Impact of capital structure choice on investment decisions

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Author: Frank de Crom

Student Administration Number: 104578

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Supervisor: Mintra Dwarkasing

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# Table of Contents

Chapter 1: Introduction.............................................................................................................. 2
Chapter 2: Literature review ................................................................................................... 5  
  2.1 Relation between leverage and investment decisions ...................................................... 5  
    2.1.1 Leverage ................................................................................................................. 5  
    2.1.2 Underinvestment and overinvestment ...................................................................... 5  
    2.1.3 The effect of leverage on future growth .................................................................... 6  
    2.1.4 Extension of the investment decision analysis .......................................................... 7  
  2.2 Other determinants of investment decisions .................................................................... 7  
    2.2.1 Tobin’s Q ................................................................................................................ 7  
    2.2.2 Free cash flow ......................................................................................................... 8  
    2.2.3 Profitability ............................................................................................................. 8  
    2.2.4 Liquidity .................................................................................................................. 8  
    2.2.5 Sales ....................................................................................................................... 9  
    2.2.6 High-growth vs. low-growth effect on investment decision ....................................... 9  
  2.3 Implications of financing method for investments ............................................................ 9  
    2.3.1 Macro-economic environment ................................................................................ 10  
    2.3.2 Short-sighted investment problem .......................................................................... 11  
    2.3.3 Asset substitution problem ..................................................................................... 11  
    2.3.4 Business risk .......................................................................................................... 12  
Chapter 3: Econometric analysis ............................................................................................ 13  
  3.1 Investment equation ....................................................................................................... 13  
  3.2 Explanation of the variables ......................................................................................... 13  
  3.3 Some additional information regarding the econometric analysis .................................. 15  
    3.3.1 Price-to-earnings (P/E) ratio .................................................................................. 15  
    3.3.2 Optimal regression method .................................................................................... 16  
    3.3.3 Endogeneity Problem .............................................................................................. 16  
Chapter 4: Results .................................................................................................................... 17  
  4.1 Correlations ................................................................................................................... 17  
  4.2 Outliers ......................................................................................................................... 17  
  4.3 Regression ..................................................................................................................... 17  
    4.3.1 Whole sample regression analysis ......................................................................... 18  
    4.3.2 High-growth sample regression analysis ................................................................. 18  
    4.3.2 Low-growth sample regression analysis ................................................................. 19  
Chapter 5: Conclusion.............................................................................................................. 20  
Reference list .......................................................................................................................... 22  
Appendix .................................................................................................................................. 24
1. Introduction

This research investigates whether the capital structure choice influences managers’ investment decision. The capital structure is of great importance for a company. It gives the ratio between the amount of equity and debt capital that a company uses to finance its assets. This ratio is important, not only because it affects the financial situation of the firm, but also because the stakeholders have different interests in this area. In addition, the capital structure gives signals to the market, which may affect the value of the company in question. For example, if a company is willing to exchange debt for equity, this can increase firm value or reduce firm risk, because there is a signal to the market that the debt capacity has increased (Myers, 1984). Hence, managers pay great attention to finding a good distribution of debt and equity.

There has already been much research to the factors that influence decisions concerning the capital structure. Four major theories of corporate financing have been developed, according to Myers (2002).

First, the Modigliani-Miller theory (1958), alleging that in complete markets investment decisions do not affect the capital structure.

Furthermore, we know the trade-off theory, which states that companies, in making decisions regarding the issue of debt, weigh the tax benefits against the downside of financial distress costs.

The third theory looks at the agency problems, which means that managers have different incentives in determining the leverage ratio.

Finally there is the pecking-order theory. This theory considers the hierarchy of sources of financing as the main factor in determining the capital structure, with retained earnings as first choice and equity funding as a last resort.

Nowadays, the most important factor that affects the decision to issue debt instead of equity is the financial flexibility of firms (Graham and Harvey, 2001). Financial flexibility is defined by Soku Byoun (2008) as “a firm's capacity to mobilize its financial resources in order to take preventive and exploitive actions in response to uncertain future contingencies in a timely manner to maximize the firm value”. Managers choose their leverage ratio in such a way that they are, among others, able to finance their future investment opportunities. This, in turn,
affects the managers’ decisions of current investment opportunities, because they can be afraid to borrow up to their debt capacity.

There clearly is some interaction between investment decisions and capital structure decisions of firms. For instance, the paper of Odit and Chittoo (2008) provides empirical evidence of this relation by investigating the effect of leverage on investment decisions of 27 Mauritian firms. This paper supported earlier research in this field by, for example, Varouj A. Aivazian, Ying Ge, Jiaping Qiu (2005), who examined the Canadian publicly traded firms. They both found a significantly negative relationship between leverage and investments.

Furthermore, they found even more interesting evidence that this interaction is significantly stronger for low-growth firms, than it is for high-growth firms. I want to test this statement by performing regression analysis on the 25 AEX-listed firms of the Euronext Amsterdam, to see whether their results can be extended to Dutch firms as well.

The main research question then is: What is the effect of leverage on the investment decisions of all Dutch AEX-listed firms, low-growth AEX-listed firms and high-growth AEX-listed firms?

The overall goal is to investigate the influence of the capital structure on the investment decisions of the managers of the firms, but therefore the following sub-questions have to be answered:

- What is the expected relationship between leverage and investment decisions of firms based on earlier research?
- Which factors will be part of the regression model for investment?
- What is the best way to estimate the variables of the regression model?
- What is the most appropriate regression method for the estimation of the leverage impact on investment?
- How can we make the distinction between high-growth and low-growth firms?

In the following section I will outline the relationship between leverage and investment, I will discuss the choice of the variables in the regression model on the basis of earlier literature and explain the division between high-growth and low-growth firms on the basis of existing
literature. Because there are some implications regarding the financing method for investments, I will give some information about that as well. Section 3 introduces the regression model. It provides a description of the variables I am going to use in the econometric analysis, we will discover the best regression method and also the way to separate the low-growth firms from the high-growth firms. Section 4 shows us the results of the regression analysis and finally, Chapter 5 will conclude and will answer the main research question.
2. Literature Review

2.1. Relation between leverage and investment decisions

2.1.1. Leverage

Before explaining the link between leverage and investment decisions, it is necessary to have a clear understanding of what leverage actually means. Leverage has multiple definitions, but the most common one is the degree to which an investor or business is utilizing borrowed money; it is the amount of debt used to finance a firm’s investments. Opler and Titman (1994) measure leverage by taking the book value of liabilities in terms of the book value of total assets. This ratio was adopted by many others, like Lang et al. (1996) and Odit and Chittoo (2008). In some papers, an adjustment is made to account for a dominant role of long-term debt in the investment decision. We then take only long-term liabilities instead of total liabilities in the numerator of the leverage ratio, in order to investigate whether or not firms tend to borrow more money with high maturity rather than low maturity when financing an investment.

2.1.2. Underinvestment and overinvestment

As stated in the paper of Myers (1977), debt overhang gives managers incentives for underinvestment. In his paper, he describes two important reasons for the previous statement. First of all, the benefits of a positive net present value investment in a highly levered firm accrue partially to the debt holders instead of fully to the shareholders. More important however, a high leverage ratio means a lower financial flexibility, which can cause a liquidity problem in the future. This can give rise to a negative relationship between investments and leverage, because managers will take preventive actions regarding the leverage ratio, when they recognize valuable growth opportunities.

There is also a possibility of overinvestment. This means that there is a conflict between managers and shareholders, because the first group wants to increase the scale of the firm by undertaking negative NPV-investment opportunities, thereby reducing the welfare of the
shareholders. Because there are not enough free cash flows available, they have to borrow money and as a consequence, there is an increase in debt obligations. Here, debt has a disciplinary role, because the lack of funds prevents managers from undertaking negative NPV-projects, which implies a negative interaction between debt and investments.

The paper of McConnell and Servaes (1995) supports the work of Myers. They focused on the relation between corporate value, leverage and equity ownership, and found that for firms with low-growth opportunities, leverage is positively correlated with the value of the firm, due to the overinvestment problem. That is, when firms with more internally generated funds than investment opportunities finance their projects with debt, the value of the firm increases. In this paper, they also tested the hypothesis that the allocation of equity ownership has an influence on corporate value. They predicted a strong effect of the allocation on the value of the firm, given that managers want to increase the size of the firm at the expense of the interests of the shareholder, on the condition that they get rewarded for it. If there is no separation of management and equity ownership, there is no conflict of interest. This reduces the overinvestment problem and increases firm value. The results of their research supported this statement.

2.1.3. The effect of leverage on future growth

Lang et al. (1996) take a somewhat different point of view, namely that leverage affects future growth. They investigate this hypothesis by using 3 measures. The first is capital expenditures in excess of depreciation normalized by fixed assets, the second is the rate of growth of capital expenditures and the last is the rate of increase of employment. The result is a strong negative relation between leverage and all growth measures, and that this relation is underestimated when the regression takes into account leverage only through its impact on cash flows.

They provided evidence that the negative effect of leverage is significant for firms with growth opportunities which are not recognized by the market and for firms that have low growth opportunities but still want to grow.
2.1.4. Extension of the investment decision analysis

As I mentioned before, Varouj A. Aivazian, Ying Ge, Jiaping Qiu (2005) did some interesting research on the effect of leverage on investment decisions by using panel data of Canadian publicly traded firms between 1982 and 1999. By using 6231 observations of 863 firms, they were able to give a good approximation of the impact of leverage on investment. However, in order to draw conclusions regarding the leverage effect, they had to deal with some important issues.

First of all, they wanted to extend the work of Lang et al. (1996) by taking into account the heterogeneity which exists across firms and across industries. Assuming that the unobservable individual effect is larger than zero, they use fixed-effect regression in addition to the random effect model and pooling regression. As I will explain later, fixed regression seems the most suitable.

Another important extension of prior literature was the treatment of the endogeneity problem in the model, which I will also discuss extensively later on.

Unfortunately, they had some troubles regarding the econometric analysis, because of heteroscedasticity among the variances of the error terms across firms and because there was correlation of error terms across time periods. They solved these problems by, respectively, using White’s correction for heteroscedasticity and assuming first-order autocorrelation of the error terms.

In advance, they expected collinearity to be a problem, but because the correlations among the independent variables were less than 0.30, they assumed that this was not the case.

2.2. Other determinants of investment decisions

2.2.1. Tobin’s Q

In order to estimate the impact of leverage on investment decisions, it is necessary to determine what other variables can affect these decisions.

Of course, a very important one is Tobin’s Q, which determines the future growth opportunities of firms by dividing the market value of installed capital by the replacement
cost of capital. The rationale behind this is that firms with a market value greater than their recorded assets have some unmeasured assets, which implies that the market overvalues the company (Lang et al (1996)). Probably, firms are going to invest more in capital in this case and therefore I expect a positive relation between Tobin’s Q and investment.

2.2.2. Free Cash Flow

Another independent variable will be free cash flows. Two explanations are found for the effect of FCF on investments. First, because of the financing hierarchy that is described in the pecking-order theory of Myers (1984), firms will prefer internal funds over debt and equity financing, due to a cost disadvantage of external funding. This makes cash flow an important determinant of investment decisions. The second reason is given by Jensen (1986), who suggests that managers rather spend the free cash flows in investments to increase the scale of the company than paying out this money to shareholders.

2.2.3. Profitability

Profitability of the firm will be of importance, because it gives managers an idea of the efficiency of the investments, which will be of influence on the decisions of future investments, as explained by Odit and Chittoo (2008).

2.2.4. Liquidity

The same authors explain the fact that liquidity should be included in the regression analysis. Firms need to be able to pay their current debt obligations and when this is not the case, they have insufficient current assets and therefore lose creditworthiness. This has serious implications for the ability to finance their investments. This is why I expect a significant positive relation between these variables.
2.2.5. Sales

Last but not least, also sales will have a significant positive influence on the investment equation. The amount of sales in terms of total assets is a good estimate of the size of the firm, which I assume to have a great impact on firms investment decisions. The truth is that small firms usually experience many growth opportunities and are therefore in need of financial flexibility, while having less available funds and more difficulty in finding access to capital markets. This implies that they can be unable to finance their NPV-opportunities. Large firms on the other hand, have better access to external funds and are more diversified. This is explained in the paper of Byoun (2008). The obvious conclusion is that sales and investments will show a positive relation.

2.2.6. High-growth vs. low-growth effect on investment decision

The paper of Aivazian et al. (2005) shows that leverage has a strong negative impact on investment decisions. It turned out that this effect is significantly greater for a low-growth firm than for a high-growth firm. They explain this by stating that the latter depends less on external financing and that for high-growth firms the investment opportunities are recognized earlier by the market.

This is the reason why, in addition to the results of the influence of leverage on investment decisions for all firms, I want to see if this outcome is significantly different for low-growth and high-growth firms. In order to distinguish between these two groups, McConnell and Servaes (1995) make use of the price-to-operating earnings ratio, because it measures the amount of profitable growth opportunities, with the important advantage that it leaves out of consideration the interest payments, meaning that leverage has no influence on this ratio.

2.3. Implications of financing method for investments

In this section, I will discuss the other factors that complicate the investment decision. I will deal with four implications of financing methods for investments, of which the first will be the macro-economic influences. Next, the short-sighted investment problem and the asset substitution problem will be explained and finally business risk.
2.3.1. Macro-Economic Environment

If we want to predict the most common way of financing a project for investment decision makers of Dutch AEX-listed firms, we also need to have some understanding of the macro-economic environment in this country. Though I will not go into detail about this, I will briefly explain some characteristics.

For example, we identify a difference between countries which are market-oriented and others which are bank-oriented. The countries belonging to the first group recognize developed capital markets and find it easier to obtain equity funds, in contradiction to the second group which exists of countries with a better banking system, which means that firms find it easier to obtain debt (Cheng and Shiu, 2007 and Bancel and Mittoo, 2003). Because the Netherlands are part of the first group, according to Demirguc-Kunt and Levine (1999), we expect more equity funding than debt funding for investments.

In addition, the interest tax shield depends on the corporate tax rate and will therefore have a positive effect on borrowing. Because the Netherlands end up in the middle with a corporate tax rate between 20 and 25.5%, I cannot give a prediction of the effect on the leverage ratio.

Also investor protection is involved in the decision of how to finance an investment. A problem arises when controlling shareholders or managers have the opportunity to benefit from the profits of the firm themselves instead of returning the money the external investors. The less laws and regulations a legal system has regarding this problem, the less investor protection there is. Investor protection shows to have a strong relationship with equity ownership, development of financial markets and future growth opportunities (La Porta et al., 2000). La Porta, Lopez-de-Silanes, Schleifer and Vishny state that in countries with poor protection, outsiders are treated well as long as there are valuable growth opportunities. When this changes and future prospects become worse, managers and controlling shareholders start to expropriate. Investor protection is positively related to leverage, because the better investors are protected, the more external financing a firm uses for its investments.
2.3.2. Short-Sighted Investment Problem

Investment capital can have many advantages for firms, like efficiency, flexibility and high corporate profitability. The problem is that it is not always spent on the most productive investment projects. One example of spending this capital in a wrong way is the short-sighted investment problem.

Institutional investors are only interested in the quarterly or annual results of the companies that are part of their investment portfolio. They exclusively focus on the profits they can make. In the paper of M.E. Porter (1992) it is stated that mutual funds hold their shares for 1.9 years on average, which is quite a short period.

Furthermore, managers are evaluated and rewarded on the basis of their short-term performance. This induces them to invest in projects that pay off quickly, which make it easier for them to meet the near-term debt obligations, thereby ignoring valuable long-term investments and long-term performance of the company (M.E. Porter, 1992).

2.3.3. Asset Substitution Problem

We know that managers normally act in the interest of the shareholders, when making investment decisions. On top of that, investors are most interested in increasing their own wealth and have limited liability, which means they can only lose their own investment but are not held responsible for the total losses of an investment.

Another important thing to mention is that shareholders get paid after tax and interest payments to debt holders, in case of a profit. This means that shareholders benefit from investments with more risk, because these kinds of projects involve the chance of high profits but also high losses.

Thus, when a manager has the opportunity to invest in a risky and a less risky project, he will decide to take the risky one.

Therefore, we assume that for a given amount of leverage, the managers of a firm will be influenced by the so-called „asset substitution” or „risk incentive” problem when making decisions regarding investment opportunities (Green and Talmor, 1986)
2.3.4. Business Risk

A factor which influences both the capital structure decision and the investment decision is the business risk (Booth et al. 2001). It is calculated as the variability of the return on assets and gives an accurate estimation of the probability of financial distress for a given firm. If a company finds itself in a position of high variability of returns, it probably has some difficulties with meeting its current debt obligations. This would imply that their financial flexibility decreases, because this firm has troubles with attracting external investors to fund their investments.

In this thesis I do not include a proxy for business risk, because it would make the regression analysis a lot more complicated as this proxy is quite difficult to estimate, but we have to be aware that the creditworthiness of the firm has implications for its leverage ratio as well as its investment decisions.
3. Econometric analysis

For my research I will use data of 17 of the 25 AEX-listed companies over the last 10 years, because I was unable to find reliable data of the other 8 companies. In order to give a good approximation of the effect of leverage on investment decisions, I needed information on about 30 variables, which are found in Compustat. The missing data will be complemented using Amadeus. Hereafter I will introduce the investment equation, explain how the variables in this equation are estimated and why they are estimated in this way. I will also discuss some problems related to the econometric analysis.

3.1. Investment equation

The formula I am going to apply for my research, is adapted from the paper of Odit and Chittoo (2008). It is the reduced form of the original equation of Lang et al. (1996):

\[
\frac{I_{i,t}}{K_{i,t-1}} = \alpha + \beta_1 \left( \frac{CF_{i,t-1}}{K_{i,t-1}} \right) + \beta_2 Q_{i,t-1} + \beta_3 LEV_{i,t-1} + \beta_4 \left( \frac{SALE_{i,t-1}}{K_{i,t-1}} \right) + \beta_5 ROA_{i,t-1} + \beta_6 LIQ_{i,t-1} + \epsilon_{i,t}
\]

In this equation, \( I_{i,t} \) stands for the net investment of company \( i \) during the period \( t \), \( K_{i,t-1} \) are the lagged net fixed assets and \( CF_{i,t-1} \) represents the lagged cash flow of firm \( i \) at time \( t-1 \). \( Q_{i,t-1} \) is the lagged Tobin’s Q, \( LEV_{i,t-1} \) is the lagged leverage and \( SALE_{i,t-1} \) are the lagged net sales of firm \( i \). Finally, \( ROA_{i,t-1} \) is the lagged profitability of firm \( i \) and \( LIQ_{i,t-1} \) stands for the liquidity of firm \( i \) during period \( t \). In addition, \( \alpha \) is a constant, \( y_{i,t-1} \) is an indicator of the individual firm effect and \( \epsilon_{i,t} \) is the error term.

3.2. Explanation of the variables

*Investment* is estimated as net investment divided by lagged net fixed assets. The first term exists of capital expenditures minus non-cash depreciation and we divide this part by total assets to account for the size of the firm.

We can examine *Cash Flows* by taking earnings before extraordinary items and add depreciation. The same reason for dividing the net investment by lagged net fixed assets applies to cash flows.
Tobin’s $Q$ should reflect a firm’s growth opportunities and is therefore calculated by the market value of its common and preferred stocks in terms of total assets. It tells us the market value of a firm’s recorded assets in terms of the replacement value of the book equity. As it was not possible to find data on the market value of the common and preferred stock, I replaced this term by the variable “market capitalization” as the estimate for the market value of the recorded assets, because this variable equals the public opinion of the net worth of the company. As explained earlier, we can take Tobin’s Q as an estimate for the future prospects of a company.

Although Leverage can be measured in two possible ways; one is book value of total liabilities divided by the book value of total assets and the second is book value of long-term liabilities divided by total assets. I only use the first method, because of complexity reasons. Furthermore, I will use book value instead of market value, because focusing on the latter would give too much importance on recent changes in equity, as discussed by Lang et al. (1996).

The variable for Sales is obviously approximated as net sales of the previous period divided by lagged net fixed assets.

Return on assets shows us the profitability of the assets in generating revenue. This ratio is normally measured by net income divided by the sum of total assets to estimate how many money a company makes for each euro of assets that the firm controls.

Liquidity is added to the regression equation, because it gives some insights of the firm’s ability to meet its current debt obligations. This variable will be estimated by current assets in terms of current liabilities.
3.3. Some additional information regarding the econometric analysis

3.3.1. Price-to-earnings (P/E) Ratio

After performing normal regression analysis, the sample will be divided in three groups: firms with negative price-to-earnings ratio, the ones with low price-to-earnings ratio and the firms with a high ratio. This will be done to see whether leverage has a different effect on investment for each of these 3 groups of firms or not.

This will be done by taking the average P/E ratio of all the firms in the sample, after which the group of firms with a negative ratio will be excluded from the sample. After ranking the firms according to this ratio, I will demarcate between high-growth and low-growth firms by taking the median price-to-earnings ratio of all firms (except for the ones with a negative ratio). The firms with price-to-earnings above the median belong to the group of high-growth firms, while firms below the median are classified as low-growth firms.

This ratio is viewed as a sufficient predictor for future growth of a firm (McConnell and Servaes, 1995). A company's current P/E ratio reflects the stock price divided by operating earnings per share. A high P/E ratio means an investor is willing to pay more for each unit of net income and, in this way, indicates that the firm has many profitable growth opportunities. According to McConnell and Servaes this ratio is quite useful, because it leaves out the interest payments when calculating the earnings. This means that the P/E ratio stays unaffected by leverage.
3.3.2. Optimal regression method

There are several ways to perform the regression, like pooling regression, random effect regression and fixed effect regression. Of course, it is important to examine which of these methods gives the most accurate results.

By conducting a Lagrangian Multiplier test of the random effect model, Aivazian et al. (2005) tried to find out which methodology is the most suitable in estimating the investment equation. They found that the pooling regression method tends to underestimate the underinvestment problem.

They also performed a Hausman specification test to see whether the individual effects are uncorrelated with the independent variables. If this is the case, both the fixed and random effect model are appropriate, but it turned out that the results are significantly different. As a consequence, the fixed effect model is most suitable in this situation. Relying on the findings of Aivazian et al. (2005), I will use a fixed effect model in this analysis as well.

3.3.3. Endogeneity problem

We know that leverage has an effect on investment, but important to notice is that investment decisions affect the leverage ratio of the firm as well. This phenomenon is known as the so-called “endogeneity problem” or “reverse causality problem”. This means there is a correlation between a variable and the error term.

Byoun (2008) has proved that the proxy for future expected investment belongs in the regression equation for leverage, because it has a significant effect on leverage. Aivazian et al. (2005) solve this problem by taking the proportion of the value of tangible assets to total assets as the instrumental variable of leverage. The most important reason is that tangibility tends to increase the use of leverage while it decreases the bankruptcy costs and as we know, bankruptcy costs are an important factor in determining the capital structure. That is why they predicted a high correlation with leverage and low correlation with investment opportunities, which turned out to be true. Due to the scope of my analysis however, I will not take any possible endogeneity problem into account in the regression analysis.
4. Results

4.1. Correlations

Before going to the actual results of the regression, I need to know the correlations between the variables. This is necessary, because it can give us an indication of the usefulness of the model. When there is a high correlation between two independent variables, the regression estimates could be biased because of multi-collinearity. The correlation matrix that I found using SPSS can be found in table 1 of the appendix.

As we can observe from the table, the variables Cash Flow and Tobin’s Q are positively correlated. But after having performed regression with and without these variables, I was sure that this correlation does not have any effect worth mentioning.

As expected, also Lagged Liquidity shows some correlation with most of the other independent variables and that is the reason why I performed the regression without this variable. As it turned out, dropping this variable meant an increase in the R-square, and therefore I left Lagged Liquidity out of the model.

4.2. Outliers

When looking at the data of all firms, I observed remarkable results regarding Tomtom N.V. I recognized that there was almost no long-term debt, capital expenditures, property, plant and equipment and nearly no depreciation and amortization. This had serious implications for my variables and thus, for the model. I decided to drop this firm, which left me with 16 other companies.

4.3. Regression

As will be explained later, the results of the regression analyses are very surprising. With a sample of 16 firms and 5 variables, it was possible to perform a regression analysis, which could give a useful prediction of the effect of lagged leverage on investment decisions. It was important to use Stata, because with this program it is possible to do a fixed-effect regression, which means that the unobserved individual firm effect is taken into account.
Because the sample consists of panel data, I had to set the numeric gvkey as the ID variable. In this way, the aforementioned unobserved individual firm effect is included in the model. The first regression is done for all firms, followed by the regression for high-growth firms and finally for low-growth firms. In the last two regressions there is one company excluded from the sample because it has negative earnings-per-share of -20.10, namely Koninklijke Ahold N.V. The other firms are either classified as high-growth or low-growth.

### 4.3.1. Whole sample regression analysis

In this part, I took all 16 firms and commanded Stata to perform a panel data regression with Investment as the independent variable and Lagged Cash Flow, Lagged Tobin’s Q, Lagged Leverage, Lagged Sales and Lagged ROA as independent variables. I also controlled in this regression for unobserved firm fixed effects. 

Table 2 of the appendix reports, as discussed before, that Sales is significantly positively related to investment. The same is true for ROA, although this cannot be proved at a significance level of 0.05. In addition, Cash flow and Tobin’s Q are insignificantly negatively correlated with investment, which is in contradiction with what I expected beforehand. But the most important observation is the negative, but insignificant relationship between lagged leverage and investment. This result can be the consequence of the reverse causality between these two variables, but I will explain this in detail in the next chapter. The table shows an R-square of 0.1286, which means that almost 13% of the error term is explained. As this R-square is quite low, we cannot rely too much on results that we retrieved from the regression model.

### 4.3.2. High-growth firms regression analysis

Table 3 shows that the results of this regression are very interesting, because the outcome is not in line with previous research. In fact, the leverage effect is exactly the opposite of my hypothesis that leverage has a smaller negative influence on the investment decisions of high-growth firms than for low-growth firms. However, I do find, as expected, a significant negative effect of leverage on investment with a coefficient of -0.4456343 and significance level of 0.006. This relationship is quite strong and supports the results of Aivazian et al. (2005) who argue that higher leverage negatively influences investment, because a high
leverage ratio can cause a liquidity problem due to a lack of financial flexibility. We refer to this problem as the underinvestment problem. The other possibility is that there is an overinvestment problem, which is the consequence of managers acting in their own interest by increasing the scale of the firm at the expense of the shareholders.

For the firms in my sample, leverage has a significant negative effect on investment decisions. Later, I will discuss some possibilities that can give an explanation for these findings. Furthermore, I have found a significant positive effect of cash flow on investment decisions. This is indeed supported by earlier literature.

The regression analysis of high-growth firms shows a higher R-square than the regression performed for all firms, namely 0.5619. The conclusions we draw from this table are therefore more reliable.

4.3.3. Low-growth firms regression analysis

*Table 4* provides us with the even more interesting fact that the expected negative relationship between the capital structure and investment decisions of low-growth firms does not hold. There is an insignificant effect of lagged leverage on investment decisions and the coefficient is even slightly positive, but given the R-square of 0.1970 this does not have serious consequences for my research.

In agreement with the other models, sales and return on assets show a positive effect on investment, but unfortunately we cannot prove this at a 0.05 significance level. Cash Flow and Tobin’s Q leave us with a small and insignificant negative effect on investment decisions, which is somewhat unusual. I assumed an increase in one of these two variables during the previous period would have positive consequences on investments of this period, but following the results of my research more cash flow or more growth opportunities does not give managers the intention to invest more.
5. Conclusions

This paper examined the relationship between investment decisions and leverage for the Dutch AEX-listed firms. It has given us some interesting results. According to my results, leverage has a negative, but insignificant impact on investment for low-growth firms. However, for high-growth firms the effect is indeed significantly negative. This is an indication that the underinvestment and overinvestment problem are more severe for high-growth firms than for low-growth firms. This could mean that high-growth firms are more afraid to lose their financial flexibility, because these companies expect they will need more sources of funding in the nearby future. The second and more likely cause of this result is that managers of high-growth firms are too self-assured and greedy when they see that their firm is growing. They start to take risky decisions, like investing in negative net present value investment opportunities. Therefore, the disciplinary role of debt to undertake risky investments can be stronger.

My findings are interesting, because they are not in line with the predictions I made on the basis of earlier studies in this field. First of all, the negative impact of leverage in the case of all firms is not significant. A possible explanation can be the endogeneity problem. In my sample, I did not include an instrumental variable to take care of the reverse causality between investment and leverage. This means that there is still some room left for further investigation. Another way to improve this research is by taking a bigger sample, which means that the results will be more accurate. We will end up with a higher r-square, implying that more of the error is explained by the model. Furthermore, Soku Byoun (2008) states that big, well-known firms with large cash flow and dividend payouts, large earned capital and high credit ratings, care less about their leverage ratio and finance more of their investments with equity. The fact that I took a sample of this kind of firms can affect the significance of the interaction between leverage and investments and would probably improve the results of this research. Because more variables provide us with insignificant results, it is conceivable that the approximation of the dependent variable, namely investment, is not optimal. I calculated this variable as capital expenditures minus non-cash depreciation, divided by assets, but there are more ways to estimate this variable. These other possibilities could be more accurate.
A second interesting finding is the significant negative effect for high-growth firms, while low-growth firms do not show a significant relationship.

In other words, there is not enough evidence to conclude that low-growth firms are more averse to investment when having a high leverage ratio as compared to high-growth firms. In another paper of Aivazian, Ge and Qui (2005), the impact of a firm’s debt maturity structure on its investment decisions is studied, and they found that high-growth firms show a significantly strong reduction in investments when these firms have more long-term debt obligations. For low-growth firms this effect is not that strong. This debt maturity structure could be an argument why the underinvestment problem in my research is significantly stronger for high-growth firms than for low-growth firms.

Furthermore, another benchmark for growth can improve the distinction between high-growth and low growth firms. McConnell and Servaes (1995) questioned the use of price-to-earnings as a proxy for growth. They used this ratio and it did not cause any problems for their research, but in my case it may be helpful to use another proxy for growth.

To conclude, I have given some recommendations for further investigation to the effect of the leverage ratio on investment decisions of the 25 Dutch AEX-listed firms, but for now I can state that this research found evidence that leverage only has a significant negative impact on investments for the high-growth firms in my sample.
Reference list


## Appendix

### Table 1. Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Cash Flow</th>
<th>Lagged Tobin's Q</th>
<th>Lagged Leverage</th>
<th>Lagged Sales</th>
<th>Lagged Return On Assets</th>
<th>Lagged Liquidity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lagged Cash Flow</strong></td>
<td>Pearson Correlation</td>
<td>1</td>
<td>0.566**</td>
<td>-0.112</td>
<td>0.237**</td>
<td>0.057</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.00</td>
<td>0.147</td>
<td>0.002</td>
<td>0.488</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>168</td>
<td>80</td>
<td>168</td>
<td>168</td>
<td>150</td>
</tr>
<tr>
<td><strong>Lagged Tobin’s Q</strong></td>
<td>Pearson Correlation</td>
<td>0.566**</td>
<td>1</td>
<td>-0.013</td>
<td>0.361**</td>
<td>0.085</td>
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<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.00</td>
<td>0.911</td>
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<td>0.457</td>
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<tr>
<td><strong>Lagged Leverage</strong></td>
<td>Pearson Correlation</td>
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<td>-0.013</td>
<td>1</td>
<td>0.163*</td>
<td>-0.260**</td>
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<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.147</td>
<td>0.911</td>
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<td></td>
<td>N</td>
<td>168</td>
<td>80</td>
<td>168</td>
<td>168</td>
<td>150</td>
</tr>
<tr>
<td><strong>Lagged Sales</strong></td>
<td>Pearson Correlation</td>
<td>0.237**</td>
<td>0.361**</td>
<td>0.163*</td>
<td>1</td>
<td>0.170*</td>
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<td>Sig. (2-tailed)</td>
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<td>0.001</td>
<td>0.034</td>
<td>0.038</td>
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<td>168</td>
<td>80</td>
<td>168</td>
<td>168</td>
<td>150</td>
</tr>
<tr>
<td><strong>Lagged Return On Assets</strong></td>
<td>Pearson Correlation</td>
<td>0.057</td>
<td>0.085</td>
<td>-0.260**</td>
<td>0.170*</td>
<td>1</td>
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<td></td>
<td>Sig. (2-tailed)</td>
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<td>0.488</td>
<td>0.457</td>
<td>0.001</td>
<td>0.038</td>
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<td>N</td>
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<td>78</td>
<td>150</td>
<td>150</td>
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<td><strong>Lagged Liquidity</strong></td>
<td>Pearson Correlation</td>
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**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).
Table 2. Regression analysis results whole sample

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<tr>
<th>Investment</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T</th>
<th>P &gt; T</th>
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<td>Nr. of obs.</td>
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Table 3. Regression analysis results of high-growth sample

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<th>Investment</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T</th>
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<td>Cashflow</td>
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Table 4. Regression analysis results low-growth sample

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<tr>
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<td>0.809</td>
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<tr>
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