The Netherlands and their SMEs – Evidence for the impact of the global financial crisis on the access to external financing

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ABSTRACT

SMEs and their access to external finance have long been of concern among politicians and the academic society. Since the global financial crisis of 2008 hit, the European Commission and the Dutch government developed various financial instruments to support SMEs in order to mitigate the impact of the crisis and boost their investments for a fast recovery. While many scholars have found evidence for financial constraints among SMEs from separate European countries, the Dutch SME sector was not yet part of an individual investigation. This research effort aimed to fill this gap in the literature and investigated financial constraints of SMEs in the Netherlands during the global financial crisis with the goal of supporting the Dutch government to base their decision making on profound information. Examining the impact of the global credit crunch on SMEs level of investment, multiple linear regression analysis, namely an ordinary least square method, was applied to 247 SMEs and 988 firm-year observations obtained from the highly esteemed Reach Database. The findings indicate that the only indicators of a financially constraint status of Dutch SMEs in the sample are the firm's growth development and their profitability state as they were found to be statistically and economically significant in predicting a firm's level of investment. However, against the expectation, Dutch SMEs appeared to not invest less during the crisis showing that the crisis did not provide a negative exogenous credit supply shock as it was found to be the case among other countries in the European Union. Dutch policy makers at the government level are encouraged to revaluate their interventions regarding the mitigation of financial constraints of SMEs in the Netherlands.

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Keywords

SMEs, Access to finance, Measures of financial constraints, Global financial crisis, Level of investments, Euro area, The Netherlands, Policy interventions

5th IBA Bachelor Thesis Conference, July 2nd, 2015, Enschede, The Netherlands.

1. INTRODUCTION

To thoroughly acquaint oneself with corporate finance themes, it is inevitable to study the affairs of large, listed enterprises and their impact on the world's economy and the life of everyone affected. However, hidden behind the big stories in the news and in the media about multinational companies (MNCs) such as Apple, Nokia, and Nike, there is more to discover! Worldwide, the key driver for economic growth, innovation and employment still are the small- and medium sized enterprises (SMEs) which represent 99.8% of the total number of firms, 67.3% of total employment, and around 61.6% of total value added[1] in the Netherlands (Vermoesen, DeLoof and Laveren, 2013; European Commission, 2014). Even though they are only a small part of the overall public and academic community's area of discussion, SMEs and their proper access to essential financial resources are one of the main objectives for politicians across all member states of the European Union. Recently, the European Commission started to monitor the access of SMEs to external financing through the European Central Banks 'Survey on the Access to Finance of Enterprises' (SAFE) which also served as a data source for testing hypotheses in many scientific articles (e.g. Casey and O'Toole, 2014; European Commission, 2015a). After detecting weaknesses in the financial markets, the joint European Commission started to develop various financial instruments to support small businesses in their access to resources from financial institutions, via guarantee providers and through venture capital funds (European Commission, 2015b). Supporting this, the academic body of knowledge increasingly indicates that SMEs across the member states of the European Union suffered from credit rationing after the global financial crisis of 2008. Elaborating this, academic researchers investigated this effect by focusing on the countries across Europe (e.g. Casey and O'Toole, 2014) and by focusing on separate Euro area countries, such as Belgian (Vermoesen et al., 2013; De Maeseneire and Claeys, 2012), French (Kremp and Savestre, 2013), British (North, Baldock and Ullah, 2013) and Irish (Mac an Bhairad, 2013) SMEs. As far as it is known, Dutch SMEs were not yet part of an individual investigation which represents a significant gap in the literature since the European Commission (2014) highlighted that the Dutch SME sector has problems to follow the emerging recovery of other member states across Europe. In particular, Dutch SMEs access to finance is one of the major concerns since they trailed the EU average. For example, the Dutch government made an effort to mobilize financial resources from pension funds and insurance companies as a source for credits for local SMEs in order to compensate the restrictive loan policies of banks (European Commission, 2014). Therefore, the question remains to what extent Dutch SMEs faced such credit constraints during the global credit crunch from 2008.

Leaning on the research conducted by Vermoesen et al. (2013), this research paper aims to study financial constraints by investigating how the level of investment of Dutch SMEs is affected by the availability of external funding during the recent global financial crisis of 2008. As Vermoesen et al. (2013) advocate that the financial crisis constituted to an exogenous credit supply shock for SMEs, the advantage of concentrating on this crisis is that it allows to separate the effect of financing constraints on investments from the effect of investment opportunities. However, this study differs from the investigation of Vermoesen et al. (2013) in the way the credit constraints are measured. The authors used, among some other variables, mainly the proportion of long-term debt that matures within the next year of the crisis as explanatory variable and as measure of financial constraints of SMEs. The underlying logic is that at the beginning of the crisis, companies who have a major part of their long-term debt maturing within the next year tend to experience a significantly larger drop in investments in 2009. For this reason, these companies were expected to face tighter financing constraints (Almeida, Campello, Laranja and Weisbenner, 2011; Vermoesen et al., 2013). Based on limited data availability for Dutch SMEs, this study will aim to take advantage out of a set of variables that are further found to be an appropriate measure of financial constraints of SMEs in the background of an exogenous credit supply shock. In consequence, the subsequent research question will be evaluated in this research paper:

"To what extent does the global financial crisis of 2008 influence the access of Dutch SMEs to bank funding, as identified by their relation of financial constraints measures to their level of investments?"

This research is structured as follows. Part two will provide an overview of the key literature related to the research question and the derived hypotheses. The operationalization of the used data and methodology will follow in part three. Part four will provide the results of testing the stated hypothesis. Part five will include a discussion of the main findings, and part six will provide the conclusions of this research together with the academic contribution, practical implications, the limitations of this study and recommendations for further research.

2. LITERATURE REVIEW

2.1 Definition of SMEs and their financing

Before the literature review for this research paper can begin, it is vital for a proper investigation to first of all define the term SME. In compliance with Beck (2013), the criteria to distinguish between small- and medium sized, micro, and large enterprises varies across financial institutions and countries. Such criteria usually include numerical bounds for the number of employees, the total amount of assets or sales/turnover. In order to stay attached to the Euro area, the term SME in this research paper will be defined in alignment with the European Commission (2003) which describes an enterprise as SME when it employs between 10 and 249 staff members, has an annual turnover higher than € 2 million but smaller than € 50 million, or obtains an annual balance sheet total between € 2 million and € 43 million[2].

In this context, it is further noteworthy that SMEs usually face a different financial environment when compared to the smaller micro enterprises. By means of that, the umbrella term 'SME finance' usually refers to all financial services especially tailored for small- and medium sized enterprises. According to Beck (2013) it represents a segmented client approach for SMEs as compared to other segments such as 'corporate' and 'retail' segments catered by financial institutions. For this reason, the author stated that it can be implied that SMEs receive different lending techniques, product differentiation and different delivery channels as opposed to large firms and retail clients (Beck, 2013). When comparing to the micro enterprise segment, the lending techniques also differ between SME finance and microfinance segments, where SMEs face harder collateral requirements and business assessments and micro enterprises receive more 'personal' assessments. The

[1] According to the citation of the 2014 SBA Fact Sheet of the Netherlands composed by the European Commission (2014, p. 2), these values represent estimates for 2013 produced by DIW Econ, which are based on 2008–2011 figures from the Structural Business Statistics Database (Eurostat).

[2] Extract of Article 2 of the Annex of Recommendation 2003/361/EC according to the European Commission (2003).

underlying rationale for this is that microfinance is often provided by other institutions than banks such as non-governmental organizations (NGOs) or specialized microfinance banks which usually tend to aim a double or triple bottom-line emphasis rather than only profit targets (Beck, 2013). In conclusion, it can be inferred that SMEs and their access to external finance need to be focused on separately in order to avoid having different circumstances that could have an effect when examining the access to finance during the global financial crisis.

2.2 SMEs and their financial institutions

In order to fully understand the bank funding related financial circumstances that SMEs face, it is important to investigate not only what distinguishes SMEs from other enterprises (see previous part) but also to elaborate more in-depth on what relationships exist between financial institutions and SMEs, and what the current academic literature found out about this. The reason for this is that it is difficult to refer to financial constraints as in the following subsection 2.3 without firstly elaborating recent existing literature to other possible explanations for financial obstacles for SMEs than those factors being correlated with the global financial crisis.

One of the leading theories in the academic literature which tries to explain financial obstacles faced by companies is the traditional industrial organization prediction - *the market power hypothesis* - which states that increased market power will result in constrained credit supply and higher lending interest rates, thereby intensifying the above mentioned financing constraints (Ryan, O'Toole and McCann, 2014). Using this market power hypothesis as a starting point, the authors Ryan et al. (2014) investigated and confirmed recently that bank market power magnifies the credit obstacles faced by SMEs across Europe. This finding provides a hint that in the relationship between financial institutions and SMEs, the banks seem to be the one with the power over the constrained access to bank funding – indicating a more supply driven approach. Regarding the relationship of SMEs and their banks, empirical evidence further suggests that also internal financial institutional characteristics tend to have an effect on the constrained access to bank funding of SMEs. Moro and Fink (2013) found out that increased trust of loan managers in the managers of SMEs is negatively related to SMEs risk of being financially constrained. The underlying rationale for this is that trust tends to reduce agency costs and transaction costs in a lending relationship. Furthermore, when loan managers rely on trust, they were found to overcome information asymmetries and are better able to evaluate companies' creditworthiness (Moro and Fink, 2013). Collaborating to this, the study of Canales and Nanda (2012) points out that the organizational structure of a financial institution also has an impact on SME lending. Their findings show that decentralized banks with branch managers having larger autonomy over credit decisions issue larger loans to small companies than those with soft information available. But on the other side, these financial institutions tend to be cherry picking customers and restrict the access to loans when they have market power (Canales and Nanda, 2012). Moreover, it is important to note that Ivashina and Scharfstein (2010) found out that some financial institutions were more adversely impacted by the global financial crisis than others. Their findings indicate that banks which have access to deposit financing cut their lending less than banks with for instance less access to it, as a response to the credit crunch from 2008.

From these arguments, it can be extracted that it is essential to consider that SMEs and their access to bank funding can be affected by multiple factors. These factors include external situational changes in the environment such as the impact of the global financial crisis of 2008 on financial institutions resulting in a direct effect on the access to bank funding. However, internal circumstances need to be considered as well, as academics recently found that factors such as for instance the extent of market power the bank possesses, the personal relationships with the bank and the organizational structure of the responsible financial institution can also have an effect on the constrained access to bank funding in especially the SME segment.

2.3 Constrained access to bank funding

The access to bank finance has always been one of the main banes for SMEs in many of the developed countries (Abor, Agbloyor and Kuipo, 2014). In general, the academic literature characterizes SMEs as being 'financially constrained' when they face all possible obstacles to raise external financing, from e.g. credit rationing until high transaction cost (Ryan et al., 2014; Fazzari, Hubbard and Petersen, 1988). More in depth speaking, the access to bank financing for SMEs is mainly affected by two types of constraints – demand and supply constraints. Demand constraints encompass all factors which make it difficult for SMEs themselves to access bank funding such as poor quality of potential projects and the inability of SMEs to convince financial institutions, such as unattractive business plans and pro-forma financial statements (Abor et al., 2014). On the other side, supply constraints refer to circumstances that make it difficult for financial institutions to provide loans to SMEs such as high levels of information asymmetry (compare Binks, Ennew and Reed, 1992), high transaction costs, the general inherent risk with SME lending and institutional weaknesses in developing countries such as disruptions caused by financial crises (Abor et al., 2014). Another differentiation of constrained access to bank funding is defined by Casey and O'Toole (2014) who used the ECB Survey on the Access to Finance for SMEs (SAFE) to investigate alternative financing methods of SMEs in the background of the recent global financial crisis. Based on this survey, the authors suggest to differentiate financial constraints along two types of constrained companies: (1) the credit-rationed firms that are companies whose credit applications are rejected outright, and (2) self-rationed borrowers – firms which do not apply for a loan due to high entry barriers for the access to finance such as high lending costs. A problem that occurs regarding the usage of such a kind of survey is that there is still an ongoing debate whether financial constraints are perceived or based on real experience. The authors Artola and Genre (2011) found out that in the background of the global financial crisis, the perceived impact was broadly found across all companies but only young and small companies tend to really experience the constraints when lending conditions are tightened.

Synthesizing the extent to which SMEs can face financial obstacles, it crystalizes out that this research paper needs an extensive elaboration of how to measure financial constraints in order to examine to what extent the global financial crisis of 2008 influences the access of Dutch SMEs to bank funding. The reason for this is that the previous academic literature had different approaches to define financial obstacles (see above) and also different measurement approaches (for an overview, compare e.g. Fazzari et al., 1988; Tobin, 1969; Hayashi, 1982; Abel, 1980; Abel and Blanchard, 1986; Bond and Meghir, 1994; Gilchrist and Himmelberg, 1995; Gilchrist and Himmelberg, 1998; Demirgüç-Kunt and Maksimovic, 1998; as cited by Beck, Demirgüç-Kunt, Laeven and Maksimovic, 2006; and Almeida et al., 2011). Therefore, this research paper will further explain which approaches will be best suited to

investigate Dutch SMEs in subsection 2.5, after elaborating what the academic literature provides about the financial crisis in order to first fully understand which impact on Dutch SMEs can be expected.

2.4 The impact of the global credit crisis

The story from the recent global financial crisis is well-known among academics and practitioners. Nevertheless, in order to fully understand the impact that the crisis can have on the access to bank funding of SMEs, it is vital to shortly introduce what happened during the crisis in order to deduce what impact it assumed to have on Dutch SMEs. Ivashina and Scharfstein (2010) describe the global financial crisis as a banking panic which had their origin in the preceding credit boom that peaked in the middle of 2007, followed by a meltdown of subprime mortgages and all kinds of securitized products. This meltdown led to concerns about the liquidity and solvency of financial institutions which resulted in a full-blown banking panic with the need for some government takeovers and subsidization. Even though the banking panic dropped in the first half of October as result of the governmental backing, the prices of most asset classes and commodities fell rigorously and financial market volatility and the cost of bank lending rose substantially (Ivashina and Scharfstein, 2010).

One of the key theories which need to be mentioned in this context is that of Hempell and Søerensen (2011). The authors also argue that the financial crisis led to disruptions on the access to wide financial sources and put pressure on the bank's liquidity position. Therefore, the so-called price effects (for instance higher return demands on riskier loans) and constraints on the debt volume were found to positively affect the drop of corporate debts after the global financial crisis of 2008. In relation to SMEs, it can be assumed that SMEs usually rely on bank funding and are therefore likely to be defenseless if there is such an abrupt and extensive disruption in the financing system of the world such as the global financial crisis (Udell, 2009; Mac an Bhairad, 2013). Additionally, other scholars back up this assumption by indicating that SMEs are more likely to face financial obstacles because they tend to be more exposed to information problems and they are assumed to be more bank reliant than large companies (Vermoesen et al., 2013). For this reason, the reliance of SMEs on bank funding causes them to be particularly sensitive and vulnerable when there is an abrupt and extensive disruption in the world's financing system such as a credit crisis (Udell, 2009). Collaborating to this is the fact that small firms usually do not have a diversified access to external funding (Vos, Yeh and Carter and Tagg, 2007). Moreover, history showed that this fact is even more intensified when a credit crisis is preceded by a period of expanded loan supply due to companies may become even more reliant on debt finance (Hughes, 1997). For these reasons, the recent global financial crisis provides an interesting and valuable opportunity to get insights into the behavior of companies and financial institutions in a period of expanding credit followed by a constrained period. Furthermore, this literature shows that SMEs are of particular interest because they tend to be more bank reliant which is further intensified when a credit boom period was preceding the crisis which was the case in 2008, making them even more sensitive and vulnerable when the crisis hits.

2.5 Measuring financial constraints

Measuring financial constraints of SMEs based on their firm-level data involves to focus on a various set of quantifiable independent variables as the academic body of knowledge indicate that the concept of '*financial constraints*' is only indirectly feasible. The chosen set of independent variables, based on previous research efforts, are directly indicating the status of the extent a company can face financial obstacles which in turn are assumed to impact the level of investments of a company. For this reason, below, two related hypotheses are built after an extensive elaboration about the assumptions related to the independent variables used in this study.

The approach of this research paper will take into account the effect of the global financial crisis on the *investment – cash flow sensitivity* as this concept was firstly introduced by Fazzari et al. (1988) and recently reconfirmed by Fazzari, Hubbard and Petersen (2000) after being criticized by Kaplan and Zingales (1997). This concept emphasizes the importance of cash flow as a determinant of investment expenditures, relying on the assumption of 'financing hierarchy' in which internal funding has preferential advantages over external financing. The researchers implied that to the extent to which companies are constrained in their access to external finance, the level of investments reacts sensitively to the availability of internal funding, more deeply speaking, the movements in cash flow of the company. It therefore can be extracted and transferred to this research, that the lower the level of cash flow, the higher the external financing constraints can be expected for companies. Furthermore, the constructed framework of Myers and Majluf (1984) indicates that companies may abandon valuable investment opportunities when internal funds are not sufficient to cover them. Therefore, the high sensitivity of a company's growth and investments to internal sources are taken further as an indicator for the presence of financing constraints (Fazzari et al., 1988, Fazzari et al., 2000; Carpenter and Petersen, 2002; as cited by Ferrando and Mulier, 2013). More in depth, the author Rahaman (2011) points out that a company with no or only limited access to external finance may face serious obstacles in its ability to pursue an optimal investment program which, in turn, may hinder the growth of this company (see e.g. Rajan and Zingales, 1998; Demirgüç-Kunt and Maksimovic, 1998; Levine, 2005 and Knyazeva et al., 2009). For this reason, a lower firm growth is assumed to be associated with higher financial constraints.

Furthermore, the research paper of Kremp and Savestre (2013) provides an extensive insight into variables which serve as a measure for financial constraints. Among other, they emphasize the importance of firm size as indicator in the background of the credit crisis. The underlying rationale includes that smaller firms are rather expected to rely more on bank funding than larger enterprises that may have an easier access to a variety of external finance. Additionally, the firm size variable indicates both the likelihood to go bankrupt and the level of collateral that can be offered by firms as an assurance for their bank loan (Kremp and Savestre, 2013). When considering the age of a company, it is well known among the academic society that younger firms are more likely to default than mature companies (see for example Fougère, Golfier, Horny and Kremp, 2012). As the degree of leverage of an SME is taken into account, it is moreover assumed that financial institutions are reluctant to provide loans to already strongly indebted companies (Kremp and Savestre, 2013). In measuring leverage, it is found to be particularly interesting to take short-term debt into account. According to Duchin, Ozbas and Sensoy (2010, p. 429), it "represents a looming reduction in liquidity in times when rolling over debt is difficult or costly" and it further includes long-term debt which matures in less than one year. The reason why long-term debt is not that appropriate lies in the fact that long-term debt with greater maturity cannot be regarded as having an immediate effect on corporate liquidity (Duchin et al., 2010). Therefore, in the background of the recent global financial crisis, it can be assumed that the crisis resulted in a decline of supply of

external funding and/or higher costs of debt financing. This post-crisis investment reduction is further expected to be greater for firms with high net short-term liabilities (short-term debt minus cash reserves), but this effect is not expected for long-term debt (Duchin et al., 2010). Furthermore, it is suggested that profitability acts as an indicator of the capacity of the firm to generate cash-flow and to refund their financial liabilities (Kremp and Savestre, 2013). Therefore, it is assumed that profitability and access to bank funding is positively related. Holmström and Tirole (2000) had further drawn attention to the liquidity variable. It is argued that companies need to manage their liquidity balances in order to continue their investments even in the face of negative exogenous liquidity shocks. However, when the firms discontinue, the effect is that their expected future profits will be lower and this increases their likelihood of default and thus in turn will increase external financial constraints for companies as banks will be unlikely to provide bank funding (Holmström and Tirole, 2000). Nonetheless, the effect that these kinds of variables try to capture, is the willingness of financial institutions to lend money to SMEs, indicating a rather supply driven approach which will also be taken into account by this research paper. Based on this, the subsequent hypotheses is built.

Hypothesis 1. Dutch SMEs which are small in size, relatively young in age, show a low degree of cash flow and growth development, have a high degree of net short-term debt, a low degree of profitability and liquidity tend to be more financially constrained during the time of the crisis due to a negative credit supply shock.

These indicators of financial obstacles that SMEs can face in the context of the global financial crisis of 2008 will be used as predictor variables in order to examine their influence on the level of investments of the studied SMEs. Related to this, the underlying assumption of this research is based on standard models of investment with financial frictions (compare Jaffee and Russel, 1976; Stiglitz and Weiss, 1981; Holmstrom and Tirole, 1997). By means of that, the theory suggests that negative exogenous shocks of external finance, together with the presence of financial constraints tend to hamper investments if the associated company lacks sufficient internal means to finance profitable investment opportunities. Further, it can be assumed that this effect intensifies when the company faces relatively greater costs in raising external capital (Duchin et al., 2010). This leads to the following hypothesis of this research.

Hypothesis 2. In the presence of the global financial crisis (2008-2009), it is expected for Dutch SMEs that the higher the extent of financial constraints, the lower the level of investment is expected to be observed.

2.6 Evidence of the impact of the global financial crisis of 2008 across Europe

Before the methodology and data section can start, it is essential to evaluate and reconsider the most important and related previous literature which focused on the impact of the global financial crisis of 2008 on SMEs across Europe in order to evaluate what is already found on this topic and what is still missing. For this purpose, Table 1 (see Appendix) will give a short overview of the main scientific findings regarding the constrained access to external finance which SMEs face during the credit crunch of 2008 across different European countries. In the following, the most important and most relevant studies of this list will be reviewed and evaluated for an appropriate overview relating to this research paper.

In the context of the recent financial crisis, the author Beck (2013) states that there are many references that SMEs are being the enterprise segment which suffers the most. For this purpose, the first mentioned collaborating paper is written by Mac an Bhairad (2013) which provides important insights into the supply and demand responses from SMEs to the global financial crisis across the European Union by examining secondary survey data from the Irish Central Statistics Office (CSO). Herewith, the author solely focus on characteristics of Irish SMEs which seek finance before and after the crisis and his results indicate that growth, ownership, age and size are important features in the pre- and post-era of the crisis. The evidence further indicates that mostly financially distressed SMEs were suffering the greatest consequences from the crisis and most importantly that failure to secure debt in previous periods did not deter companies from applying for credits in following periods. The latter finding is valuable for this paper since it indicates that the demand for debt and the willingness to access external finance for investment projects did not reduce that significantly.

Moreover, the research from Kremp and Sevestre (2013) investigated exactly this, whether the observed evolution of loans for SMEs during the recent crisis was demand driven or supply driven. The former is characterized by the authors as a result of the decrease in companies' investment and activity projects, and the latter as a result in loan rationing resulting from a more cautious behavior of financial institutions. However, based on two databases of the Banque de France, Kremp and Sevestre (2013) found out that French SMEs were not strongly affected by credit constraints since 2008. The major part of the observed reduction in loans outstanding is explained by the decrease in SMEs' demand for credit. This is further counteracting the expectations from this paper that all SMEs in the Euro area were suffering similarly from loan restrictions after the global financial crisis but it is in line with several recent surveys conducted in France about this topic. Moreover, this research of Kremp and Sevestre (2013) is difficult to compare with the other academic papers, since French SMEs tend to be an exceptive case. According to Hernández-Cánovas and Koëter-Kant (2011), French SMEs tend to be less financially constrained since SMEs under French civil law tend to have significantly shorter loan maturities, indicating that financial constraints in France are more correlated with the legal institutional environment rather than with the global financial crisis. Empirical evidence which supports the supply side impact of the global financial crisis on the access to external finance for SMEs is provided by North et al. (2013). Their study puts emphasis on British technology-based small companies which were found to face difficulties in the access to both debt and equity finance, especially when funding is needed for an early stage and for research and development activities. This constrained financing shows that this kind of small, innovative enterprises did not face less demand for investments after the crisis of 2008 and in the whole post era, hereby indicating the strong impact of the supply side.

All in all, exploring if the global financial crisis of 2008 had a supply driven impact or a demand driven impact is a difficult matter. Empirical evidence provides mixed results regarding the impact on small- and medium sized companies in the Euro area. The results of the academics which recognize that both have an impact but strongly support the supply side are that of Mac an Bhairad (2013), North et al. (2013) and Vermoesen et al. (2013). However, Kremp and Savestre (2013) claim that the identified impact was mainly due to a decrease in demand and therefore demand driven. However, further exploring if the impact of the credit crunch of 2008 is supply or demand driven is such a controversial debate, whose extent would go far beyond the scope of this research.

3. METHODOLOGY AND DATA

3.1 Sample and data preparation

This research paper benefited from using a secondary dataset extracted from the Reach database of Bureau van Dijk, as provided by the University of Twente library. This dataset contained comprehensive financial information of enterprises in the Netherlands (Bureau van Dijk, 2015). The sample selection criteria required the data to be reduced based on some specific criteria in order to test the stated hypotheses in an appropriate way and find a relevant answer to the research question free from unintended implications. For this reason, this study used the European definition of SMEs as named in subsection 2.1. The way in which these criteria of companies being a SMEs are satisfied is when they apply completely to at least one of the considered time periods (2006 until 2009). Further, following Vermoesen et al. (2013), financial firms, governmental enterprises, and not-for profit organizations as defined with the US SIC code encompassing the intervals 6000-6999 and 8000-9999 are excluded. The underlying logic for this is that the latter two are not free of governmental regulations regarding their investment decisions (Smith, 1986) and because the former face a different financial environment, making it difficult to compare the SMEs in the sample. Finally, the sample was reduced to companies that have a full dataset across the relevant time period for the values of total assets and values for the dependent variable resulting in a final sample consisting of 247 SMEs with 988 firm-year observations. However, the amount of firm-year observations depended on the available unbalanced panel data extracted from a secondary resource and therefore varied across the observed variables during the time period (for an exact overview, see table 3). In alignment with Vermoesen et al. (2013), this study investigated SME investments during the period 2006 until 2009 by equally dividing the main period into two pre-crisis years (2006 and 2007) and two crisis years (2008 and 2009). Following the related research conducted by Duchin et al. (2010), this research paper used the base specification to regress firm-level data on an indicator variable (the crisis dummy) for whether the time considered is during the crisis and on the interaction of these with the company's position measured one year before. The underlying logic of measuring the explanatory variables in this way is based on the *instrumental variables approach* which states that "year-before financial positions are not positively correlated with unobserved within changes in investment opportunities, encompassing i.e. unobserved firm-specific demand shocks" (Duchin et al., 2010, p. 419). For this reason, the base specification of this research paper regressed to the year 2005 (as t-1) in order to capture this consideration.

3.2 Variable description

In one of the previous parts it is described which financial indicators tend to measure financial constraints during a global credit crunch. However, the way in which the relevant variables are measured varies across academics. Therefore, a definition is further necessary in order to avoid misunderstandings. For this purpose, table 2 displays the measurement of the variables as they were defined in this research paper, leaning on the most related academic papers to this study which also investigated these variables. It is further noteworthy that all variables were divided by the company's total assets as suggested by Duchin et al. (2010), except for firm size and the dummy variables. Regarding the dummy variables, this study took the research of Kremp and Savestre (2013) into account and defined the following dummy variables. Age was operationalized as taking the value of 1 for < 5 years referring to young SMEs, and with the value 0 for all mature companies categorized. Furthermore, it is suggested by Kremp and Savestre (2013) to take a crisis year dummy into consideration in order to examine the impact of the global financial crisis. For this reason, this research paper considered this indicator variable for whether the time period in question is during the global financial crisis (dummy value of 1 if true, otherwise 0 when false) into account (Duchin et al., 2010). By applying this approach, it is possible to compare the impact on the dependent variable in the multivariate regression analysis during the time of an exogenous credit supply shock (2008-2009) with the pre-crisis period (2006-2007). Moreover, a description of the applied methodology including the specific type of multivariate regression analysis conducted is illustrated in the subsequent part.

3.3 Research methodology

In order to be able to examine the research question and investigate how the global financial crisis of 2008 has impacted the access to bank funding for Dutch SMEs, this study followed the research conducted by Vermoesen et al. (2013), Kremp and Savestre (2013) and Duchin et al. (2010). As it is best practice to do so, this research methodology conducted as a first step a univariate analysis in the form of a descriptive statistics. These included the number of firm-year observations, the mean, median, standard deviation, minimum and maximum values for each of the variables encompassing the years 2006 until 2009. Following the research of Vermoesen et al. (2013), the next step involved a bivariate analysis which reported the Pearson correlation coefficients between the variables. Furthermore, a cross-sectional research method was applied to the panel dataset, namely multivariate regression analysis. For this aim, the estimated linear regression model will be the ordinary least squares (OLS) method which has the aim to fit a straight line by minimizing the distance between the data and the residuals and by means of that, summarizing the general pattern (Bock, Velleman and De Veaux, 2010). However, before this research paper can proceed with the results part, it is vital to provide the model specification:

$$\textbf{\textit{Level of investments (log)}}_t = \alpha_0 + \beta_1 Firmsize_t + \beta_2 Growth_t + \beta_3 Cashflow_t + \beta_4 Liquidity_t + \beta_5 Profitability_t - \beta_6 Net\ short\text{-}term\ Debt_t - \beta_7 Age_{t-1} - \beta_8 Crisis\text{-}year_t + \varepsilon_t$$

4. RESULTS

4.1 Descriptive statistics

After the sample was defined according to the previously described procedures and the variables were calculated with the available panel dataset, table 3 was prepared in order to display the descriptive statistics including the mean, median, standard deviation, minimum and maximum values of the dependent variable and the independent variables during the observed time periods. Regarding the dependent variable, it is identifiable that the average yearly investments in fixed assets of Dutch SMEs for the total period amount to 4.8% of total assets which is comparable to the findings of Vermoesen et al. (2013). They investigated a sample with 2,354 firm-year observations and ascertain that Belgian SMEs faced a degree of investments in fixed assets (7.9%) which is proportionate to that of the Dutch SME sector. As this value was identified to be "representative for the overall investment policy of Belgian SMEs in the period considered" (Vermoesen et al., 2013, p. 439), it can be extracted that this also holds true for Dutch SMEs in this research paper. For the indicators of SMEs being financially constrained (the independent variables), it is visible that the variable growth only accounts for 1.5% on average. Additionally, it is remarkable that the variable cash flow includes an average value of 224.2% for the whole considered period. Roughly speaking, cash flow accounts for an average amount that is twice as high as the total

assets of the SMEs in the sample. However, it needs to be emphasized that the variable cash flow is the one with the smallest firm-year observations in the sample, as the operating income was seldomly accessible for Dutch SMEs. In order to cope with this situation, the regression analysis took this fact into account. Besides, the Dutch SMEs in the sample were further demonstrating a comparable picture for the variable liquidity as compared to the results found by the authors Vermoesen et al. (2013). A mean value of 6% of total assets was ascertained for Belgian SMEs whereas for Dutch SMEs a value of 8.9% can be extracted from the descriptive statistics. The results further revealed that the observed Dutch SMEs in the sample had a higher degree of profitability compared to their mean level of liquidity. Regarding the categorical variable age, it can be extracted that the proportion of young SMEs in the sample is relatively low (5.3%), compared to mature Dutch SMEs.

Moreover, table 3 acted in this study not only as an overview, but it was also utilized in order to capture a first idea of the degree of financial constraints that the average Dutch SME faced over the total period. As Duchin et al. (2010) suggest, it is advisable to use the independent variables in order to examine the extent to which companies are financially constrained. The authors claim that firms can be classified as constrained or unconstrained by dividing the sample at the median respectively to the assumptions made about the direction of the relationship (see previous subsection 2.5). After applying this method, it became clear that the average Dutch SME in the sample observation is rather constrained concerning their degree of firm size and their growth development, as they tend to be smaller than the median values. Nonetheless, it becomes noticeable that concerning the other indicators of the extent of financial constraints (i.e. cash flow, liquidity, profitability and the debt variables net short-term debt and net long-term debt), the sample appears to be rather financially unconstrained.

Summarizing briefly the findings of the univariate analysis described above, it can be extracted that the dependent variable of Dutch SMEs showed comparable results on average over the total considered period as they did for Belgian SMEs reported in a previous study (cf. Vermoesen et al., 2013) which indicates that the sample can be regarded as representative for the overall investment policy of Dutch SMEs in the examined time period. It further could be observed that the number of firm-year observations for the variable cash flow is rather low as compared to the other independent variables. Acting as warning sign that the multivariate regression analysis might have been conducted with a too small number of observations, a second analysis was operated without the variable cash flow in order to assess the extent the results of the linear regression analysis have changed. Moreover concerning the interpretation of the results, it became further vital to discuss the findings of the multivariate regression analysis in the view of the discovery that some independent variables appeared to not show a financially constrained characteristic when examining their tendency.

4.2 Correlation analysis

As described in the methodology section of this research paper, table 4 was built in order to illustrate the Pearson correlation coefficients between the measured variables in this analysis. Following the suggestions of Vermoesen et al. (2013) and studying the overall period, this table revealed that Dutch SMEs which invest more tend to experience a significantly higher firm growth development. Further, they tend to generate a higher profitability and expose a lower degree of cash flow when investing more. Taking the debt variables into account, the bivariate analysis revealed that SMEs that invest more tend to have a significantly lower net short-term debt amount. Moreover, analyzing the correlation of independent variables reciprocal to each other, it became visible that some independent variables tend to significantly correlate with each other. Liquidity was found to be highly correlated with net long-term debt and net short-term debt (-0.525 and -0.591, respectively). Additionally, cash flow was further found to significantly correlate with firm size (-0.482) and with net short-term debt (-0.373) reciprocal to each other. However, this inter-correlation among the independent variables could portray a multicollinearity problem. The author Pollock (2012) explains multicollinearity as an occurring problem when the independent variables included in a multivariate regression analysis are related to each other to such a strong extent that it becomes problematic to estimate the partial effect of each predictor variable on the dependent variable. As a rule, the author suggests that there is no problem when the magnitude of the correlation coefficient between the variables is less than 0.80. As can be seen in table 4, this is not the case in this research and therefore, multicollinearity appears to not threaten the validity of the outcomes of this study.

4.3 Regression analysis

In the subsequent section, the results of the linear multivariate regression analysis are formulated as they can be observed in the Appendix. The results section is built as follows. Firstly, the relationship of the indicators of the constrained access to external finance on the investments of Dutch SMEs in the sample is illustrated. Secondly, the same analysis is applied to the sample but without the variable cash flow as explained in subsection 4.1.

4.3.1 The relationship between SME's financial constraints and their level of investment

Table 5 in the Appendix provides insight into the findings of the regression analysis. The results of model 1 indicate the extent to which financial constraints tend to explain the level of investments of Dutch SMEs in the sample. The R^2 of 45.1% is not expressive since it usually increases when additional independent variables are included in the model. For this reason, the adjusted R^2 of 39.8% is more informative. Therefore, the results indicate that 39.8% of the variance of the level of investments can be explained by the regression model. Regarding the results of the independent variable, the OLS regression analysis further provides rather mixed results. The results depicted in table 5 (model 1) indicate that only the indicators growth, net long-term debt and the degree of profitability tended to significantly estimate the level of investments of Dutch SMEs in the sample, as explained in the following. However, before analyzing the results, it is vital to take into account that the dependent variable was logarithmized in order to help normalizing the residuals and constructing a more linear model for the purpose of practicing a proper multivariate regression analysis (for further explanation, see subsection 4.4). For this reason, the following interpretation of the results was carefully adjusted to the fact that only the dependent variable is log-transformed as suggested by Fox (1991). For this reason, the results are as follows. The findings indicate that for every unit decrease in the degree of growth, there is a (100 * 0.060 % =) 6.0% decrease in investments, while holding the other variables constant. Further, the findings suggest that for every unit decrease in the profitability, the investment significantly decreases by 5.2%, when holding the other predictors constant. Finally, it appears that the predictor net long-term debt significantly explains the variation of the level of investments. However, this variable was only included

as a control since net short-term debt was assumed to be significantly related to the degree of investments. Nonetheless, model 1 predicted that for every unit decrease in the net long-term debt, the level of investments significantly decreases by 4.8% while holding the other predictors constant. As controlled for the crisis-period dummy, it can be extracted that compared to the pre-crisis period, the level of investments was (non-significantly) higher by 0.6%. Furthermore, regarding the results of the model 2 in table 5 (without the cash flow variable in order to enhance the number of firm-year observations) it became obvious that the adjusted R^2 of 29.7% deteriorated compared to the first regression analysis. The results of the analysis further showed comparable outcomes for the variables growth and profitability which stayed significant. However, after omitting cash flow from the analysis, the debt variables behaved in a different manner. Net long-term debt was not significantly related to the level of investments anymore but net short-term debt was, as expected in hypothesis 1. It can be extracted that every unit increase in net short-term debt leads to a decrease in the level of investments by 1.0%, when holding the other variables fixed. Further controlling for the crisis-period, it can be claimed that compared to the pre-crisis period, the level of investments was significantly higher by 0.5%.

All in all, regarding the confirmation of hypothesis 1, the following can be extracted. Only firm size and the growth development of Dutch SMEs tend to express a financially constrained tendency regarding the access to bank funding as found and explained in subsection 4.1. The other predictor variables are on average expressing a rather unconstrained access to bank funding over the full considered time period. Nonetheless, the regression analysis regarding the extent to which the independent variables (as measures of the extent of financial obstacles) explain the level of investments, showed that only the degree of growth and profitability tend to be significantly related to the level of investments as expected. However, when the variable cash flow is omitted, the variables growth, profitability and net short-term debt tend to significantly explain the level of investments. Regarding the impact of the global financial crisis, the examination was conducted by including a dummy variable as suggested by Duchin et al. (2010) and Vermoesen et al. (2013). The results indicate that all things being equal, the model predicted that the level of investment was higher in the crisis period as compared to the reference category pre-crisis period which was against the expectations. However, the results and their implications will be fully discussed in part 5.

4.3.2 Assessing the impact of the credit crisis

Regarding hypothesis 2, the results indicate that the SMEs in the sample did not experience the fully assumed degree of financial constraints during the global financial crisis of 2008. Lower levels of investments were only identified for a few indicators of financial constraints, even though the results regarding the independent variables changed by omitting the variable cash flow and thereby increased the number of firm-year observations in the multivariate regression analysis. Additionally, the exogenous credit supply shock appeared to not have negatively impacted the level of investments. Unexpectedly, the level of investments of Dutch SMEs tended to be higher by 0.6% with the variable cash flow (but not statistically significant) and 0.5% higher without the variable cash flow (significant at the 5% level). Summarizing this, it can be claimed that hypothesis 2 was not confirmed regarding the impact of the global credit crunch.

4.4 Robustness of the results

Before a step towards an appropriate discussion and conclusion based on the findings of this research paper can be undertaken, it is essential to critically evaluate the robustness of the results. For this purpose, it is best practice to examine if vital assumptions about the variables used in the multiple regression analysis were satisfied. Before the regression even started, the inspection of the variables indicated that the dependent variable was initially not normally distributed and thereby violated the assumption of a normally distributed dependent variable. Visual inspection displayed a rather skewed picture to the left. Conquering this problem, this research followed Fox (1991) who suggested to use power transformations in this case. Therefore, the dependent variable was log-transformed together with a constant in order to create a better picture and pulling it in the right tail direction. However, as shown in figure A, the essential assumption of normally distributed errors is hardly fulfilled and should be considered critically. As Osborne and Waters (2002) suggest, it can distort the relationship and the significance tests and leading to a less efficient least square estimation when this assumption is not perfectly fulfilled. Since this seems to be a weakness, it will be further taken in the limitations. Further, examining the constant error variance assumption by visually inspecting the scatterplot of standardized predicted values against the standardized residuals indicates that the homoscedasticity assumption is fulfilled. The errors are constantly dispersed with a mean value of zero. Finally, it is advised to test the linearity assumption, as multiple regression can only estimate the relationship between the variables accurately when this assumption is met (Osborne and Waters, 2002). For this purpose, a partial scatterplot of the level of investments against the predictor variables was drawn. The results indicate that the phenomenon is rather linear but it appears to be weak. Being the closest to the perfect linear relationships comes the relationship between the level of investment and firm's growth. Moreover, in order to clear the sample from influencing outliers, all variables were winsorized in alignment with Vermoesen et al. (2013) and Duchin et al. (2010). However, Duchin et al. (2010) indicate that this way of removing influential outliers is not sufficient when considering the debt variables. In order to solve this problem, the authors suggest to restrict the sample to firms with debt less than 50% of their assets and a net debt amount within a range of +/-50% of assets. Nonetheless, this expected problem with the debt variables was not observed with the available data for Dutch SMEs and removing outliers for the debt variables was mainly successful for some of the variables with Winsorization at the 5%/95% level. For the dependent variable however, more effort was needed, as large outliers threatened to influence the validity of the regression analysis. In conclusion, in order to best assess the relationship between the variables it is further important to take these assumptions and their inherent risks into account in order to properly discuss the results and draw conclusions based on them.

5. DISCUSSION

All variables in the model specification were carefully selected based on the most relevant available academic literature. As Hardlock and Pierce (2010) adequately pinpointed, this approach to assess companies based on sorting characteristics that the academic society is confident are related to financial constraints, goes back to Fazzari et al. (1988) and is still practiced and appreciated in recent times (see for instance Almeida et al., 2011; Duchin et al., 2010; Kremp and Savestre, 2013; Vermoesen et al., 2013). Therefore, the selected variables in this research were found to be useful measures of the extent to which a company can face obstacles in their access to

external finance and based on this approach, the first hypothesis was built (see part 2.5). Beginning with the first variable, firm size, the findings of the study suggest a weak, neither statistically significant nor economically interesting negative relationship between firm size and the level of investment of SMEs. The results indicate that for every unit decrease in firm size, the level of investment will increase by 0.1%, while all other variables are held constant. Since these results turned out to be opposite of the expectations that smaller firms were expected to be more reliant on bank funding than larger companies that can draw on an easier access to a variety of external finance, it can be extracted that concerning this indicator of financial obstacles, the Dutch SMEs in the sample do not appear to be financially constrained. Relating these findings in the context of previously published scientific articles, the findings turned out to be against the expectations. For instance, the results of Vermoesen et al. (2013) suggest that the investments of both smaller and larger SMEs decreased in 2009. However, this was not confirmed by the results of this study when controlling for the crisis impact (compare subsection 5.1). On the contrary, the variables growth and profitability indicate that Dutch SMEs faced financial obstacles, and hence invested less. The results show that for 1 unit decrease in growth as well as in profitability, the model predicts a 7.8% and 5.7% decrease in the level of investments, respectively, while holding each of the other variables constant. These results show a very strong significance at the 1% level. Concerning the growth development of SMEs, the related academic literature provides the presumption that companies with lower firm growth are expected to be associated with higher financial constraints because as they face no or only limited access to external financial resources, they could face serious obstacles to pursue an optimal investment program which, in turn, could hamper the growth development of the company (see e.g. Rajan and Zingales, 1998; Demirgüç-Kunt and Maksimovic, 1998; Levine, 2005 and Knyazeva et al., 2009). The indicator of a financially constrained access to external finance, profitability, however, is embedded into the supposition that it acts as a barometer of the capacity of the companies in the sample to generate cash flow and to refund their financial liabilities (Kremp and Savestre, 2013). For this reason, it was expected that profitability and growth were positively related to the access to bank funding. The results of this study show that when both these variables decrease, the level of investment decreases as well and therefore companies are assumed to be financially constrained as they could not keep their optimum investment level high. Since these factors are related to the *investment – cash flow sensitivity* of companies as described by Fazzari et al. (1988; 2000), this study was aiming to capture the extent to which cash flow is further predicting the level of investments of Dutch SMEs in the sample as well. Unfortunately, this study was unsuccessful in this direction due to limited data availability – a problem which is well-known among scientific researchers. Still, a linear regression analysis effort was made with unconvincing results (see model 1 in table 5), where cash flow was not only not significantly predicting the dependent variable but also was not even close to being economically significant. Furthermore, against the expectations, the related research of Vermoesen et al. (2013) found out that cash flow should have a positive influence on investment – a further opposite finding in this study, which may be based on the fact that the results could not be distinguished from being attributed to chance. Nonetheless, the results from the cash flow variable are excluded in the main regression analysis (model 2 in table 5) in order to enhance the firm-year observations, for a more accurate outcome.

Following the approach of Vermoesen et al. (2013) and discussing the liquidity and leverage variables both together, it became clear that liquidity behaved unexpectedly in this study and was uninteresting in its nature to predict the level of investments (non-statistically significant and the economic significance is questionable as the magnitude of the coefficients appear to be rather weak). The academic literature however, presumed that when companies are not able to manage their liquidity position and it started to decline, expected future profits will be lower and this increases their likelihood of default and this in turn, will increase external financial constraints as banks will be unlikely to provide bank debts (Holmström and Tirole, 2000). Further, the study of Vermoesen et al. (2013) indicates that investments will decrease when firms experience a reduction in their liquidity position which cannot be confirmed by this study, meaning that Dutch SMEs tend to be rather financially unconstrained when considering their liquidity state. Regarding the debt variables, only net short-term debt was assumed to be negatively related to a decrease in the level of investments. These results are comparable to the findings of Duchin et al. (2010) who also used net short-term debt to estimate the level of investments of companies during the time of the global financial crisis but in the context of large, listed companies. Initially, it was assumed that only net short-term debt would have a negative effect on the level of investments, whereas for the variable net long-term debt, no relationship was expected to be found. The underlying logic includes that net short-term debt illustrates a looming reduction in liquidity in times when refinancing could be difficult or too costly. Furthermore, it encompasses the portion of long-term debt maturing in less than one year. In contrast, net long-term debt does not show this effect since it does not have an immediate effect on corporate liquidity due to its greater maturity time (Duchin et al., 2010). In summary, when a decreased level of investments can be observed, then it is assumed to be greater for companies with higher net short-term debt. Nonetheless, this study could confirm this as well and it can therefore be assumed that the SMEs in the sample faced a greater extent of financial constraints based on the results provided in table 5. However, at this point it is further necessary to pinpoint that the statistical significance level was indeed significant but also relatively weak (at the 10%). Further, the magnitude of the unstandardized coefficient of 0.010 is hardly worth mentioning which shows that the economic significance is rather questionable. These concerns also encompass the results related to the variable age which was expected to have a meaningful impact in the first place. However, the findings were not statistically significant and further unconvincing (the model predicts that investments were higher for younger SMEs in the sample as compared to the reference category ‘mature’).

Synthesizing the arguments provided above, the findings express a rather mixed picture concerning whether the SMEs in the sample are financially constrained or not. The results of this research effort were mainly against the expectations and also contrasting to the findings of previous studies which found rather high levels of financial constraints among their firm observations as the magnitude of their coefficients expressed a rather strong and more interesting economic significance.

The second and last hypothesis in this study stated that in the presence of the global financial crisis, it is expected for Dutch SMEs that the higher the extent of financial constraints, the lower the level of investment is observed. In order to appropriately examine this hypothesis, a categorical (dummy) variable was constructed to determine whether the time in question lies in the crisis period as it was suggested by Duchin et al. (2010). After including this crisis-dummy, the model predicted that the level of investment was higher (by 0.5% and

significant at the 5% level) for the crisis period as compared to the reference category 'pre-crisis period'. However, discussing this result in the context of the existing academic body of knowledge, it can be extracted that this finding was opposite to the results provided by e.g. Vermoesen et al. (2013) and Duchin et al. (2010). Their findings showed that investments declined in the post-crisis period even for both unconstrained and constrained companies which was not the case in this study.

6. CONCLUSION

Purposefully pursuing an answer to the research question '*To what extent does the global financial crisis of 2008 influence the access of Dutch SMEs to bank funding, as identified by their relation of financial constraints measures to their level of investments?'*, this research paper conducted several analyses where the results were provided and discussed in part 4 and 5, respectively. Concluding the results, the main findings of this research effort could confirm that the access to bank funding significantly affects the investment behavior of Dutch SMEs in the sample once controlled for their profitability, growth and net short-term debt state as measures of financial obstacles. For this reason, the results indicate that the SMEs in the sample could be regarded as financially constrained but not in the expected extent since not all indicators in the model specification were found to predict the level of investment. Due to this, it could be further assumed that the identified financially constraint status would hold true when the credit crisis hits. However, the impact of the credit crisis did not hamper the ability of SMEs to finance new investments, indicating that their access to bank funding was not influenced negatively since Dutch SMEs did not invest less, showing that the crisis did not provide the negative exogenous credit supply shock as it was found to be the case among other countries in the European Union.

Contributing to the academic body of knowledge, this research paper closed the gap regarding the recently increasing insinuations that SMEs across the European member states suffered from credit rationing after the credit crisis of 2008 with evidence for SMEs located in the Netherlands. Even though applying different research methodologies (e.g. examining firm-level data or surveys), scholars relentlessly elaborated SME's access to external finance where mixed results were found (cf. table 1 in the Appendix). In this context, the evidence of this research effort suggests that the impact of the crisis did not affect Dutch SMEs access to bank funding in a comparable manner to previous studies.

Moreover, practically evaluating the implications of the findings presented in this study, it is important to consider the decisions made by the European Union. The reason behind this includes the fact that the European Commission started to respond to changes in the financial markets as a result of the credit crisis of 2008. By means of that, the joint European Commission developed a diverse set of supporting instruments in order to mitigate the identified impact of the credit crisis on European SMEs (European Commission, 2015b). These aiding policy interventions however were mainly based on the assumption that the access to bank funding is a supply driven question, not demand related where SMEs investments dropped based on endogenous factors instead as a result of an exogenous credit supply shock. However, this study was not able to confirm that Dutch SMEs faced a constrained access to bank funding and thus, invested less in the crisis period. Linking the findings of this study in the context of the European policy foundation, it becomes obvious that the presumption that the Dutch SME sector has problems to follow the emerging recovery of other member states across Europe (European Commission, 2014) appears questionable and should be subjected to further research. The findings of this study are especially interesting for the Dutch governmental policy makers who used the concerns of both the European Commission and European Central Banks as a basis to mobilize financial resources from pension funds and insurance companies as a source of external funding for local SMEs in order to compensate their constrained access to bank funding. However, this study recommends the policy makers of the Dutch government not to precipitately stop their aid but to rethink and reconsider their decisions carefully again.

Conducting this research effort provided a valuable and interesting view on the access to external funding of Dutch SMEs during the times of the credit crisis but also comprises limitations. Especially as a consequence of applying the valued and appreciated approach of Fazzari et al. (1988) and using a set of firm-level variables from which the academic society is confident that they are indicating financial constraints (Hadlock and Pierce, 2010) this study has shortcomings regarding its model specification. A concern can be marked that using variables based on firm-level data can, to some extent, be regarded as endogenous to choices made by the company itself (Duchin et al., 2010). Further, they could also be particularly endogenous to unobserved variations in investment opportunities, thus more generally speaking, be demand driven in their nature instead of being impacted by an exogenous credit supply shock as assumed in this study. Carrying this concern forward, the authors Hadlock and Pierce (2010) warned about the endogenous nature of these variables and suggested that financial constraints measures should solely rely on firm size and age – two relatively exogenous firm variables. However, Duchin et al. (2010) argue that this criticism would only apply if there was a relation between year-before financial constraints and unobserved changes in investment opportunities following a shock one year later. As this *instrumental variables approach* (as described in part 4.3) including lagging variables was applied in this study as well, this limitation should, according to the authors, be less salient. Nonetheless, the concern exists and should be further taken into account in future research. Additionally, further limitations relating to the model specification include the well-known trade-off between the omitted variables problem and the multicollinearity problem. Concerning the former, this study suffered from limited data availability especially for the variable cash flow which was initially expected to be influential for this research. However, the exclusion of this variable in the main regression analysis (model 2 in table 5) could have led to biased estimates of the coefficients of the included variables. In addition, multicollinearity should not appear to be a problem as evaluated in part 4.2. Moreover, it needs to be considered that by testing the robustness of the results (part 4.4) it still stands out that the normally distributed error assumption was not perfectly fulfilled which is usually essential when multiple linear regression analysis is conducted. However, as related researchers tend to calculate the variables alike, it would be interesting if they faced the same scarce fulfilment of this assumption as they actually missed to publish this information. Besides these concerns and limitations, this research paper is confident to have provided a well-considered conclusion.

The findings of this paper furthermore provide valuable directions for further research, especially among Dutch SMEs. A further research effort is needed that includes a larger number of firm-year observations in order to express more confidence about the impact of the credit crisis on the access to external finance. More in-depth speaking, it would be further interesting to empirically examine if cash flow and long-term debt maturity, both as measures of financial constraints with limited data availability, tend to predict the level of investments of Dutch SMEs during the times of a crisis. Also, examining

placebo periods would be further useful to investigate the robustness of the results. Moreover, it would be interesting to examine the reason why Dutch SMEs were not found to be negatively impacted by the crisis. Similar to this, French SMEs also were not found to suffer from credit constraints as a consequence from the crisis of 2008 (Kremp and Savestre, 2013) and further research could examine if there are similarities among this two countries which tend to explain this effect. Furthermore, as a last remark, some related researchers used another method of multivariate regression analysis than ordinary least square estimation, namely fixed-effects regression analysis. This method was not applied in this study due to time restrictions but would be a great suggestion for further research in order to provide more robustness to the results of this study.

ACKNOWLEGMENTS

Finally, it is of great importance for me to express my deep appreciation for the advice and supervision that I received during my research. I am gratefully indebted to Henry van Beusichem, without him, this research could never have been conducted in the first place. Furthermore, his guidance and reviews were always helpful making the best researcher out of me which I never dared to dream of. In addition, acknowledgments further belong to Rezaul Kabir who provided the necessary vision to successfully conduct this study and of course Xiaohong Huang for coordinating all fundamental requirements to successfully finish this research effort. Briefly speaking, thank you whole Finance & Accounting Team of the University of Twente!

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APPENDIX

FIGURE A: VISUAL INSPECTION OF NORMALLY DISTRIBUTED ERROR ASSUMPTION

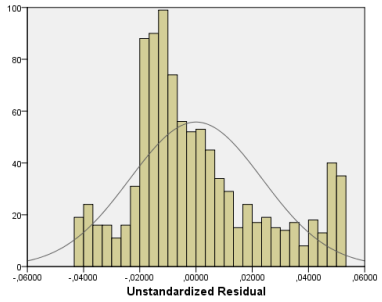

TABLE 1: SUMMARY - EVIDENCE OF THE IMPACT OF THE CREDIT CRISIS ON SMES ACROSS EUROPE

AREA	DATA	MAIN FINDING(S)	AUTHOR(S)
Ireland	CSO (Survey)	Reduction in the use of debt and equity due to a combination of supply and demand factors, indicating that SMEs willingness to access external finance for investment purposes was not hampered.	Mac an Bhairad (2013)
France	Banque de France FIBEN Database; Financial Linkage Database	French SMEs did not suffer from credit constraints after the crisis of 2008. Existing reduction in loan outstanding were mainly demand driven.	Kremp and Sevestre (2013)
Belgian	Interviews with SMEs, Banks and venture capitalists	Not directly related to the crisis of 2008, nevertheless the authors found that home bias of financiers and the capital gearing method of banks to evaluate SME's foreign direct investment (FDI) projects support raising financial constraints for SMEs.	De Maeseneire and Claeys (2012)
Belgian	Belfirst Database, Bureau van Dijk	SMEs that had a larger part of their long-term debt maturing during the crisis of 2008 experienced a significant larger drop in investments in 2009. Their results indicate that this decrease is due to a larger extent caused by a reduction in the supply after the crisis since SMEs invest less when larger proportions of long-term debt need to be renewed in the short-run.	Vermoesen et al. (2013)
UK	Surveys with SMEs and in-depth interviews with finance providers	Debt and equity finance became harder to access for technology-based small firms in the context of the crisis of 2008, which hampers their growth potential while holding a strong demand for external finance during and after the crisis.	North et al. (2013)
Across Europe	SAFE Data	Bank lending constraints were found to be both credit- rationed companies and these which self-lower their demand for loans due to higher credit costs.	Casey and O'Toole (2014)

Table 1 represents a short overview of previous studies which were conducted by related academic researchers. The 'data' column depicted what kind of data was collected and the 'main finding(s)' column describes their summarized main findings of their studies. Further, it is important to note that all these studies involved SMEs as units of analysis.

TABLE 2: VARIABLE MEASUREMENT

VARIABLE	MEASUREMENT/FORMULA	AT TIME	REFERENCE
Dependent Variable			
Level of Investments	(Fixed Assets$_t$ - Fixed Assets$_{t-1}$) + Total Amount of Depreciation$_t$ / Total Assets$_t$	2006 – 2009	Vermoesen et al. (2013)
Independent Variables			
Firm Size	Natural Logarithm of Total Assets	2006 – 2009	Vermoesen et al. (2013)
Firm Growth	(Total Assets$_t$ - Total Assets$_{t-1}$) / Total Assets$_t$	2006 – 2009	Carpenter and Petersen (2002)
Cash Flow	Operating Income$_t$ / Total Assets$_t$	2006 – 2009	Duchin et al. (2010); Vermoesen et al. (2013)
Liquidity	Liquid Assets$_t$ / Total Assets$_t$	2006 – 2009	Vermoesen et al. (2013)
Profitability	EBITDA$_t$ / Total Assets$_t$	2006 – 2009	Deesomsak et al. (2004)
Leverage (set)			
Net Long-Term Debt	(Long-Term Debt$_t$ – Liquid Assets$_t$) / Total Assets$_t$	2006 – 2009	Duchin et al. (2010)
Net Short-Term Debt	(Short-Term Debt$_t$ – Liquid Assets$_t$) / Total Assets$_t$	2006 – 2009	Duchin et al. (2010)
Dummy Variables			
Age	Measured in years at the measurement begin; Referred as 'young' when < 5 years, then 1 Referred as 'mature' when older, then 0	2005	Kremp and Savestre (2013)
Crisis year	Measured at predefined time period; Crisis year when 2008 and 2009, then 1 Pre-Crisis Period when 2007 and 2006, then 0	2008 – 2009	Vermoesen et al. (2013)

Table 2 presents the way in which the available panel dataset was used in order to create the necessary variables. As mentioned before, all independent variables are lagged one year before in order to follow the *instrumental variables approach*, as suggested by Duchin et al. (2010). The authors provide the underlying logic that changes in a company's financial positions can be related to unobserved changes in investment opportunities, therefore, it is strongly advised to purge the variable specification in this way (Duchin et al., 2010). Moreover, it is important to note that this individual variable measurement will not be further repeated in subsequent tables as their calculation will not differ.

TABLE 3: DESCRIPTIVE STATISTICS

VARIABLE	MEAN	MEDIAN	ST. DEV.	MINIMUM	MAXIMUM	N OBSERVATION
Investments	0.048	0.031	0.058	-0.047	0.175	988
Investments (log)	0.020	0.014	0.024	-0.021	0.070	988
Firm Size	9.410	9.434	0.574	7.788	10.706	988
Growth	0.015	0.030	0.152	-0.403	0.305	988
Cash Flow	2.242	2.000	1.011	0.308	4.894	184
Liquidity	0.089	0.036	0.115	-0.006	0.423	940
Profitability	0.135	0.126	0.096	-0.058	0.362	988
Net Long-term Debt	0.145	0.130	0.163	-0.190	0.504	536
Net Short-term Debt	0.370	0.373	0.262	-0.174	0.983	940
Age	0.053	0.000	0.223	0	1	988
Crisis Year	0.500	0.500	0.500	0	1	988

This table displays the summary statistic for the main total sample of firm-year observations. The variables are calculated as shown in table 2. The values provided for the dependent variable are based on their original calculations. However, after log-transforming the variable Investments (cf. part 4.4), the new descriptive statistics involve the values provided below the original values.

TABLE 4: CORRELATION TABLE

VARIABLE	INVESTMENT (LOG)	FIRM SIZE	GROWTH	CASH FLOW	LIQUIDITY	PROFITABILITY	NET LT DEBT
Firm Size	-0.037						
Growth	0.366**	-0.153**					
Cash Flow	-0.221**	-0.482**	-0.019				
Liquidity	0.009	-0.016	0.014	-0.065			
Profitability	0.258**	-0.119**	0.183**	-0.173*	0.133**		
Net LT Debt	0.060	-0.057	-0.022	-0.296**	-0.525**	0.002	
Net ST Debt	-0.164**	-0.237**	-0.094**	0.373**	-0.591**	-0.279**	-0.019

Table 4 provides the correlation between the variables according to the Pearson Correlation Coefficient. Herewith, a value of 1 indicates perfect correlation whereas a value of 0 suggests no correlation at all. Two asterisks (**) show a significance level at the 0.01 level (2-tailed) and one asterisk (*) displays a significant correlation at the 0.05 level (2-tailed).

TABLE 5: LINEAR MULTIVARIATE REGRESSION RESULTS

	EXPECTED SIGN	MODEL 1	STD. ERROR	MODEL 2	STD. ERROR
(Constant)		0.004	[0.034]	0.025	[0.020]
Firm Size	+	0.001	[0.003]	-0.001	[0.002]
Growth	+	0.060***	[0.014]	0.078***	[0.007]
Cash Flow	+	-0.002	[0.002]	N/A	N/A
Liquidity	+	-0.006	[0.034]	-0.011	[0.007]
Profitability	+	0.052*	[0.026]	0.057***	[0.012]
Net ST Debt	-	-0.012	[0.015]	-0.010*	[0.006]
Net LT Debt	-	0.048***	[0.015]	0.008	[0.007]
Age	-	0.016	[0.011]	-0.001	[0.004]
Crisis Year	-	0.006	[0.004]	0.005**	[0.002]
R^2		0.451		0.297	
Adjusted R^2		0.398		0.286	
No. of Obs.		104		536	

Table 5 represents the regression analysis results explaining Dutch SMEs yearly level of investments (dependent variable) by the extent to which they experience financial constraints. All variables are defined as in table 2. Model 1 represents the linear multivariate regression results including the whole model specification. However, model 2 was constructed with the same model specification but without the variable cash flow, thereby increasing the number of observations. For this reason, the results declared in this research study mainly relates to model 2 if not otherwise noted. The first row of the model indicates the regression coefficient estimates (unstandardized), beginning with the constant. The value in brackets represents the associated standard error. The asterisks ***, ** and * display that the coefficient estimate is statistically significant at the 1% ($p < 0.01$), 5% ($p < 0.05$), or at the 10% ($p < 0.10$) level, respectively.