2010

The graph also shows the impact the bank crisis of 2008 had on the investment levels; both public and private firms invested less around this period. For public firms this decrease came in 2007, whereas this decrease for private firms was in 2007 and in 2009.

The findings in this study complements to Mortal & Reisel (2013) in a way that they also found that public firms in Europe invest more over private firms. Listed firms invest, on average, 34% of their fixed assets and this number is 29% for unlisted firms. But for The Netherlands they found that private firms show a higher invest percentage for fixed assets (34% for listed and 58% for unlisted). A reason here for the difference could be that Mortal & Reisel did not incorporate the crisis years in their study. As seen in this study and others the bank crisis has a significant impact on the investment levels of firms. The reason for the high differences in investment percentages is that Mortal & Reisel relate fixed assets growth by end and beginning of fixed assets and not to total assets like this study. As it is logical that total assets represent a much higher number than fixed assets of a firm. Asker et al. (2012) also found that private firms invest more than public firms (4.1% for public and 7.5% for private). In the latest edition of their study (2013) they included the years 2008-2011. In

relation to their older version, which not included these years and ended at 2007, a decline in investment levels can be found when including crisis years into the sample; until 2007 public firms in the U.S. also invested less than private firms but they invested more than during the crisis years, 4.5% for public firms and 7.6% for private firms. This could indicate that the bank crisis is the reason for the decline in investment in the U.S. This study also shows that after the crisis both public and private firms invest less than before the bank crisis.

Table 5.3 | Investment levels of public and private firms

This table compares the mean investment levels of public and private firms for the matched samples, pre-crisis and crisis period of OSIRIS from Bureau van Dijk, the size-and-industry matched samples. Chapter 4 gives details on the matching approach, Appendix B gives the variables definitions and their construction. For NACE codes and their industry see appendix A. The table reports means and standard deviations of investment levels of public and private firms under the different matching specifications, as well as the pairwise differences in means and medians with *** indicating a difference that is significant in a *t*-test (for means) at the 5% level.

	Public firms			Private firms			Public – private firms		
	Mean	std. dev.	Nr. of firms	Mean	std. dev.	Nr. of Firms	Diff. in means	*t*-score	sig. (2-tailed)
Whole period (2004-2010)	**0.0435**	0.0873	150	**0.0239**	0.0671	150	**0.0196***	2.270	0.025
Pre-crisis ('04-'07)	**0.0878**	0.1536	150	**0.0389**	0.0967	150	**0.0489***	3.469	0.001
Crisis ('08-'10)	**0.0090**	0.1030	150	**0.0080**	0.0771	150	**0.0010**	0.095	0.925
Diff. Public Pre-crisis/crisis	**0.0788***							3.360	0.001
Diff. Private Pre-crisis/crisis				**0.0308***				5.713	0.001
Investments per year									
2004	**0.0134**	0.1909	150	**-0.0162**	0.1151	150	**0.0297***	1.685	0.094
2005	**0.1393**	0.2703	150	**0.0711**	0.1181	150	**0.0700***	3.008	0.003
2006	**0.1148**	0.2185	150	**0.0671**	0.1837	150	**0.0534***	2.300	0.023
2007	**0.0133**	0.1454	150	**0.0275**	0.1690	150	**-0.0141**	0.781	0.438
2008	**0.0202**	0.0948	150	**0.0468**	0.1865	150	**-0.0258**	0.345	0.139
2009	**0.0132**	0.2058	150	**-0.0135**	0.1140	150	**0.0267**	1.388	0.167
2010	**-0.0030**	0.1401	150	**-0.0077**	0.1174	150	**0.0047**	0.328	0.743
Samples matched on:									
Industry									
Manufacturing	**0.0384**	0.0774	45	**0.0164**	0.0515	45	**0.0220**	1.656	0.105
Wholesale and retail	**0.0296**	0.0469	27	**0.0365**	0.0513	27	**-0.0069**	-0.632	0.533
Technical activities	**0.0109**	0.05609	24	**0.0081**	0.0434	24	**0.0028**	0.203	0.841
Information, communication	**0.0537**	0.0821	18	**0.0266**	0.1024	18	**0.0270**	0.806	0.431
Transportation, storage	**0.0805**	0.1106	12	**0.0433**	0.0957	12	**0.0372**	0.876	0.400
Remaining industries[4]	**0.0752**	0.1348	24	**0.0278**	0.0796	24	**0.0475**	1.580	0.128
Total			150			150			

[4] Remaining industries: Agriculture, mining, construction, food services, administrative support, education, human health activities, arts, other services

In the next section it will be discussed whether this holds for The Netherlands as well. This study complements on the study by Sheen (2009). He found that public firms invest more than private firms in the U.S. chemical industry but public firms do this less efficient than their private counterparts; private firms are more responsive to positive demand shocks and act accordingly. Gilje & Taillard (2012) also found that public firms invest more than private firms in the U.S. gas and oil drilling industry. This study also includes crisis years up until 2010, but did not made a distinction between these periods. In relation to their capital stock public firms invest 13.2% and private firms 9.7%. The difference of 3.47% was tested significant at the 1% level. When comparing exactly to the NACE 'code oil and gas drilling' and 'chemicals' are listed in, NACE 11 for chemicals (Sheen, 2009) and 13 for crude oil & natural gas (Gilje & Taillard, 2012) in Europe, the results of this study shows that this tendency also is the case for the Netherlands; 3.8% for public and 1.6% for private.

Investment levels pre-crisis and crisis years

Rows 4-7 in table 5.3 show the investment levels of the matched sample before and during the crisis years. Where possible the statistics will be compared to other studies; only Asker et al. (2012) and Gilje & Taillard (2012) have included crisis years into their samples but have not made a distinction between pre-crisis and crisis years and also did not test these different periods. This study has made a distinction between investment of public and private firms before (2004-2007) and during crisis years (2008-2010). Public firms invest more than private firms, both before and after the crisis. Also ,as expected, both public and private firms invest more before the crisis; 8.78% for public and 3.89% for private. During the crisis both public and private firms did not invest 1% fixed assets in relation to their total assets. The decline is greater for public than for private firms (7.88% for public and 3.08% for private). Both the declines are significant at the 1% level. The differences were tested with a one sample *t*-test.

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The results suggest that the bank crisis had an impact on the investment levels of public and private firms in The Netherlands. These results are in line with other studies who also found a negative shock in investment among firms and these negative shocks of the global crisis affected firms in every part of the world. As stated earlier in the two versions of Asker et al. (2012) and (2013) there was also a decline in investment before and after including the crisis years. Duchin et al. (2010) found that investments made by publicly traded firms declined after the mortgage crisis in the U.S. Private firms in the U.K. are holding cash and issued equity for hedging the negative effects of the global crisis, and invest less after the crisis (Akbar et al., 2013). Firms in Latin America stopped investing in innovative projects because of the global crisis (Paunov, 2012). Dornean et al. (2012) showed that the foreign direct investment in Eastern European countries declined after 2008 and Australia is coping with high current account deficits after the global crisis (Karunaratne, 2010).

Hierarchical regression analysis

In the following part the regression analyses are used to discuss the impact of sales growth, size, ROA and industry codes on investment. The regression also tests the impact of the above variables in 3 time periods; 2004-2010, 2004-2007, 2008-2010.

In the upcoming analyses and discussion all three periods will be discussed separately. The full sample shall be compared to other studies. Because other studies on investment behaviour of public and private firms did not made a distinction between pre-crisis and crisis periods it is not possible to compare the results. The results of the pre-crisis years will be compared to the crisis years but only to the results from this study.

The regression uses Durbin Watson statistics to see if there is a presence of autocorrelation. The scores of these statistical tests are accepted, implicating that there is no presence of autocorrelation in the data. The Durbin and Watson statistics values lie between 1.658 and

2.120, where a score of 2 indicates that there is no autocorrelation and 0 score indicating that there is autocorrelation. Makradis & Wheelwright (1978) consider Durbin and Watson values between 1.5 and 2.5 as acceptable level indicating no presence of collinearity. All the score are in between these numbers.

Sales growth, company size and ROA all showed statistically significant correlations. A hierarchical regression analysis with these variables entered into an explanatory model for investment according to their magnitude of correlation.

Full sample | 2004-2010

Table 5.4 reports the results of the estimating equitation for public and private firms on the three periods. A look on the full sample regression analysis results indicate a positive relation for sales growth on all three regressions and the *t*-values are all highly significant at the 5% level. Here it is safe to say that sales growth has a very high impact on the investments made by public and private firms. The adjusted R^2 of 33.8% for public and 46.0% for private show the explanatory value. The sales growth values for private firms are higher at all three regressions. This indicates that the impact of sales growth is higher for private firms than it is for public firms' investment level in the full sample. This higher positive effect of sales growth and investment of private firms were also found by Asker et al. (2012) and Sheen (2009), both results came from the U.S. Mortal & Reisel (2013) found the same results for the Netherlands. All three studies showed a significant positive relation between sales growth and investment.

When looking at the impact of size in the regression all very small coefficients can be found (from 0.002 to 3.712^{-5}), and all significant at the 5% level. Here size does have a significant but not a high impact. The reason for this could be that the regression is done on the matched sample at all times; the variance of size is already ruled out due to the matching. It also gives

evidence that the match in this study is well balanced and controls that firms of equal size, whether public or private, have equal opportunities to invest (Asker et al., 2012).

The same can be said about the impact of ROA on investment levels. It has not a high impact on the investment levels for public and private firms. For pubic firms it has a significant negative impact at the 5% level of -0.003 but for private firms it has not (it would be significant at the 10% level), and it shows a positive coefficient of 0.002. The results are somewhat the same as that for Asker et al. (2012); their study also shows a negative number for public and a positive for private firms. Their coefficients are a little higher at -0.050 for public and 0.089 for private. The difference could be caused by the fact that this study focussed on smaller public and larger private firms, where Asker et al. (2012) included also small to medium enterprises. Public firms often have many more assets than private firms but their turnover is smaller in relation than the turnover by private firms.

The results of the 2004-2010 period showed that only sales growth has a high impact on the investment level of public and private firms. It is very reasonable that sales growth has a positive impact on a firms investments. The other variables did not had high adjusted R^2 changes (size 6.5%; ROA, 2.5%).

Table 5.4 | Factors influencing investment for public and private firms

This table shows a hierarchical regression analysis for the full sample. It exploits the factors that could be of influence to investment for public and private firms. The dependent variable is gross investment. The predictors are sales growth, size and ROA. For variable definitions and details of their construction see appendix A. The sample are size and industry matched using the four digit NACE codes. See chapter 4 for the matching procedure and for the NACE codes. The table shows means for the different periods and the R^2 change.. The *t*-scores are in '( ) ', *** indicates a significance at the 5% level.

	Dependent variable: Investment					
Independent variables						
Full/Pre-crisis/Crisis period	**2004-2010**		**2004-2007**		**2008-2010**	
	Public	**Private**	**Public**	**Private**	**Public**	**Private**
Constant	0.057 (4.575)***	0.001 (0.083)	-0.012 (-0.512)	-0.018 (-0.481)	0.014 (1.933)	0.011 (1.352)
Sales growth	0.069 (8.086)***	0.352 (10.432)***	0.727 (12.059)***	0.476 (5.293)***	0.064 (30.833)***	0.028(1.828)
Adj. R^2	33.8%	46.0%	53.2%	18%	88.1%	2.5%
Constant	0.032 (2.374)***	-0.007 (-0.610)	-0.027 (-1.085)	-0.086 (-3.554)***	0.008 (1.047)	0.012 (1.393)
Sales growth	0.070 (8.591)***	0.163 (4.247)***	0.726 (12.091)***	0.242 (3.980)***	0.064 (30.966)***	0.031 (1.723)
Size	3.435^{-5} (3.732)***	3.712^{-5}(7.267)***	3.048^{-5}(1.450)	0.000 (13.375)***	6.285^{-5}(1.364)	-9.496^{-7}(-0.356)
Adj. R^2	40.3%	61.9%	54%	64%	88.3%	2.6%
Constant	0.046 (3.139)***	-0.017 (-1.392)	-0.022 (-0.786)	-0.099 (-4.006)***	0.006 (0.743)	0.004 (0.400)
sales growth	0.069 (8.503)***	0.145 (3.671)***	0.720 (11.664)***	0.207 (3.308)***	0.064 (30.906)***	0.029 (1.620)
Size	3.553^{-5}(3.920)***	3.772^{-5} (7.441)***	3.162^{-5}(1.489)	0.000 (12.998)***	6.450^{-5}(1.398)	-9.844^{-7}(-0.376)
ROA	-0.003(-2.324)***	0.002 (1.855)	-0.001 (-.0470)	0.004 (2.057)***	0.001 (0.885)	0.002 (2.355)***
Adj. R^2	42.8%	62.9%	54.1%	65.1%	88.4%	6.7%
Durbin-Watson stats	1.658	2.120	1.848	1.992	1.833	2.066
N	910	910	910	910	910	910

Figure 7 shows a graph of the relation between sales growth and investments made by public and private firms in the years 2004-2007. The graph makes clear that there is a positive relation between sales growth and investment for both public and private firms. The line for private firms is less steep than the one for public firms, this suggests that public firms use their realised sales growth more to invest than private firms do in the years before the crisis.
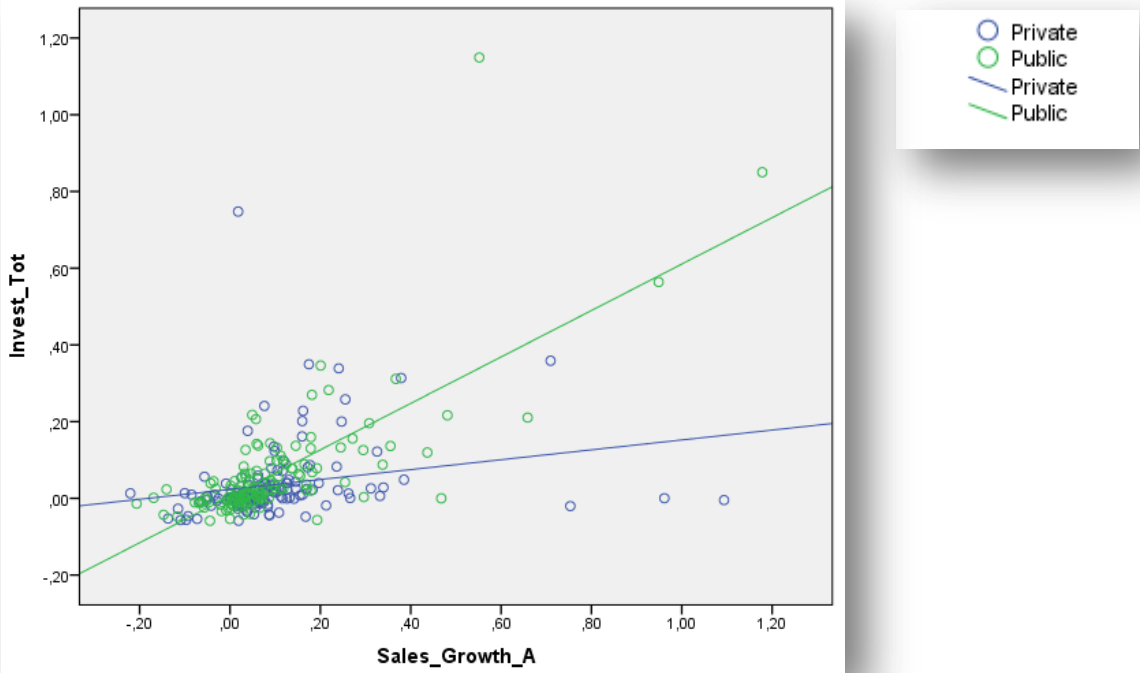

Figure 7 | Relation between sales growth and investment 2004-2007

This is line with the findings in table 5.3 where it is clear that public firms invest more than private firms.

Pre-crisis period | 2004-2007

Next the pre-crisis regression will be discussed. The results of the relation between investment and the three predictors can be found in table 5.4 under the column 2004-2007.

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The first row shows that sales growth for public firms has a coefficient of 0.727 and for private 0.476. Both significant at the 5% level and both show a high positive relation to investment. It implies that both public and private firms did invest quite considerably when a positive number of sales growth was realised. Here it is very notably that public firms are more sensitive to investment opportunities than private firms are in this period. These results are in line with the investment levels of table 5.2; public firms have invested significantly more in the years 2005 and 2006 than private firms, this could explain the difference in the sales growth coefficient when comparing to the 2004-2010 period. As mentioned earlier these results could not be compared with other studies. Because other studies did not differentiate pre-crisis and crisis years. Another explanation could be that before the crisis public firms did have easy access to a deep pool of low cost capital. It is an ongoing discussion that private firms are more financially constraint than comparable public firms are. Private firms cannot raise equity from public-market investors without going public. But they do have the option to raise equity from their own shareholders or raise debt from lenders or the bond markets (Asker et al., 2012). Financial constraints are not directly measurable. Hadlock & Pierce (2010) assess whether a firm is financially constraint by marking firms on their size and age. This study matches firms on size. The descriptive statistics and the regression shows that size is not a significant variable for investments by public and private firms. Therefore one could argue that the matching approach in this study helps to, at least partially, control for differential financial constraints between public and private firms.

Again the impact of size is in this period very small, 3.048^{-5} for public firms and <0.0001 for private firms. The coefficient for public firms is even insignificant. Not very much can be said on these numbers as they show very little impact. Also ROA shows coefficients near zero. Previous studies have shown that ROA is positively related to investment (e.g. Fazzari et al., 1988). The regression in this study shows that ROA is not of big influence to investment. This

is in line with Kaplan & Zingales (1997), who disagree on the opinion that ROA can be proxied for investment sensitivities.

Crisis period | 2008-2010

This part discusses the regression for the crisis period. The results of the relation between investment and the three predictors can be found in table 5.4 under the column 2007-2010. The sales growth coefficients dramatically declined for both public (0.064) and private (0.028) firms in relation to the pre-crisis period. Only the coefficient for public firms is significant at the 5% level, the number for private would be significant at the 10% level. The decline is robust to the decline in investment levels of the years 2008-2010 shown in table 5.2. The huge downfall of the coefficients could clearly be interpreted as a result of the bank crisis. As stated earlier other studies also recognize the bank crisis as a reason for lower investment levels (e.g. Asker et al., 2012) also show lower investment numbers after the crisis in the U.S.) When looking at the percentages of investments made in table 5.2 by public and private firms they show almost the same number (0.9% for public, 0.8% for private). Asker et al. (2012) also found that public firms invested as much as private firms after the crisis. The decline in investment and for sales growth as a predictor for investment in the crisis years is greater for public firms than for private firms. Here the debate that public firms have easier access to capital could be reopened. The public-equity market has reacted more to the bank crisis than the private lender market did. Thus public firms are more negatively influenced by the bank crisis than private firms. It is argued that private firms already are more financially constrained than public firms so it could be a logical effect that public firms are more influenced by the crisis. Also it could be said that private firms can only pursue investment opportunities when macro conditions are favourable. It must be pointed out that this study tests larger private and smaller public firms. Financing constraints may well have an

important impact on the investments made of the vast number of smaller private firms in the economy (Asker et al., 2012).

The size and ROA coefficients again show numbers close to zero are for only one not significant. Although size already was a very low number, it declined even more after the bank crisis. Indicating that size is even less important for investment after the crisis.

Table 5.5 | Factors influencing investment for public listed firms and private firms

This table shows two hierarchical regression analyses for; (1) 18 Dutch public listed firms matched with private firms on size taken from the full sample and (2) a new sample from 35 Dutch public listed firms. It exploits the factors that could be of influence to investment for public listed and private firms. The dependent variable is gross investment. The predictors are sales growth, size and ROA. For variable definitions and details of their construction see appendix A. See chapter 4 for the matching procedure. The table shows means for the different periods and the R^2 change. *** indicates a significance at the 5% level.

Dependent variable: Investment

Independent variables	2004-2010		2004-2007		2008-2010	
Full/Pre-crisis/Crisis period						
(1)	Public Listed	Private	Public Listed	Private	Public Listed	Private
Constant	0.048***	0.053	0.050***	0.109	0.027***	-0.005
Sales growth	0.238***	0.037	0.303***	0.026	0.055	0.324***
Adj. R^2	30.5%	0.2%	54.2%	0.1%	2%	37,9%
Constant	0.065***	0.009	0.066***	0.019	0.025	-0.004
Sales growth	0.192***	0.045	0.278***	0.038	0.056	0.324***
Size	-1.565^{-6}	2.123^{-5}	-1.627^{-6}	4.259^{-5}	3.039^{-7}	-4.982
Adj. R^2	35.3%	9.6%	56.2%	9.6%	2.1%	37.9%
Durbin-Watson stats	2.489	2,504	1.912	2.619	1.855	2.104
N	126	126	54	54	54	54
(2)	Public Listed		Public Listed		Public Listed	
Constant	0.057***		0.050***		0.027***	
Sales growth	0.167***		0.303***		0.055	
Adj. R^2	17.7%		54.2%		2%	
Constant	0.072***		0.066***		0.025	
Sales growth	0.131***		0.278***		0.056	
Size	-1.581^{-6}		-1.627^{-6}		3.039^{-7}	
Adj. R^2	24.7%		56.3%		2.1%	
Constant	0.049***		0.059***		0.015	
Sales growth	0.211***		0.285***		0.148***	
Size	-1.560^{-6}		-1.652^{-6}		-4.006^{-7}	
ROA	0.003		0.001		0.005***	
Adj. R^2	32.6%		56.8%		34.9%	
Durbin-Watson stats	1.876		1.906		2.134	
N	245		105		105	

Investments of public listed firms

Table 5.5 report the results of the estimating equitation for public listed firms. These regressions are done for robustness checks of the main results. The table shows two regressions; number one (1) show the results for 18 public listed firms matched with private firms on size taken from the full sample. Due to data restrictions from the full sample only 18 public listed firms could be used in this regression. Number two (2) is a new sample of 35 public listed firms retrieved from Bureau van Dijk's ORBIS. The database provides data on public listed firms from the AEX and AMX, which contain the 50 largest funds in the Netherlands. Due to strict data requirements 15 firms could not a part of this sample. The requirements used for this sample are reported in chapter 4.

When we take a look at the regressions we see that sales growth shows a significant positive relation on almost all the regressions for public listed firms. For the 18 matched private firms it does not show a significant relation, only in the 2008-2010 period. For public listed firms it is safe to say that sales growth has a high impact on the investments made. Table 5.5 show somewhat other results than table 5.4, in a way that sales growth shows a higher impact for public listed firms than for private firms. These results are the opposite of the results found by Asker et al. (2012) and Sheen (2009) who found a higher effect of sales growth for private firms. Table 5.5 shows the same tendency before and during the crisis years for public listed firms when looking at the impact of sales growth as table 5.4; it shows a big decrease for the impact of sales growth. But here it is not significant in the 2008-2010 period for both the 18 and 35 sample of pubic listed firms. As mentioned earlier this decline could be interpreted as a result of the bank crisis. The results are robust to the results in table 5.2, were a decline in investment levels are found in the years 2008-2010. A somewhat remarkable result is found for private firms during the crisis years. Here the coefficient of sales growth is 0.324 and

significant at the 5% level. It is much higher than before the crisis. What caused this higher impact is hard to say. The regression uses 18 larger private firms, in relation much larger than the full sample. This could point to the fact that larger private firms did not suffer as much form the bank crisis as the, in relation, than the smaller private firms. This could be an option to test in future research.

Agency issues

Could the agency problem theory be of influence of the investment behaviour of public and private firms? Chapter 2 discusses four agency models that predict suboptimal investment behaviour among public firms; asymmetric information, 'the quiet life' , empire builders and short-termism. When taking a look which models fits with the regression and investment levels, especially in the pre-crisis and crisis years, it becomes clear that two models fit with the results. In the pre-crisis years public firms were investing significantly more than private firms. Public firms invested 8.78% of their total assets and private firms 3.89%. Public firms were also far more responsive to investment opportunities; in the regression the sales growth coefficient showed much higher numbers than it did for the private firms. It seems that managers kept investing cash form investors into new projects. This tendency corresponds to the empire builders theory (e.g. Jensen, 1986). Empire builders keep investing because they have a preference for scale, regardless if the investment is of good quality or not. Eventually this could result in overinvestment which will bring extra costs of the low quality investments made. However, the quality of the investments made is not measured in this thesis, so it not possible to claim this type of agency issue. As stated earlier the crisis period shows a big decline in investments made and for the responsiveness to investment opportunities for both public and private firms. When concentrating on the public firms, investment levels lowered with 7.88% (against 3.08% for private firms). The coefficient for sales growth also lowered in

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the crisis years. Public firms show a more strict policy concerning investments and invest less in these hard crisis years. Managers are avoiding the costly efforts involved of making risky investment decisions. Especially the crisis years give little NPV projects so the risk/return ratio could scare the managers to invest. Furthermore managers of public firms can derive utilities from the stock price of the firm. This can give him an incentive to 'manipulate' the current stock price. He does this by underinvesting, and therefore boost the of expectations of investors' future cash flows of the firm (Stein, 1989). This behaviour is called short-termism or 'the quiet life' (e.g. Coccorese & Pellecchia, 2010; Palley, 1997)

The data in this study did not provide ownership data for private firms. This makes it not possible to test and compare ownership structure between public and private firms.

6.   Conclusions

This thesis compares the investment behaviour of comparable public and private firms, matched on size and industry, for The Netherlands. This thesis focussed on the years 2004-2010. This period is divided into three periods; the whole period, 2004-2010, the pre-crisis period, 2004-2007, and the crisis period, 2008-2010. In this thesis a sample of 150 public and 150 private firms from The Netherlands are used.

The analyses show that over all the three periods public firms invest significant more than private firms. When the sample is split into different NACE industries the analysis shows the same results; in every industry public firms invest more than private firms except for wholesale and retail. For the period 2004-2010 pubic firms are less responsive to invest when there are opportunities to invest for the firm(in this thesis these opportunities are proxied as sales growth). For the pre-crisis and crisis years public firms are more responsive to investment opportunities. The difference in investments made and responsiveness for investment opportunities is for pubic firms far more bigger than it is for private firms when compared to pre-crisis and crisis years. This indicates that pubic firms have more tightened up when it comes to investment. This decrease in investment for public firms could indicate a presence of a typical type of agency problem. Many studies have argued that the separation of ownership and control of public firms can lead to agency problems between managers and dispersed investors which in turn leads to suboptimal investment decisions (e.g. Jensen & Meckling, 1976; Fazarri et al., 1998). The results of this thesis could indicate that public firms' investment decisions after the crisis are affected with managerial short-termism, which lead them to underinvest. The same results for agency issues is found by Asker et al. (2012). Another possibility of the decline in investment could be that there is less cash to invest after the bank crisis. Also, financial markets could have implemented more strict lending standards. This thesis did not investigate these issues. This could be an option for future research. It is

impossible to say whether the managers of public firms were empire builders before the crisis; the quality of the investments made is not measured. This could also be an idea for future research.

As with all research, there are some limitations to this study. The main limitation of this study is the relative small sample size, which consists of 150 public and 150 private firms. Other research by Asker et al. (2012) used 4.360 public and 99.040 private firms and Mortal and Reisel (2013) used 11.488 public and 10.881 private firms respectively. Other limitations from the sample arrive that mostly public sector firms are used in the sample instead of public listed firms. Also limitations exist with the crisis period research. This study focusses solely on firms from The Netherlands, to truly understand the investment behaviour during crisis years a much broader scope is needed. The research should include multiple countries or a bigger country. Also limitations are caused by the fact that one crisis is used. This thesis uses the bank crisis of 2008, more crises with different causes could be included to increase the validity. Further limitations are caused by the fact that the analyses are done with annual data. When using quarterly data future research would be more precise.

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Appendices

Appendix A glossary and variable definitions

Variable	Definition
Crisis years	The years during the bank crisis in The Netherlands; 2008-2010.
Durbin-Watson	A number that test for autocorrelation in the residuals from a statistical regression analysis. It ranges from zero to four and a score of two implies that there is no autocorrelation in the sample.
ε	Error variable of the regression analysis.
Economic growth	The average change in real gross domestic product. (real GDP year 1 – real GDP year 0 / real GDP year 0) * 100%.
Financially constrained	Firms which are not able to attract sufficient financial funds for their day-to-day operations.
Fixed assets	A long-term tangible piece of property of a firm that is not expected to be consumed or converted into cash before one year's time.
Investment	The annual increase in gross fixed assets (aggregate amount of physical goods)divided by beginning-of-year total assets.
Investment opportunities	See sales growth.
NACE code	Numeric, 4 digits code that represents an industry in which a firm operates.
Pre-crisis years	The years before the crisis started in the Netherlands; 2004-2007.
Private firms	A firm whose ownership is private. A private company may issue stock but do not have to trade on public exchanges.
Public sector firms	A firm that can issue stock to everyone and does not have to write the names of the owner in a register.
Public listed firms	A firm that has issued securities through an initial public offering and is traded on at least one stock exchange.
ROA	Measure of profit per asset value (1-year average). Calculated as operating income before depreciation scaled by beginning of year total assets (Asker et al., 2012).
Sales growth	The annual increase of sales. Sales growth is calculated as (current sales – last years' sales) / last years' sales x 100%.
Size	Natural logarithm of book value of total assets.
Total assets	Total resources with economic value that a firm owns.

Appendix B Public and private firms sample

Public firms

Agriculture, forestry and fishing
1. ASTARTA HOLDING

Mining and quarrying
2. HUCO, HANDEL- EN SCHEEPVAARTMAATSCHAPPIJ
3. ANKERPOORT
4. CORE LABORATORIES
5. AGIP KAZAKHSTAN NORTH CASPIAN OPERATING

Manufacturing
7. J.C. BAMFORD
8. KONINKLIJKE DELFTSCH AARDEWERKFABRIEK 'DE PORCELEYNE FLES ANNO 1653'
9. ROODMICROTEC
10. FUNCOM
11. VALUE 8
12. J.P. HAVENS GRAANHANDEL
13. WEZO GROEP HOLDING
14. HYDRATEC INDUSTRIES
15. INVENSYS SYSTEMS
16. MTB REGIO MAASTRICHT
17. DE KUYPER HOLDING

18. TEMA HOLDING
19. XEIKON
20. SPYKER
21. SNOWWORLD
22. PHARMING GROUP
23. HOLLAND COLOURS
24. DOCDATA
25. POLYMER LOGISTICS
26. LELY INDUSTRIES
27. BETER BED HOLDING
28. BEIERSDORF
29. TOMTOM
30. NEDERLANDSCHE APPARATENFABRIEK 'NEDAP'
31. NEWAYS ELECTRONICS INTERNATIONAL
32. CROWN VAN GELDER
33. APM HOUDSTERMAATSCHAPPIJ
34. ACCELL GROUP
35. ZEELAND REFINERY
36. PONTMEYER
37. BE SEMICONDUCTOR INDUSTRIES
38. KENDRION
39. HEAD
40. QIAGEN
41. TELEGRAAF MEDIA GROEP
42. GEMALTO
43. ASM INTERNATIONAL
44. KONINKLIJKE WESSANEN
45. HUNTER DOUGLAS

Private firms

Agriculture, forestry and fishing
1. PARTICIPATIEMAATSCHAPPIJ ONINGS

Mining and quarrying
2. KARACHAGANAK PETROLEUM OPERATING
3. HOUDSTERMAATSCHAPPIJ DEKKER
4. NOBLE DRILLING (NEDERLAND)
5. GDF SUEZ GLOBAL GAS HOLDING NEDERLAND
6. PETROBRAS INTERNATIONAL BRASPETRO

Manufacturing
7. BOSMA & BRONKHORST
8. LENNOX BENELUX

9. AKATHERM
10. GOODYEAR (NEDERLAND)
11. VAN AARSEN GROUP
12. PQ ZEOLITES
13. TRAMEDICO HOLDING
14. VOESTALPINE WBN
15. THYSSENKRUPP ACCESSIBILITY
16. CYCLING SPORTS GROUP EUROPE
17. HAMILTON SUNDSTRAND CUSTOMER SUPPORT   CENTER MAASTRICHT
18. DUTCH SPACE
19. KREHALON INDUSTRIE
20. VDL BUS CHASSIS
21. PAPIERFABRIEK DOETINCHEM
22. R.J. VAN SEENUS
23. TAD INOX SERVICE
24. OTIS
25. KROEF HOLDING
26. NN NETHERLANDS
27. VERMILION OIL & GAS NETHERLANDS
28. YANMAR MARINE INTERNATIONAL
29. YAGEO EUROPE HOLDING
30. TANATEX CHEMICALS
31. DELPHI CONNECTION SYSTEMS NETHERLANDS HOLDING
32. VANDERLANDE INDUSTRIES HOLDING
33. SYNGENTA CHEMICALS
34. SIHI GROUP
35. ROBA HOLDING
36. WATTS INDUSTRIES EUROPE
37. SULZER NETHERLANDS HOLDING
38. ALCAN HOLDINGS NEDERLAND
39. GAS AND TECHNOLOGIES WORLD
40. INFINEUM HOLDINGS
41. TBI BEHEER
42. CLONDALKIN GROUP HOLDINGS
43. BOSTON SCIENTIFIC INTERNATIONAL
44. INTERNATIONAL FLAVORS & FRAGRANCES I.F.F. (NL)
45. BASF NEDERLAND

46. NUTRECO
47. SIEMENS NEDERLAND
48. CORBION
49. ASML HOLDING
50. BAVARIA
51. ROYAL TEN CATE

46. HUNTSMAN INVESTMENTS (NETHERLANDS)
47. TATA STEEL IJMUIDEN
48. SABIC INTERNATIONAL HOLDINGS
49. EUROSPECIALITIES FOODS
50. YARA SLUISKIL
51. BASELL BENELUX

Construction
52. STADSHERSTEL DEN HAAG EN OMGEVING
53. VDR HOLDING
54. BATENBURG TECHNIEK
55. ARCHIRODON GROUP
56. DURA VERMEER GROEP
57. BALLAST NEDAM

Construction
52. H.I.G. BEHEER
53. FRISO BOUWGROEP
54. SMIT'S BOUWBEDRIJF
55. BALLAST NEDAM INFRA
56. TBI BOUW
57. VOLKERWESSELS BOUW&VASTGOEDONTWIKKELING

Wholesale and retail trade
58. REHAU
59. JACOB SPREY
60. VEREENIGDE INGENIEURSBUREAUX
61. CONCORDIA HOLDING
62. TRIPLE P
63. UNIVAR ZWIJNDRECHT
64. ENVIPCO HOLDING
65. COLOMBIER GROUP
66. AMSTERDAM COMMODITIES
67. RIVA
68. PARFIBEL
69. KONINKLIJKE REESINK
70. COPACO
71. PGA NEDERLAND
72. KOOPS FURNESS
73. MICHELIN NEDERLAND
74. KUIKEN
75. LEKKERLAND BEHEER
76. MACINTOSH RETAIL GROUP
77. X5 RETAIL GROUP
78. STERN GROEP
79. HITACHI CONSTRUCTION MACHINERY (EUROPE)
80. SLIGRO FOOD GROUP
81. YAMAHA MOTOR EUROPE
82. OTRA
83. CANON EUROPA
84. FUHRMANN 1735

Wholesale and retail trade
58. TIMBERLAND EUROPE
59. FESTO
60. UNIVAR
61. TEEUWISSEN HOLDING
62. YARA INDUSTRIAL
63. VAN BEIJNUM BEHEER
64. ALSTOM POWER NEDERLAND
65. BIKEUROPE
66. H.L. BARENTZ
67. HOBAHO
68. UNIVERSAL ELECTRONICS
69. SAMSUNG ELECTRONICS BENELUX
70. ROBERT BOSCH
71. MARTINICO BEHEER I
72. INTERGAMMA
73. NISSAN MOTOR PARTS CENTER
74. BUFFIN
75. FAHRENHEIT HOLDING
76. DKM HOLDING
77. NIDERA
78. SPERWER HOLDING
79. AES ANDRES
80. SHIN-ETSU INTERNATIONAL EUROPE
81. MATTEL EUROPA
82. NIKE EUROPEAN OPERATIONS NETHERLANDS
83. ABBOTT HOLDINGS
84. SONY SUPPLY CHAIN SOLUTIONS (EUROPE)

Transportation and storage
85. MAASVLAKTE OLIE TERMINAL
86. EINDHOVEN AIRPORT
87. HOLLAND METROLOGY
88. KUEHNE + NAGEL
89. TEXELS EIGEN STOOMBOOT ONDERNEMING
90. G3 WORLDWIDE MAIL
91. H.E.S. BEHEER
92. DB SCHENKER RAIL NEDERLAND
93. HTM PERSONENVERVOER
94. CONNEXXION HOLDING
95. Q PARK
96. KONINKLIJKE VOPAK

Transportation and storage
85. DEN HARTOGH LIQUID LOGISTICS
86. KAHN HOLDING
87. HOLDING VAN DER LEE INTERNATIONAAL
88. STOLT-NIELSEN INLAND TANKER SERVICE
89. FLINTER GROEP
90. ENI CHINA
91. ENI TUNISIA
92. EWALS HOLDINGS
93. ENI ANGOLA PRODUCTION
94. KONINKLIJKE WAGENBORG
95. STOLT TANKERS
96. BLUE STREAM PIPELINE COMPANY

Accommodation and food storage
97. EXPLOITATIEMAATSCHAPPIJ DE KRIM

Information and communication
98. TIE KINETIX
99. CATALIS S.E.
100. C/TAC
101. AND INTERNATIONAL PUBLISHERS
102. LAVIDE HOLDING
103. KONINKLIJKE BRILL
104. NEDSENSE ENTERPRISES
105. ICT AUTOMATISERING
106. UNISYS NEDERLAND
107. TCC GLOBAL
108. TELEPLAN INTERNATIONAL
109. UNIT4
110. EXACT HOLDING
111. ORDINA
112. SITA
113. KONINKLIJKE SWETS & ZEITLINGER
HOLDING
114. TELE2 NETHERLANDS HOLDING
115. WOLTERS KLUWER

Professional, scientific and technical activities
116. KIENHUISHOVING
117. PRICEWATERHOUSECOOPERS ADVISORY
118. KEYGENE
119. HET WATERLABORATORIUM
120. NYSINGH ADVOCATEN - NOTARISSEN
121. ICTS INTERNATIONAL
122. AD PEPPER MEDIA INTERNATIONAL
123. CENTRAL INDUSTRY GROUP
124. STIBBE
125. ROVA HOLDING
126. FLYNTH HOLDING
127. NAUTADUTILH
128. KPMG ADVISORY
129. KEMA
130. BRUNEL INTERNATIONAL
131. ONS HOUDSTERMAATSCHAPPIJ
132. DE BRAUW BLACKSTONE WESTBROEK
133. WORLD FASHION CENTRE AMSTERDAM
HOLDING
134. KONINKLIJKE AHREND
135. KPMG
136. GRONTMIJ
137. COFELY NEDERLAND
138. ARCADIS
139. FUGRO

Administrative and support service activities
140. INCLUSIEF GROEP
141. DPA GROUP
142. SAFE INFORMATION GROUP
143. GRAYDON HOLDING
144. USG PEOPLE

Human health and social work activities
145. ACHMEA SERVICES

Accommodation and food storage
97. SUPPLAIR HOLDING

Information and communication
98. TECHNOLUTION
99. SIOUX EMBEDDED SYSTEMS
100. THOMSON REUTERS (MARKETS)
NETHERLANDS
101. ALGEMEEN NEDERLANDS PERSBUREAU
ANP
102. GOOGLE NETHERLANDS
103. EASYNET HOLDING
104. AVAYA NEDERLAND
105. NINTENDO BENELUX
106. ACN EUROPE
107. AT&T GLOBAL NETWORK SERVICES
108. UNITED INTERNATIONAL PICTURES
109. EMI GROUP NETHERLANDS
110. TRAVELPORT GLOBAL DISTRIBUTION
SYSTEM
111. SHELL INFORMATION TECHNOLOGY INT.
112. MCAFEE INTERNATIONAL
113. ATOS NEDERLAND
114. AMERICAN POWER CONVERSION
CORPORATION
115. UPC HOLDING

Professional, scientific and technical activities
116. KH ENGINEERING
117. BAAS HOLDING
118. BIO SEEDS
119. L.W. HOLDING
120. COLIJN BEHEER
121. KROPMAN HOLDING
122. TBWA NEDERLAND
123. KOPPELENWEG II
124. THALES INTERNATIONAL EUROPE
125. VINK HOLDING
126. ERNST & YOUNG PARTICIPATIES
127. FLUOR EUROPE
128. S.V.Z. INDUSTRIAL PRODUCTS
129. SPENCER STUART INTERNATIONAL
130. TECHNIP BENELUX
131. LOYALTY MANAGEMENT NETHERLANDS
132. TBI TECHNIEK
133. SCHAEFFLER NEDERLAND HOLDING
134. LZG GROUP
135. CITADEL ENTERPRISES
136. CARGOBULL FINANCE HOLDING
137. DELOITTE HOLDING
138. SHELL GLOBAL SOLUTIONS
INTERNATIONAL
139. BLUEWATER HOLDING

Administrative and support service activities
140. ZEEUWSE REINIGINGSDIENST
141. REISINFORMATIEGROEP
142. ABT HOLDING
143. JALPAK INTERNATIONAL (EUROPE)
144. FINTUR HOLDINGS

Human health and social work activities
145. S.K.L. KINDEROPVANG

Arts, entertainment and recreation
146. DE TWENTSE SCHOUWBURG
147. DEVENTER
ONTWIKKELINGSMAATSCHAPPIJ
SPORTCOMPLEXEN
148. CHASSE THEATER BEHEER
149. VRIENDENLOTERIJ

Other service activities
150. ORANJEWOUD

Arts, entertainment and recreation
146. RODA J.C.
147. DOLFINARIUM HARDERWIJK

148. MARTINIPLAZA
149. WVI FILMS

Other service activities
150. DYNAGROUP