

# **THE IMPACT OF THE GLOBAL FINANCIAL CRISIS ON THE CAPITAL INVESTMENT OF SMALL DUTCH CORPORATIONS.**

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**During the recent financial crisis, capital expenditures and capital investment decreased sharply. This paper examines the link between the financial crisis and the decrease in capital investment. Moreover, this paper also takes into account growth opportunities, the amount of bank debt available, cash flow and firm size into account in its analysis. The paper begins by describing the financial crisis itself and its effect on capital investment observed in other related studies. This follows into an assessment of capital investment of 56 Dutch small firms pre-, during-, and post-crisis (2006 -2012). First of all, important variables and determinants of components of capital investment are identified by means of related literature, after which these determinants are tested by means of the data provided by these firms. Weak relationships were found between total capital investment and the determinants bank debt, cash flow, firm' size and growth opportunities. However, the variable bank debt did show strong results during the correlation analysis, which were in line with underlying literature. Therefore, further research is needed to confirm whether capital investment indeed has suffered due to financial crisis.**

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## **Keywords**

Capital investment, Corporate governance, Credit crunch, Leverage, Financial crisis, Small corporations

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*3<sup>rd</sup> IBA Bachelor Thesis Conference*, July 3<sup>rd</sup>, 2014, Enschede, The Netherlands.

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# 1. INTRODUCTION

The financial crisis of 2007, which started in the United States (US) during 2007 affected the financial sector in other countries, particularly Europe (Moshirian, 2010). Not only large corporations suffered under this, but also small enterprises were affected a lot. Many firms went bankrupt; a serious decrease in profitability was seen and more important investments dropped to zero (Buca and Vermeulen, 2012; Taylor, 2008). The purpose of this paper is to determine what the impact of a financial crisis can have on a small corporations' capital investment. The first question that must be answered is what exactly caused the financial crisis? This question is being answered in various ways but mostly the answer relies in the providence of enormous amounts of subprime mortgages. There was a sharp boom and bust in the housing markets in the US and the value of interest was rather low. This prompted lenders to offer home loans to individuals with poor credit; subprime mortgages. In turn this led to excessive risk taking and when the real estate bubble burst, many borrowers could not make payments on their subprime mortgages.

While more research has been performed on whether the causal role of bank credit can explain the collapse in corporate investment during the financial crisis (Buca and Vermeulen, 2012; Campello, Graham, Giambona & Harvey, 2010), hardly any research is found on whether the financial crisis actually affected the capital investment of small corporations. Moreover, no specific research has been done only on Dutch corporations. Yet, the influence of the financial crisis on the capital investment of Dutch small corporations is not understood fully. Therefore the following research question is proposed: *“To what extent has a financial crisis impact on a small corporations' amount of capital investment”*

As mentioned before, in this paper the emphasis is on Dutch small corporations. A small corporation is a corporation that “has between 1 and 100 shareholders and that passes-through net income or losses to shareholders under in accordance with Internal Revenue Code”.<sup>1</sup> The term “capital investment” is defined as how corporations invest their capital into various tangible and intangible services and or products. In this study, that definition will be used.

This paper's sample contains 56 small firms of the Netherlands. The assessed period of this paper will cover pre-, during-, and post- crisis years. The crisis year is defined as 2009, which showed a severe dip in the volume of world merchandise trade in the figures of the Netherlands Bureau of Economic Policy Analysis. The years 2007 and 2008 are seen as the pre-crisis period and the three post crisis years are 2010, 2011 and 2012. By using this approach the pre-crisis years are observed as 2006, 2007 and 2008 and 3 post-crisis years are obtained (2010, 2011 and 2012). The crisis is a major help in this study as an enormous decrease was seen in overall economic performance. Seen the fact that capital investment is correlated with economic performance, this should result in a change of view of how much to invest in overall capital. Given the enormous impact of this financial crisis not only nationally but worldwide, it is useful to understand its causes and consequences. Moreover, this information and research can be used to discuss and assess current, as for example the Greek sovereign-debt crisis and possible future crises.

<sup>1</sup> Perez, W. *What is a small corporation?* Retrieved from: [http://taxes.about.com/od/scorporations/qt/scorp\\_criteria.htm](http://taxes.about.com/od/scorporations/qt/scorp_criteria.htm)

The online database Reach, provided by the University of Twente, is used as main provider of data. Reach is a database that offers financial and other information about 1.300.000 companies in the Netherlands. Since this database provides all data about Dutch firms, no secondary data has to be found. The papers' findings are of scientific relevance as this paper expands the already existing literature with an in-depth research. Additionally this paper is of practical importance to small business owners, who can implement this paper's findings in practice and see how they should prepare themselves when being in an economic downturn.

The structure of this paper is as follows. In order to answer the research question, first of all, an analysis of various peer-reviewed scientific articles is carried out and the outcomes of every article are evaluated and assessed. The first section, before starting the actual evaluation, provides background information about the financial crisis of 2007 and capital investment is evaluated. Additionally, this section also evaluates empirical studies. The second section elaborates on the methodology of this paper's research. Afterwards an analysis is made and results are presented. The paper ends with a conclusion, which includes the answer to the research question, limitations and possible further investigation.

# 2. THEORETICAL FRAMEWORK

This extract examines the underlying theory and reviews existing empirical evidence on capital investment

## 2.1. Financial Crisis 2007

It is widely acknowledged that the financial crisis of 2007 started in the US with its enormous increase in subprime mortgages and securitized products (Ivashina, 2010). In the recent crisis, we had a housing boom and bust, which in turn led to a financial turmoil in the US and other countries (Taylor, 2008). The sharp decline in the value of assets, real estate, prices of commodities, the collapse of a number of large banks and nonbanks and an increase in the level of unemployment, led the IMF to refer to the recent global recession as “the Great Recession” (Moshirian, 2010).

The response by the government fell apart into two approaches; 1. Stabilizing national financial systems by its regulatory actor policy and 2. Specific practices who aimed at addressing the failure of key financial institutions (Jones, 2013). Yet both goals were not obtained and its financial systems continued to destabilize, which in turn lead to the financial crisis (Moshirian, 2010). Moreover, they prolonged the crisis by misdiagnosing the problems in the bank credit markets and thereby responding inappropriately by focusing on liquidity rather than risk (Taylor, 2008). Interest rate decisions fell below what experience would suggest policy to be. Additionally, Taylor (2008) provides evidence that monetary policy was too easy and too loose during this period, which is shown in appendix A.

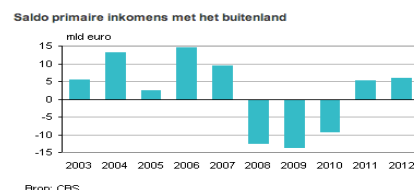


Figure 1: Primary incomes including income from abroad.

The Netherlands in particular did rather well compared to the Western countries as the US and had quite a stable economy when the financial crisis hit the ground. Inflation -and

unemployment rates were rather low and the national debt was fairly low seen the circumstances. However, as can be seen in figure 1<sup>2</sup>, the world widely known credit crunch, reduction in the availability of loans, credit and income, also hit the Netherlands.

## 2.1. Capital Investment

During a financial crisis, firms generally face restricted access to credit (small, private, non-investment grade, and unprofitable), draw more funds from their credit lines during the crisis than their large, public, investment-grade, and profitable counterparts. This is backed by the theory of Kahle and Stulz (2011) who state that research in finance, including research on the recent financial crisis, shows that exogenous credit contractions have real effects on firms whereas they want to draw more money that actually cannot be obtained, which therefore causes firms to reduce investment.

Moreover, firms that are small, private, and speculative rely more on lines of credit, before and during the crisis, than their less “limited-credit category” counterparts (Campello, Graham, Giambona & Harvey, 2010). However, much of the narrative of the financial crisis has focused on the impact of a bank credit supply shock, though such a shock cannot explain important features of the financial and investment policies of industrial firms (Kahle and Stulz, 2011). On top of that, Gentler and Gilchrist (1993) and Buca and Vermeulen (2012) provide evidence that a large class of borrowers, mainly small firms, have difficulty in substituting bank debt. Incomplete and imperfect financial markets imply that certain borrowers, such as small firms, rely more on bank finance than others. They should therefore be more affected by a reduction in bank loan supply. Additionally, when being in a crisis, small firms should see their spending drop the most. This is confirmed by Almeida et al. (2009), who show that firms whose long-term debt matured during the financial crisis observed larger drops in investment spending, consistent with a credit supply shock. In appendix B and C an overview of investment spending during boom, downturns and crisis period is given by Buca and Vermeulen (2012).

Buca and Vermeulen (2012), research that firms that entered the year with a higher bank debt leverage reduced investment more than firms that entered with a lower bank debt leverage. Almeida, Campello Laranjeira & Weisbenner (2011), find that firms whose long-term debt was largely maturing right after the third quarter of 2007 cut their investment-to-capital ratio by 2.5 percentage points more (on a quarterly basis) than otherwise similar firms whose debt was scheduled to mature after 2008. This drop in investment is statistically and economically significant, representing a drop of one-third of pre-crisis investment levels.

Buca and Vermeulen (2012) also find that bank debt leverage of firms is not important in earlier downturns. In addition they show that small and medium sized firms, which they have identified as bank-dependent borrowers, were sensitive to bank loans in 2009 whereas large firms were not.

In addition, investment spending and its corresponding behavior can be related with the agency theory and agency costs (Buca and Vermeulen, 2012; Gertler and Hubbard, 1988). The ‘conflict’ in this case manifests itself by driving a peg between the price of externally and internally generated funds. Therefore, the cost of investing and hence the decision of the borrower, depends on its financial decision, in

particular its collateralizable net worth. When borrower net worth is low as for example during the recession, agency costs of financing are raised, which in turn pressures investment.

Almeida et al (2009) state that small firms see their spending drop the most when being in a financial crisis. Buca and Vermeulen (2012), prove this statement with the table presented in appendix B, where clearly is seen that a boom phase leads to a positive percentage of investment capital, while during and after a crisis this percentage falls and turns negative. Kahle and Stulz (2013) provide evidence that during the financial crisis, firms will find it more difficult to borrow from banks and find it too expensive to find other sources of borrowing. This in turn also proves the research of Buca and Vermeulen (2012), who find that smaller firms will obtain less credit during a financial crisis, which in turns has a negative effect on the investment expenditure of these small corporations. It is hypothesized that banks will increase financing premiums on bank dependent borrowers with weak balance sheets. Moreover, borrowers with weak balance sheets also experience reduced access to credit. Therefore, an increase is seen in internally generated cash flows, which is inline with the study of Duchin et al. (2009).

Based on this empirical evidence and frameworks discussed in literature, this study will investigate the following hypothesis that is tested afterwards by the outcomes of the data analysis.

*H1: Small Dutch corporations invest less during and after a financial crisis than before a financial crisis.*

This means that a financial crisis has an impact on the corporations’ amount of capital, which makes it therefore more difficult to invest for example in fixed or non-fixed assets. Therefore, overall there exists a consensus that the relationship between a financial crisis and the amount of capital investment is negative. This hypothesis is tested at last in the results section as first all explanatory and control variables need to be tested. As the hypothesis has been created, this paper will follow into the created model, the definitions of the needed variables and its measurements.

## 3. METHODOLOGY

### 3.1 Model

The analysis in this paper uses capital investment as main variable in the investment equation. This investment equation is based on the paper of Deesomsak (2004), who perform a research on capital structure during crisis. However, in below given equation own control and independent variables are introduced. The following relationship is estimated which results in the following capital investment equation:

$$Investment_t = \alpha + \beta_1 DEBT_{i,t-1} + \beta_2 SIZE_{i,t-1} + \beta_3 CASH_{i,t-1} + \beta_4 GROW_{i,t-1} + \varepsilon$$

Investment is firms’ investment capital at time t, measured at the accounting year-end. The equation consists of firm specific variables and incorporates the following factors: crisis, firm size (SIZE), growth opportunities (GROW), cash flow (CASH) and bank debt (DEBT). This approach differs from previous studies on capital investment, as this equation incorporates the debt ratio rather than bank loan ratio as used in the research of Buca and Vermeulen (2012). Moreover, this equation integrates the concept of firm size, cash flow and growth opportunities. First of all, firm size is known to have a positive impact on leverage, which supports capital investment to grow (Deesomsak, 2004). Secondly, cash flow is taken into account as when there is a reduced access to

<sup>2</sup> Retrieved from: [www.cbs.nl](http://www.cbs.nl)

credit, firms rely more on internally generated cash flows for their investments (Campello et al., 2009). Lastly, growth opportunities are included as higher growth opportunities provide motives to invest sub optimally, which gives an increase in the amount of investment. In the next section, more detailed explanations are given why this paper chooses these certain variables. In addition, including the variable capital investment in this equation, makes it possible to verify if there is an impact of the debt ratio, firm size and growth opportunities on capital investments while controlling corporations' business opportunities.

## 3.2. Variables

### 3.2.1 Capital Investment

Since this paper studies the amount of investment capital, this is the most important variable in this study. This is also known as the dependent variable. This dependent variable can be measured by the Asset-Tangibility formula. The formula looks like the following (Campello and Almeida, 2007; Deesomsak et al, 2004):

$$\frac{\text{Tangible Assets} - \text{Current Assets}}{\text{Total Assets}}$$

Campello and Almeida (2007) find that assets, which are more tangible, sustain more external financing because such assets mitigate contractibility problems: tangibility increases the value that can be captured by creditors in default states. Moreover, they also find that “if tangibility is high, a given increase in investment has a lower effect on the marginal cost of total (i.e., collateralized and uncollateralized) external finance because it creates higher collateralized debt capacity. If tangibility is low, on the other hand, then the cost of borrowing increases very rapidly, as the firm has to tap more expensive sources of finance in order to fund the new investment. Because increases in financing costs dampen the effect of a cash flow shock, investment will tend to respond more to a cash flow shock when the tangibility of the underlying assets is high” (1436). They provide evidence for this by using the credit multiplier, which confirms that investment sensitivities are increasing in the tangibility of firm's assets.

An alternative measure is the investment capital ratio, which is measured by subtracting the sales from its tangible fixed assets, which is then divided by the capital stock. Capital stock is measured by book value of fixed assets. (Buca and Vermeulen, 2012). This measure is supported by Duchin, Ozbas & Sensoy (2009) who define “capital investment” as:

$$\frac{\text{Total capital expenditures}}{\text{Total firm assets}}$$

However, as asset tangibility is a common measure among scholars who investigate investment, in this paper it is more reliable and relevant to use the equation of asset tangibility.

### 3.2.2 Crisis

This study investigates whether a crisis has an impact on capital investment. For the full sample period crisis is therefore the independent variable, which represents the averages of 2006 – 2012. As said before, the crisis year is defined as 2009, which showed a severe dip in the volume of world merchandise trade in the figures of the Netherlands Bureau of Economic Policy Analysis. By using this approach the pre-crisis years are observed as 2006, 2007 and 2008 and 3 post-crisis years are obtained (2010, 2011 and 2012). This

averaging also reduces the possibility of measurement error and the effects of random fluctuations in the variables. The expected relationship between crisis and capital investment is found and expected in literature to be negative.

### 3.2.3. Control variables

In order to come to a more precise outcome and to control for risks, four control variables are introduced. The four control variables are bank debt, firm size, cash flow and growth opportunities. Each section provides an explanation for the chosen variable, empirical evidence from other studies and the measurement of each control variable.

#### 3.2.3.1 Bank Debt

Bank debt is associated with lower levels of capital investment during a financial crisis (Buca and Vermeulen, 2012). This already provides sense that Bank debt should be taken into account as explanatory variable for our dependent variable. They provide evidence that firms that had a total effect of bank debt leverage equal to – 0.38, which is significantly different from 0. This result confirms that firms that financed themselves more with bank debt had higher bank debt leverage at the beginning of 2009, which was significantly reduced capital investment during the investment collapse of 2009. This variable is measured by the following equation:

$$\frac{\text{Amounts owed to credit institutions} \\ (\text{Becoming due and payable within and more than one year})}{\text{Total assets} - \text{trade creditors.}}$$

An easier method to define bank debt is to divide total liabilities by total assets. This method is followed in the papers of Campello and Almeida (2007) and Kahle and Stulz (2011). However, since trade creditors are taken into account into this paper, we will follow the first definition of bank debt.

#### 3.2.3.2 Firm Size

Secondly firm size, as defined by Campello and Almeida (2007) “the logarithm of total assets”, is included in the regression analysis. The trade off theory states that there is a positive relationship between firm size and debt since larger firms have been shown to have lower bankruptcy risk and relatively lower bankruptcy cost (Deesomsak et al., 2004). Seen the fact that large firms have a bigger possibility to obtain other credit during a crisis, it is expected that small firms will be affected more by a crisis than large firms. This is confirmed by Campello et al. (2010) and Deesomsak et al. (2004), who provide evidence that access to credit lines increases a firms' investment but mainly firms with large cash holdings. Therefore, a negative relationship is created between firm size and capital investment in this paper as it studies small firms. In this paper firm size is defined as the natural logarithm of total assets. Additionally, in this study total assets are suitable, whereas the main problem of this measure, differences in reporting standards, is not applicable since data are collected from one country.

#### 3.2.3.3 Cash flow

Thirdly, cash flow is taken as a control variable since it has been found Campello et al. (2009) that when firms are unable to borrow, they rely on internally generated cash flows to fund investments in such a time. Moreover, Kahle and Stulz (2011), state that capital expenditures decrease proportionately less than cash flows, which makes it important to take the cash flow into account. Cash flow is measured as a ratio by starting with gross operating profit and subtracting interest and similar

charges minus taxes on profits. This is then divided by its capital stock, which is the book value of fixed assets (Buca and Vermeulen, 2012; Duchin et al., 2009).

### 3.2.3.4 Growth opportunities

The last control variable is growth opportunity. Growth opportunity is defined as the total net sales divided by total assets (Campello et al., 2007). Higher growth opportunities provide first of all incentives to invest sub optimally and even to accept slightly risky projects that expropriate wealth from debt holders. This will raise the cost of borrowing and therefore, firms will tend to use more internal financing than debt (Deesomsak et al., 2004). Therefore, it is known that an inverse relationship is present between growth opportunity and capital investment.

As all dependent, explanatory and control variables are defined, subsequently the data analysis can be performed. For this part a correlation analysis can be performed, to argue whether there is a consistent strength between investment expenditure of small corporations and its financial position. Moreover, a regression analysis is completed to see the strength between the variables and to argue whether the outcomes are statistically significant.

## 4. DATA

### 4.1 Sample selection and measurements

This study only focuses on Dutch firms. As said before, this paper obtains the data via “Reach” a database provided by the University of Twente, which gives insight into all key financials of various Dutch companies. Moreover, the focus will be on industrial, publicly listed companies. Financial companies are not taken into account in this study as this paper researches whether capital investment is affected by a crisis. Additionally the corporations are known as “small”, which is of high importance in this study and the currency is given in euros.

Within Reach and option is given that determines corporations to be large, medium or small. Moreover, “small” corporations are defined within the database as: very small, small and medium small corporations. Therefore, these three classifications define the keyword for a small corporation. Years taken into account are 2006, 2007, 2008, 2009, 2010, 2011 and 2012 as defined before. The resulting population brings up 56 Dutch firms that are seen as small corporations. These 56 are taken into account for the results and analysis.

### 4.2 Data analysis

For the analysis of the data several statistical tests were performed and used, to be able to assess the relationship between the named variables. First of all, descriptive statistics are used to give a brief, yet convenient overview of the data. Descriptive statistics give an idea on how investment capital evolved over the last few years.

Furthermore correlation and regression analyses will be used to assess the relationship between the variables. A bivariate correlation will be used to show the strength of the relationships between the dependent and independent variables. Furthermore, linear regression analyses are performed to research whether how significant the relationships are and also to assess the relationship between the variables.

In conducting the regression analysis, this paper does not assume that that capital investment is explained by amount of bank debt, cash flow and size measures from one year. This paper reasons as Buca and Vermeulen (2012) and various other studies on investment, that capital investment is related to measures from a previous year. Therefore, this paper uses a lag in its analysis, which means that explanatory and control variables (as crisis, bank debt, firm size, cash flow) of year T-1 will be used to define the dependent variable (total capital investment) in year T.

## 5. RESULTS

This section reports on the results of this papers’ analysis. First a short overview is given about the descriptive statistics in absolute form, where afterwards an analysis is made per variable that has been taken into account. In table 1 a summary of descriptive statistics is found. The mean total assets for the firms in this sample were found to be €1.532.972,00. Additionally, total debts have decreased from 2006 resulting roughly €15.000,00 to around €8.000,00 in 2012. This could mean that the firms have payed off their short-term debt which in turn decreases their amount of debt available within the firm. Moreover, the mean of the variable cash flow is rather low, which is caused by missing numbers in the dataset and only few firms could be taken into account. Average number of employees is counted on 89, which proves the point of that this paper investigates small firms only, that, have between 1 – 100 employees.

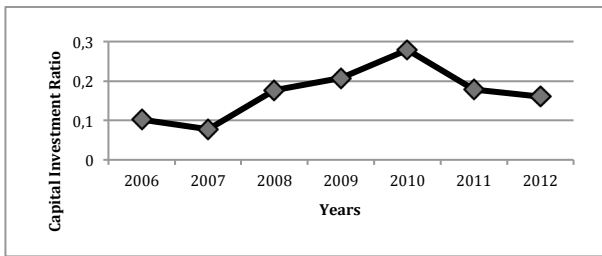
**Table 1: Summary descriptive statistics**

	Mini mum	Maximum	Mean	Std. Deviation	N
Number of employees	1	1909	86,09	283,51	45
Current market capitalisation (mil)	0	1828	173,89	397,71	49
Number of recorded shareholders	0	52	5,16	7,92	56
Operating Income	0	23674	8419	8313	36
Return on total assets (%)	-81.5	25.03	-4.49	17.47	42
Total assets	1841	20255984	1532972	3753286	54
Fixed assets	507	101992	18903,8	24523	39
Current assets	119	43450	6421	9665	42
Total debts	2445	283309	78829	116993	42
Net sales	70	23674	13067,2	7898,5	13
<b>CAPITAL INVESTMENT</b>	0.01	0.14	0.08	0,04	33
<b>FIRM SIZE</b>	3.29	14.59	10.23	2,14	43
<b>BANK DEBT</b>	0.23	0.87	0.54	0.23	12
<b>CASH FLOW</b>	-0.39	0.79	0.09	0.32	13
<b>GROWTH OPPORTUNITIES</b>	0.57	63.26	12.2	25	6

The variable ‘Debt Ratio’ is defined as total debts, trade creditors and total assets. Total debt and total assets represent the balance sheet total. Trade creditors are measured as given on the balance sheet. Capital investment is measured by subtracting current assets from the fixed assets, which is divided by total assets. The control variable firm size is defined as the natural logarithm of total assets. Total assets represent the balance sheet total, however are adjusted by LN. Growth opportunities are measured by dividing the net sales by its total assets. Lastly, cash flow is measured by dividing gross operating profit and subtracting interest and similar charges minus taxes on profits by its capital stock. Capital stock is measured by the book value of fixed assets.

### 5.1 Results of the variables

Regarding the comparison of the pre- versus post crisis evaluation, the data set needs to be defined into several groups. As said before, the pre-crisis years are 2006, 2007 and 2008; the crisis year is 2009 whereas post-crisis years are 2010, 2011 and 2012.



**Figure 2: Average capital investment ratios in sample: 2006 - 2012**

### 5.1.1. Capital investment before the financial crisis

Figure 2 depicts the annual capital investment ratios representing 56 small Dutch corporations found within Reach. This figure tells that in 2006 and 2007 the average capital investment ratios were rather low, whereas 2008 is the boom year in investment where it increased from 0.075% in 2007 to 0.18% in 2008. An explanation for this could be higher opportunities for external financing and/or better access to credit. Moreover, appendix A provides evidence that there was a decrease in monetary policy, which made it easier to obtain credit in that time and the years before.

### 5.1.2. Capital investment after the financial crisis

After the crisis the first post-crisis year, 2010, investment still increased, which is remarkable seen the fact that due to a crisis limited credit is available. However, a study of Deesomsak et al (2004) who investigate whether capital structure changed after the Asian crisis, also find that leverage ratios increase the year after the crisis has ended. Therefore, this is a motivation for further investigation into the possible implications of the crisis on corporate financing decisions. Additionally, after 2010, the ratio drops with more than 0.1%, which does confirm that a crisis reduces capital investment. Moreover, average total investments in total assets are found to be €2.2 million in 2006 to €1.7 million in 2012, which shows a major decrease. This decrease can be explained by restrictions in access to credit and/or higher interest rates which causes lending to be more expensive which directly leads to a decrease in available credit for investment in assets.

When taking a look at the Pearson correlation analysis and the integration of all variables, such as firm size, bank debt, cash flow and growth opportunities a positive and strong adjusted R-square is found in the analysis. This means that there exists a relationship between the dependent and independent variables. However, the analysis of the total sample per specific independent variable gives rather weak relationships. Therefore, overall it can be said that there exists a positive relationship between all the variables, however statistically indifferent.

### 5.1.3. Total debt

The first control variable in this study is total debt. Recall that total debt is measured by total credit amounts due within this year or more years, total assets and trade creditors. Results indicate the following. For this analysis, Pearson correlation is used. Pearson's correlation examines the strength of a relationship between variables. In table 2 the results of the correlation test have been summarized. In the pre-crisis period, the Pearson correlation between total capital investment and total debt was -0.324, whereas this decreased to a significant -0.291 in the crisis period and -0.469 during the post-crisis period. The Pearson correlation for the whole sample period was found to be -0.452 and was found significant, which indicates that there is a rather strong

negative relationship among the variables. This suggests that when a value of one variable increases the value of the second variable decreases. On the contrary, however statistically insignificant, positive unstandardized coefficients have been observed during the regression analysis presented in table 3. The crisis period starts off with -0.488, which follows into 1.267 in the crisis period and 0.180 in the post-crisis period. The overall regression value is 0.122 with a p value of 0.201. This shows that an increase in bank debt does lead to an increase in capital investment. Nevertheless, the relationship is rather weak and p-values exceed the 0.05 thresholds, which results into a rather indifferent relationship between these two variables.

### 5.1.4. Firm size

The control variable firm size is defined in this paper as the natural logarithm of total assets. Again, Pearson correlation is used in the analysis and the following outcomes were observed. The relationship between firm size and capital investment is found to be negative during the regression analysis seen the fact -0.191 is obtained in the pre-crisis year, -0.075 during the crisis and -0.08 after the crisis. Pearson correlations were found to be rather indifferent and indicate a weak relationship between firm size and capital investment. As it is nearly 0.323 in the pre-crisis period, during the crisis this decreases to only 0.116 and in the post-crisis period to 0.109. P-values are higher than 0.05, which indicates that the coefficient is not significantly different from 0. The total period results into 0.141, which does mean that there is a positive relationship between the variables during the correlation analysis however, when progressing the regression analysis, unstandardized coefficients are observed of -0.109, which means that a negative relationship is present. However, overall it cannot be said that there is a significant relationship between firm size and capital investment in this sample.

### 5.1.5. Cash flow

Cash flow is measured by dividing gross operating profit and subtracting interest and similar charges minus taxes on profits by its capital stock. Capital stock is measured by the book value of fixed assets. Correlation values were found of -0.263 during pre-crisis, -0.364 during the crisis and 0.238 in the post-crisis period. This shows that there is a negative relationship before and during the financial crisis, however positive in the post-crisis period. This stipulates that after the financial crisis, firms are likely to rely more on their internal cash flows, which is in line with the findings of Buca and Vermeulen (2012) and Duchin et al. (2009). Additionally, regression analysis show strong and positive relationships between the two variables during the pre-crisis (unstandardized coefficients 1.914) and post-crisis period (1.219), however, negative and a rather weak relationship in the crisis period (-0.567). Therefore, an indifferent relationship is created between cash flow and capital investment.

### 5.1.6. Growth opportunity

The last control variable, growth opportunity, is also taken into account in the analysis. Growth opportunity is defined as net sales divided by capital stock, which is defined as the book value of fixed assets. The results gave correlation values of -0.796 during the pre-crisis period, -0.706 during crisis and post-crisis -0.695 with p-values of 0.058 in the pre-crisis period, -0.299 in the crisis period and 0.126 in the post-crisis period. Reported unstandardized coefficients during the regression analysis gave negative outcomes in the pre-crisis period (-0.234), during the crisis (-0.086) and post-crisis (-

0.187). This results into insignificant and weak relationships between the variables growth opportunities and capital investment.

**Table 2. Determinants of Capital Investment (Correlation)**

		Bank debt	Firm size	Cash flow	Growth opportunity's
<b>Pre-Crisis Capital Investment</b>	Pearson Correlation	-0.324	0.323*	-0.263	-0.796
	Sig. (2-tailed)	0.107	0.088	0.569	0.058
	N	26	29	7	6
<b>Crisis Capital Investment</b>	Pearson Correlation	-0.291*	0.116	-0.364	-0.706
	Sig. (2-tailed)	0.132	0.541	0.422	0.117
	N	28	30	7	6
<b>Post-Crisis Capital Investment</b>	Pearson Correlation	-0.469	0.109	0.238	-0.695
	Sig. (2-tailed)	0.018	0.603	0.699	0.126
	N	25	25	5	6
<b>Total</b>	Pearson Correlation	-0.452*	0.141	0.434	-0.684
	Sig. (2-tailed)	0.035	0.531	0.465	0.134
	N	22	22	6	6

This table shows the Pearson correlations, 2-tailed significance and the number of observations in relation to total capital investment in pre-crisis, crisis and post-crisis periods. See definition in table 1. The expected relations column is based on existing literature.

### 5.1.7. Adjusted R-Square

The adjusted R-Square is a statistical measure that shows how well one variable is at predicting another. During the regression analyses, explanatory variables as total debt, cash flows and firm size were pooled together, which led to the Adjusted R square value in all periods shown at the bottom in table 3. The combined adjusted R-squared values delivered positive results with 0.112 during the pre-crisis period, 0.376 during crisis and 0.588 in the post-crisis period. In the overall sample an adjusted R square is found of 0.652. This indicates that there is a moderately strong and positive correlation between the independent, control variables and total capital investment.

**Table 3: Determinants of Total Capital Investment (Regression)**

	Expected Relation		Pre-Crisis	Crisis	Post-Crisis	Total
<b>Constant</b>	+	Unstandardized coefficient	2.892	0.266	1.190	0.536
		T-value	(1.102)	(6.570)	(1.433)	(2.093)
		P-value	0.469	0.096	0.288	0.12
<b>Bank Debt</b>	+	Unstandardized coefficient	-0.488	1.267	0.180	0.122
		T-value	(-0.593)	(63.15)	(1.135)	(2.093)
		P-value	0.659	0.010	0.374	0.201
<b>Firm size</b>	-	Unstandardized coefficient	-0.191	-0.075	-0.08	-0.109
		T-value	(-1.224)	(-21.63)	(-1.031)	(-3.03)
		P-value	0.436	0.029	0.411	0.094
<b>Cash flow</b>	+	Unstandardized coefficient	1.914	-0.567	1.219	0.223
		T-value	1.326	(-40.41)	(0.361)	(0.835)
		P-value	0.411	0.016	0.742	0.465
<b>Growth Opportunities</b>	+	Unstandardized coefficient	-0.299	-0.086	-0.187	-0.033
		T-value	(-1.605)	(-21.30)	(-9.56)	(-2.15)
		P-value	0.355	0.030	0.011	0.128
<b>Adjusted R-square</b>	+		0.112	0.376	0.588	0.652
<b>N</b>			11	12	15	38

This table shows the unstandardized coefficients, t-values within a 95% confidence interval and p-values in relation to total capital investment for the pre-crisis, crisis and post-crisis and total-period. The expected relations are based on the literature review observed before. See table 1 for definition of the variables.

## 6. DISCUSSION

The results obtained in this paper by performing the regression analysis observed rather low R square values, which means that there exists a weak correlation between the variables. Nevertheless, analysis of regression does not solely rely on adjusted R squared values and therefore there should be no concern about these low adjusted R squared values. In a previous study from Buca and Vermeulen (2012), rather low adjusted R-square values also were observed (0.05, 0.06, 0.09) and this was also shown in another study from Ivashina (2010) that both investigated the impact of crisis on capital investment.

Additionally, as far as determinants of capital investment are concerned, credit rating seems to be of vital importance. The number of firms that have low credit ratings cancel or restrain their investments are significantly greater than that of firms that have positive credit ratings. However, this study focuses itself on Dutch corporations and in the Netherlands they do not apply credit ratings yet as they do in the US. This variable is taken into account in various other studies; Campello et al (2007), Kahle and Stulz (2011) and Campello et al (2010) who also study the effect of a crisis on capital investment.

Therefore, this could be a limitation in this study and it is suggested to include this variable in further research when the use of credit ratings becomes available in the Netherlands.

Another fact that impeded this study was the fact that this paper is written in the time that firms are still in the process of filling in their annual financial numbers. Moreover, as only small firms are observed they might only keep their financial details closely to themselves and are still in the process of preparing their annual reports. Therefore, the dataset contains a limited amount of information provided in the year 2012.

Moreover, as more researches, this study suffers from subjectivity. This paper defines variables as firm size the logarithm of total assets. However, using other definitions could result to different outcomes in the results. Another adverse interpretation is the crisis year. In this study this is seen as the year 2009 as being observed by a larger dip in economic activity estimated by Nederland's Bureau for Economic Policy Analysis. However, the crisis already had major impact in the US in the year 2008. Therefore, this could lead to different interpretations of when the crisis actually began. However, as this study focuses on Dutch small firms, the year 2009 fits the best to the crisis year.

## 7. CONCLUSION

This paper intended to answer the following research question: "To what extent has a financial crisis impact on a small corporations' amount of capital investment?" Firstly, background information about the financial crisis itself was defined, together with the findings of other studies on capital investment after the financial crisis. Afterwards, the model was provided, along with the definitions of the variables. Lastly, data were collected and results were analysed to give an outcome to the research question mentioned above.

Overall, it can be said that capital investment was affected a lot and has changed significantly by the global financial crisis of 2009. Before the financial crisis, low interest rates were observed, which increased the amount of debt significantly (Buca and Vermeulen, 2012). Moreover increases in bank debt ratio at the beginning of the crisis lead to a decrease in investment after the crisis. This is in line with the findings of Almeida et al. (2011). Marks of the financial crisis are still



seen in the post-crisis period where a decrease of capital investment is observed. Therefore, companies that had higher leverage for investment before the crisis show lower ratios after the crisis, requiring them to raise even more leverage. The findings of figure 2 in this paper show that there is a rapid decrease after 2010 in the capital investment ratio

In the analysis of the results the variables firm size and growth opportunity, as they are being defined in this study, do not correlate with total capital investment. There exists a rather weak and statistically insignificant relationship. However, the variable bank debt is found to have a positive relationship with capital investment, which means that an increase in bank debt leads to an increase in capital investment. On the contrary, growth opportunities seem to be negatively correlated with capital investment however in the correlation analysis showed a strong relationship with capital investment. Nevertheless, results obtained by the regression analysis indicate rather weak and insignificant relationships. Therefore, both growth opportunity and total debt are found to have little to no impact on a firms' amount of capital investment. The last variable, firm size was found to have insignificant impact on the amount of capital investment in all three periods. However, correlations were found to be negative, but strongly related and significant. Therefore, there still is a rather indifferent relationship between these two variables and hence future research is suggested. The last control variable, cash flow, provides evidence that there is a rather weak relationship between the variables, however during the regression analysis it did show significant results, but indifferent.

The limitation of this study is that as only small Dutch firms have been observed, the amount of firms taken into account in the analysis was rather small. Therefore, more research is required as the results obtained in this study show coincidental relationships between variables. Elaborations on factors of influence on capital investment determined here in this paper could be researched more extensively by having a broader and large sample size, which could increase the representativeness of the study. As this paper chose for a country- and firm size specific analysis, it is suggested in future research to perform cross sectional analyses between differences in size and countries

### **Acknowledgements**

I would like to thank all my three supervisors in supporting this paper. Especially Mrs Huang, who provided me with a lot of valuable feedback, suggestions and comments and who was always available to help.

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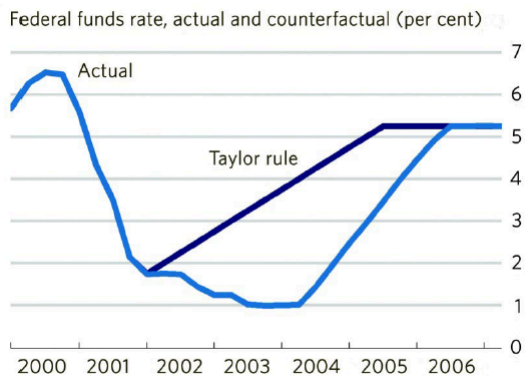
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## APPENDIX

### A. LOOSE FITTING MONETARY POLICY (TAYLOR, 2008)

#### Loose-fitting monetary policy



Source: *The Economist*, 18 October 2007

### B. INVESTMENT CAPITAL DURING BOOM – PRE-CRISIS AND IN CRISIS ZONE (BUCA & VERMEULEN, 2012)

TABLE 1  
Aggregate fixed capital formation  
in investment booms, downturns and collapse year 2009  
(Average annual growth: period 2001-2009)

	Boom	Downturn	Financial crisis Collapse
Belgium	3.74	-4.46	-8.11
France	3.25	-1.95	-9.04
Germany	3.85	-2.71	-11.41
Italy	2.44	-2.50	-11.74
Portugal	1.62	-2.41	-11.27
Spain	5.41	-4.76	-15.96

Boom years: Belgium ('01,'03,'04,'05,'06,'07,'08), France('01,'03,'04,'05,'06,'07,'08),  
Germany ('05,'06,'07,'08), Italy('01,'02,'04,'05,'06,'07),Portugal ('01,'07),  
Spain('01,'02,'03,'04,'05,'06,'07)

Collapse year is 2009 for all countries

Source: own calculations based on EUROSTAT national accounts

### C. INVESTMENT REGRESSION VARIABLES (BUCA & VERMEULEN, 2012)

TABLE 2  
Summary statistics of the regression variables

Variable	MEAN	ST.DEV	MEDIAN	MINIMUM	MAXIMUM
<b>Small firms</b>					
$Investment_{it}/K_{it}$	23.87	12.67	23.91	-16.72	59.93
$Sales\ growth_{it}$	0.36	7.82	0.64	-38.03	32.02
$Cashflow_{it-1}/K_{it-1}$	25.69	18.85	20.98	-12.23	132.35
$bank\ debt\ leverage_{it-1}$	23.86	8.94	24.20	3.03	43.46
$total\ leverage_{it-1}$	50.68	7.86	50.92	19.55	73.09