



**The Effect of the Recent Financial Crisis on the Financial and  
Investment Policies of UK Private and Public Firms**

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By

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## Abstract

The recent financial crisis, sparked as a result of the subprime market in the United States, is regarded by many researchers as the most severe financial crisis to happen since the Great Depression. This crisis has raised the important issue of the spill-over effect of the financial crisis into other sectors of the economy. However, evidence of the effect on firms' behaviour with respect to their financing and investment decisions is limited, and the existing research has mainly concentrated on the publicly listed firms in the US. It is also evident from the findings of existing published studies that the majority of studies do not reach a unanimous conclusion (Allen and Carletti 2008; Bakke 2009; Duchin, Ozbas and Sensoy 2010; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a). Further, the focus of the majority of the existing studies is very narrow with respect to the components of capital structure. As a result, it is not clear from the existing literature which component of the capital structure is more sensitive to credit supply contractions than any other. Moreover, accounting regulations, financial reporting requirements and institutional features are different between the US and the UK, which highlights the need for more research in this area. In addition, no systematic investigation into the financing and investment decisions of private firms during the crisis has ever taken place in the UK.

The main purpose of this study is, therefore, to investigate the financial and investment decisions of both private and public listed firms during the time of the recent financial crisis in the UK. More specifically, this study investigates whether shocks to the supply of credit affect firms' leverage and determines which components of capital structure are affected by credit supply contractions. Further, the study investigates how firms manage their finances during a crisis period. In other words, how firms minimize the effect of credit contractions by resorting to alternative sources of finance such as internal funds, net debt issues, net trade credits and net equity issues. The study also examines whether firms manage their dividend payouts to maintain their financial slack. Finally, the study investigates the effect of the credit crisis on firms' performance and investment decisions. To investigate these issues, the study adopts a comprehensive strategy which consists of three elements, namely, identification of exogenous credit crisis, the use of firm fixed effects model and the use of firm level control variables. Data for the analysis are extracted from the FAME and the Datastream databases for the period 2004-2009. A total of 4973 private firms are extracted from the FAME database and 2039 public firms are extracted from the Datastream database.

The fixed effects analyses highlight that the financial crisis has adversely affected the total debt ratios of both types of firms. This effect is most significant on the short-term financing channel (such as short-term debt and trade credit) in the sample of private firms; while it is the trade credit channel that is negatively affected by the credit crisis in the sample of public firms. The effect on long-term and short-term debt is statistically insignificant in the sample of public firms. There are also differences in the way both types of firm responded to the credit crisis. Private firms, for example, issued more equity and held cash in response to the credit shortage. These firms do not move to net debt issues and net trade credits; nor do they adjust their dividend payout policies during the crisis period. The results further reveal that public firms use more internal funding and repurchase equity in response to the credit drought. These firms also reduced dividend payout to preserve their financial slack. In addition, public firms do not change to net debt issues and net trade credits in response to the credit supply shocks. Moreover, the results reveal that the performance and investment of both types of firm are adversely affected by the credit crisis. This highlights that the inability to obtain external credit and the relative lack of substitution towards alternative sources of finance have negatively affected the performance and investment of both types of firm. Further, in the private firms' sample, the increase in cash holdings and decline in investment suggest that funds raised through the equity issue may have been used to finance the cash holdings of these firms. In the public firms' sample, decrease in cash reserve, dividend payout and investment in tangible assets suggests that internal funds may have been used to finance the equity repurchases. Overall, the results suggest that financial and investment policies of private and public firms are sensitive to the credit supply shocks.

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## Declaration

No portion of the work referred to in this thesis has been submitted in support of an application to another degree or qualification of this or any other university or other institute of learning. However, some part of this thesis has been published in co-authorship with Dr. Saeed Akbar and Phillip Ormrod in the following papers

Rehman, S., Akbar, S. & Ormrod, P. (2011) 'The Impact of Recent Financial Shocks on the Financing and Investment Policies of UK Private Firms', *Underreview in International Review of Financial Analysis*.

Rehman, S. & Akbar, S. (2011) How Private Firms Manage Their Financial Policies During the Crisis Period: Evidence From United Kingdom, *Forthcoming Proceedings of the Salford Postgraduate Annual Research Conference*, University of Salford, UK.

Rehman, S. & Akbar, S. (2011) 'Credit Supply Conditions and Financial Policies: Evidence from a Panel of UK Public Firms ', *Available at SSRN: <http://ssrn.com/abstract=1966014>*.

Rehman, S. & Akbar, S. (2011) 'The Effect of the Credit Crisis on Performance and Investment Policies of the UK Public Firms', *Available at SSRN: <http://ssrn.com/abstract=1966528>*.

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## **Dedication**

*This thesis is dedicated to  
my beloved mother and to the memory of  
my father, for their endless prayers, support, help and encouragement.*

# Chapter 1

## An Overview of the Research

### 1.1 Introduction

The last two decades have witnessed a number of financial crises<sup>1</sup>. The most noticeable are the 1994-1995 Mexican financial crisis, the 1997-1998 Asian financial crisis, the 1998 Russian crisis, the Turkish financial crisis (2000), and also the recent wave of financial crises in 2007-2009. Financial crises usually have two things in common, i.e., they come as a surprise, and affect the smooth functioning of the financial markets, leaving the economies in a weaker state. As a result, economic growth slows down and investors' confidence is affected. The effects of the financial crises are not limited only to the financial sector but also affect household welfare (Kang and Sawada 2008) and gender employment (Lim 2000). In other words, they also affect other sectors of the economy. This highlights that financial shocks may have an impact on the economy.

The recent financial crisis (2007-2009), sparked as a result of the subprime meltdown in the United States, is regarded by many researchers as the most severe financial crisis to happen since the Great Depression (see for example, IMF 2008; Kahle and Stulz 2010; Melvin and Taylor 2009; Mian and Sufi 2009; Tong and Wei 2008). This crisis has not only affected the financial markets and institutions, but also goods' markets and consumers all over the world and has hence generated a global effect<sup>2</sup>. It is thus well documented in some of the latest research papers that the 2007 US financial crisis has not only affected the stock market performance of the United Kingdom and Japan but

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<sup>1</sup> Schularick and Taylor (2009, p. 13) define "*financial crises as events during which a country's banking sector experiences bank runs, sharp increases in default rates accompanied by large losses of capital that result in public intervention, bankruptcy, or forced merger of financial institutions*".

<sup>2</sup> IMF (2008, p. 4) report that "*The financial market crisis that erupted in August 2007 has developed into the largest financial shock since great depression, inflicting heavy damage on markets and institutions at the core of the financial system*".

also the stock markets of emerging economies such as Malaysia and Indonesia (see for example, Majid and Kassim 2009, for details)<sup>3</sup>.

In the UK, the effect of the financial crisis can be seen from the increased number of defaults in the financial sector. The earlier victims of the credit crisis were Northern Rock, Bradford and Bingley, Alliance and Leicester, HBOS, and the Cheshire and Derbyshire building societies. Northern Rock, for example, after receiving an emergency loan from the Bank of England in September 2007, eventually went into state ownership in February 2008. Alliance and Leicester was taken over by the Spanish bank Santander in July 2008. In September 2008, not only was HBOS taken over by Lloyds TSB, but the Cheshire and Derbyshire building societies were taken over by the Nationwide Building Society and the Bradford and Bingley bank was nationalized (see for example, Hall 2008, 2009, for details).

These defaults and disruptions in the financial markets increased awareness about risk management on the part of financial institutions. As a result, their willingness and ability to take risks in lending were reduced. There is also evidence that financial institutions' terms and conditions for the issue of credit became tighter (see for example, Campello et al. 2009; De Haas and Van Horen 2009). These disruptions to the financial markets raised an important issue of the spill-over effect of the financial crisis<sup>4</sup> into other sectors of the economy. Specifically, it raises the questions of whether the recent financial crisis affects firms' financing mix, performance and investment decisions.

In response to the crises, a significant amount of research endeavours were undertaken by researchers exploring the underlying causes (see for example, Carmassi, Gros and Micossi 2009; Clair and Tucker 1993; Crotty 2009; Diamond and Rajan 2009; Gorton 2008; Melvin and Taylor 2009; Murphy 2008; Summers 2000). Other studies have

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<sup>3</sup> Brzoza-Brzezina and Makarski (2011) highlight that the recent financial crisis (2008-2009) has adversely affected the Polish economy. Similarly, other studies such as Sterholm (2010) demonstrate that financial crisis has negatively affected the Swedish economy.

<sup>4</sup> George Soros cited in Parry and Ablan (2008) argue that "...the financial crisis is beginning to have serious effects on the real economy, adding: 'the extent of that is not, in my opinion, yet fully recognized'"

focused on the impact and consequences of the financial crises (Greenlaw et al. 2008; Mian and Sufi 2009). However, studies of the effects on firms' behaviour with respect to their financing and investment decisions are limited<sup>5</sup> (Chava and Purnanandam 2011; Gan 2007 a; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a; Voutsinas and Werner 2011). The majority of these studies have focused on specific events. In addition, most of these studies have used the US market<sup>6</sup> data, which highlights that this issue need to be further investigated in other environments to check the robustness of the US findings.

In the context of the recent financial crisis, handful of studies have focused on the effect of the exogenous credit supply shocks on firms' financing and investment decisions (see for example, Allen and Carletti 2008; Bakke 2009; Campello, Graham and Harvey 2010; Duchin, Ozbas and Sensoy 2010; Iyer et al. 2010). Furthermore, an examination of the findings of the existing studies shows that the majority provide mixed and inconclusive evidence (Allen and Carletti 2008; Bakke 2009; Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Iyer et al. 2010; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a), which signifies the need for further research in this area.

In addition, the majority of the above-mentioned studies have concentrated on the US public listed firms. It is, however, not clear whether the results of the US are generalisable to other jurisdictions. Moreover, accounting regulations, financial reporting requirements, and institutional differences such as insolvency code, tax system and ownership structure<sup>7</sup> (see for example, Akbar, Shah and Stark 2011; Beattie, Goodacre and Thomson 2006; Dahya and Travlos 2000; Franks, Nyborg and Torous 1996; Jairo 2004; Kaiser 1996; Rajan and Zingales 1995; Wald 1999) between the UK and the US further highlight the need for more research in this area.

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<sup>5</sup> Jermann and Quadrini (2009, p. 1) argue that “...importance of financial shocks-that is, perturbations that originate directly in the financial sector-has not been fully explored in the literature”.

<sup>6</sup> The studies by Gan (2007 a) and Voutsinas and Werner (2011) have, however, focused on the Japanese Market.

<sup>7</sup> Rajan and Zingales (1995, p. 1440) wonder “.... why firms in countries such as the United Kingdom and the United States with similar capital markets and financial institutions have such different levels of debt”.

Similarly, little attention has been paid to the effect of the credit supply shocks on the financing and investment decisions of private firms<sup>8</sup>, for which the number of external sources of finance are limited. It is, however, well documented that small and medium sized firms<sup>9</sup> (SMEs) are very important for economic growth, innovation, employment growth, revenue generation and technological advancement (Acs and Audretsch 1990; Kotey and Meredith 1997; Neck and Dockner 1987). It is also important to note that SMEs represent more than 90% of enterprise and account for more than half of the labour force in OECD countries (Lukács 2005)<sup>10</sup>. Also, Brav (2009, p. 264) highlights that private companies are “*representing 97.5% of all incorporated entities in the United Kingdom*”.

However, despite their important role in the economic development of the global economy, research on private firms is limited. In this regard, Zingales (2000, p. 1629) argue that “*the emphasis on large companies has led us to ignore (or study less than necessary) the rest of the universe: the young and small firms, who do not have access to public markets*”. Similarly, Ang (1991) reports that small business are largely ignored by financial theories. Daskalakis and Psillaki (2008) document that non-listed firms represent a huge percentage of the total number of firms in both developed and developing countries alike. Hall, Hutchinson and Michaelas (2000) highlight a lack of research on SMEs and document its importance. In addition, given the differences of degree of information opacity, funding sources (Bartholdy and Mateus 2011) and ownership structure (Brav 2009; Michaelas, Chittenden and Poutziouris 1999 a) between the public and private firms suggests that further research about the behaviour of the latter will add new insights.

This study considers the UK for its investigation. This is because the majority of published studies have considered the US in their research (see for example, Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Ivashina and Scharfstein 2010;

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<sup>8</sup> In the context of this study, private firms are those firms whose shares are not traded on the stock exchange.

<sup>9</sup> The majority of the SMEs are non-listed firms (Hall, Hutchinson and Michaelas 2000; Hall, Hutchinson and Michaelas 2004). They are normally unquoted/unlisted firms classified as private firms. This terminology has been used interchangeably in this study.

<sup>10</sup> According to an OECD (2009) report, SMEs account for over 99% of all enterprises in the European Union.

Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a). This is mainly due to the size of the US economy and the existence of a large body of researchers in the US academic institutions. However, it is also evident to argue that the United Kingdom is the sixth biggest economy in the world, with unique institutional set-up and financial reporting requirements for private firms. In addition, the institutional differences mentioned earlier between the US and the UK further justifies the need for this research. Based on the above arguments, it is fair to argue that the impact of the current financial crisis on the financial and investment decisions of private and public firms appears to have scope for more thorough investigation.

The main purpose of this study is, therefore, to investigate the financial and investment decisions of both private and public listed firms during the time of the recent financial crisis in the UK. More specifically, this study investigates whether shock to the supply of credit affects a firm's leverage ratio and determines which components of capital structure are affected by credit supply contractions. The purpose of examining each component of capital structure individually is to better comprehend the exact channel(s) through which supply shock travels. It will also help to better understand the extent of substitution across credit sources. Further, the study investigates how firms manage their finances during the crisis period. In other words, how firms minimize the effect of credit contractions by resorting to alternative sources of finance such as internal funds, net debt issue, net trade credit and net equity issue. The study also examines whether firms manage their dividend payouts to maintain their financial slack. Finally, the study investigates the effect of credit contractions on firms' performance and investment decisions.

Investigating the effect of credit contractions on firms' behaviour is important for two reasons. First, variations in the supply of capital may affect the financial and investment behaviour of firms, which is independent of monetary policy shift (see for example, Becker 2007; Chava and Purnanandam 2011; Choi et al. 2010; Duchin, Ozbas and Sensoy 2010; Faulkender and Petersen 2006; Gan 2007 a; Ivashina and Scharfstein 2010; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a; Rehman and Akbar 2011a, 2011b; Rehman and Akbar 2011c; Rehman, Akbar and Ormrod 2011; Voutsinas and Werner 2011). Second, there are differences in the views

about whether the firm's financing decisions tends to be governed by user's demand for capital or preferences of the supply of capital (Graham and Harvey 2001; Titman 2002).

However, the main challenge in estimating the effect of the credit supply shocks on firms' financial and investment behaviour arises from clearly disentangling the supply effect from the endogenous demand effect (Chava and Purnanandam 2011; Gan 2007 a). The simultaneity of corporate financing and investment decisions make it a difficult task to clearly identify the credit supply shocks. For instance, the estimation may be biased, if the study does not clearly control for the endogenous demand effect, because changes in firms' capital structure and investment policy as the crisis unfolds may simply reflect an unobserved shift in firms' demand for capital or it may reflect unobserved variations in investment opportunities (Duchin, Ozbas and Sensoy 2010). For example, the financial crisis often leads to a deterioration in the financial health of the banking sector as well as reducing the corporate sector investment opportunities at the same time (Chava and Purnanandam 2011).

To address this challenge, the study adopts a comprehensive identification strategy which consists of three elements that helped to overcome this problem. Firstly, the identification strategy aims to identify the exogenous variations in the supply of credit. The recent credit crisis (2007-2009) provides us with such an event. Duchin, Ozbas and Sensoy (2010, p. 418), for example, argue that "*The crisis represents an unexplored negative shock to the supply of external finance for non-financial firms*". Since the recent financial crisis is originated from the subprime market, it is therefore reasonably exogenous to credit demand and, hence, this exogenous shock makes it possible to identify the effect of the credit supply shocks on corporate capital structure and investment.

Secondly, the empirical strategy relies on the firm fixed effects regression model. As this study employs panel data, there is a potential concern regarding unobserved heterogeneity. This is because the data contains multiple observations per firm. In this regard, Love, Preve and Sarria-Allende (2007) argue that this model not only captures the unobserved time-invariant heterogeneous firm characteristics, but also allows

researchers to disentangle the post-crisis effect from the pre-crisis effect. Finally, the last element of identification strategy is the inclusion of a set of control variables that partial out the effect of demand factors on variable of interest.

To achieve the objectives of the study, data for the analysis were extracted from two different databases. First, for the private firms' sample the data were extracted from the Financial Analysis Made Easy (FAME) database for the period 2004-2009. As this study focuses on the UK market, therefore, data were extracted from only those private firms on the FAME database whose office is registered in the UK. Financial and utility firms were excluded from the sample due to standard reasons. The issue of missing observation is a serious problem in the private firms' sample. In order to avoid this problem, the study required that firms must have non-missing value for the key variables<sup>11</sup>. The resulting sample after taking these steps consisted of 4973 private firms. Similarly, for the public listed firms, data were extracted from the Datastream database for the period 2004-2009. The study removed all those firms from the sample whose currency is other than pounds sterling. Next, the unclassified and unquoted entities were removed from the sample. Financial and Public sector firms were also excluded from the sample. Finally, the study removed one of those firms which was entered twice in the sample. The final sample after taking these steps yielded a total of 2039 public firms.

The research approach adopted in this study is that, first, the study investigated the effect of the credit supply shocks on total debt ratios of private firms. Second, to investigate the effect of the credit crisis on components of firm financing mix, the study divided the total debt ratios into its components (such as short-term debt, long-term debt and trade credit) and then ran separate regressions on each of these variables. Next, the study investigated how private firms manage their finances during the crisis period. In other words, the study investigated how private firms minimize the effect of credit contractions by resorting to alternative sources of finance such as internal funds, net debt issue, net trade credit and net equity issue. The study also examined whether private firms adjust dividend policy during the crisis period to

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<sup>11</sup> This may introduce survivorship bias, as firms included in the sample are all 'live' firms.

maintain their financial slack. Finally, to examine the effect of the credit crisis on the performance and investment behaviour of private firms, the fixed effects regression model was run on these variables. As public firms are different from private firms in terms of degree of information asymmetry, funding sources, accounting regulations, and financial reporting requirements, to better understand the behaviour of public firms during the crisis period, all the above-mentioned regression models were also run on the public firms' sample.

The fixed effects results show that the credit crisis has adversely affected the total leverage ratio of both types of firms. There are, however, differences in the way each type responded to the crisis. Private firms, for example, issued more equity and held onto cash while public firms used more internal funding and repurchased equity in response to the exogenous credit crisis. Further, the results highlight that the credit drought has also negatively affected the performance and investment policies of both private and public firms. The rest of this chapter is organized as follows. Section 1.2 explains the justification and scope of the study. The potential implications of this study are discussed in Section 1.3. Section 1.4 briefly discusses the structure of the thesis. The final Section 1.5 concludes the chapter.

## **1.2 Justification and Scope of the Study**

As mentioned earlier, the 2007-2009 financial crisis is considered as the most severe crisis in history because of its global effect. The occurrences of financial crises have attracted the attention of both academicians and practitioners. As a result, a growing number of studies have focused on the causes and consequences of financial crises (see for example, Carmassi, Gros and Micossi 2009; Clair and Tucker 1993; Crotty 2009; Diamond and Rajan 2009; Gorton 2008; Melvin and Taylor 2009; Murphy 2008; Summers 2000). Other studies have looked at the impact of the financial crises on banks' performance (Jeon and Miller 2004), the financial markets (Saldana 2009), economies (Brzoza-Brzezina and Makarski 2011; Park 2009), household welfare (Kang and Sawada 2008), and gender employment (Lim 2000).

There is, however, a lack of research on the financing mix, behaviour of trade credit, performance, and investment decisions of firms in general and during the crisis period in particular. A relatively limited number of published studies have explored the effect of the credit supply shocks on firms' behaviour using specific events (see for example, Chava and Purnanandam 2011; Khwaja and Mian 2008; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a; Voutsinas and Werner 2011). Lemmon and Roberts (2010), for example, investigate shocks to the junk bond market caused by regulation changes, and the collapse of Drexel Burnham Lambert, and its subsequent effect on leverage and investment decisions of firms which borrowed from that market. In addition, an examination of the findings of the above-mentioned studies shows that the majority of them provide mixed and inconclusive evidence.

Similarly, a limited number of studies have unearthed the effect of the recent financial crisis on firms' leverage ratios (see for example, Becker and Ivashina 2010; Gao and Yun 2009; Iyer et al. 2010). Gao and Yun (2009), for example, examine the short-term debt borrowing (commercial paper) of the US manufacturing firms and report that aggregate commercial borrowing declined following the default of Lehman Brothers. Becker and Ivashina (2010) focus on the behaviour of bank and bond finance during the crisis period. Their results highlight that firm substitute towards bond financing during the crisis period. The focus of these studies are, however, very narrow with respect to the components of the capital structure of firms. As a result, it is not clear from their findings which component of the capital structure is more sensitive to exogenous credit supply shocks than others. Further, these studies do not fully exploit the role of alternative sources of finance such as equity issues, trade credit, net trade credit and cash reserve during the crisis period. In addition, these studies do not focus on dividend payout behaviour of firms during the crisis period. This highlights and justifies the need for this research.

Moreover, the role of trade credit as an alternative source of short-term debt finance is also not fully explored in the existing literature, and is still the subject of much debate. Its role as a potential substitute for bank credit is mostly explored during a tight monetary policy regime (see for example, Atanasova and Wilson 2003; Atanasova and Wilson 2004; Bernanke and Gertler 1995; Gertler and Gilchrist 1993; Kohler, Britton

and Yates 2000; Mateut, Bougheas and Mizen 2006; Nilsen 2002; Oliner and Rudebusch 1996; Petersen and Rajan 1997). Further, the above-mentioned studies do not reach a unanimous conclusion.

Relatively few studies have examined the same issue during a crisis period. Love, Preve and Sarria-Allende (2007), for example, examine the trade credit behaviour of public firms in six emerging economies, namely Indonesia, Korea, Malaysia, the Philippines, Mexico, and Thailand during the Asian financial crisis. Gao and Yun (2009) focus on the accounts receivable of US public firms during the recent financial crisis. Both of these studies support the substitution role of trade credit during the crisis period. Taketa and Udell (2007) and Love and Zaidi (2010), however, support the complementary view of trade credit; whereas Arslan and Goknur (2009) report mixed evidence. In brief, the existing empirical evidences are not conclusive, which signifies the need for more research in this area. In this regard, some authors have called for more research on the issue (see for example, Love and Zaidi 2010). Further, the majority of the above-mentioned studies have focused on one type of firm at a time. In addition, the behaviour of trade credit (accounts payable), trade debtor (accounts receivable) and net trade credit during the recent financial crisis period has, to date, not been thoroughly investigated with regard to the UK market.

Similarly, evidence of the effects on firms' behaviour with respect to their performance and investment decisions is limited. Only a handful of studies in the literature have looked at the effect of credit supply shocks on firms' performance and investment decisions, and these have reported contrasting results. Tong and Wei (2008), for example, argue that the stock price performance of US firms is adversely affected by the recent subprime crisis. Gao and Yun (2009) report that the effect of the financial crisis on firms' performance and investment depends on their ex-ante liquidity position. In a similar vein, Duchin, Ozbas and Sensoy (2010) and Campello, Graham and Harvey (2010) document that reduction in the availability of credit has negatively affected US firms' investment. Allen and Carletti (2008), however, report that firms' investment is not restricted due to non-availability of credit. Also, Bakke (2009) highlights that the credit crisis has little effect on firms' investment. The findings of the above-mentioned studies are however, inconsistent, leading to some authors calling

for more research on this issue (see for example, Bakke 2009; Lemmon and Roberts 2010).

The above mentioned issues have not been thoroughly investigated to date in the UK. The majority of studies have used data concerning the US market. There are some institutional differences such as tax system, ownership structure, and insolvency procedures (see for example, Ashton 1989, 1991; Franks, Nyborg and Torous 1996; Kaiser 1996; Panno 2003; Rajan and Zingales 1995; Wald 1999, for details) between the US and the UK which signify that these issues are worth investigating in the UK market. This provides support and justification for this research. In addition, there is relatively lesser research on the financing mix, the behaviour of trade credit, alternative sources of finance, performance, and investment decisions of private firms in general and during the crisis period in particular. To the best of the author's knowledge, the same issue has not been investigated in the UK market from the perspective of private firms, which clearly highlights the scope and justifies the need for this research.

### **1.3 Potential Implications**

This study will provide useful insights into the financing and investment decisions of both private and public firms. First, the findings of the study will contribute to the existing literature on corporate finance. This is because most of the published studies in this strand of literature have modelled the firm financing mix as a function of demand side factors, while assuming that supply of capital is frictionless. This demand driven approach to corporate finance has, however, recently been called into question (see for example, Duchin, Ozbas and Sensoy 2010; Faulkender and Petersen 2006; Gan 2007 a; Leary 2009; Lemmon and Roberts 2010; Rehman and Akbar 2011a, 2011b; Rehman and Akbar 2011c; Rehman, Akbar and Ormrod 2011; Rehman and Rehman 2011; Voutsinas and Werner 2011). The contribution of this study is the explicit use of both demand and supply factors in explaining the firm financing mix. Therefore, the results of the study will help to better understand the firm financing decisions during the crisis period.

Second, the study will contribute to the burgeoning literature on the financing and investment decisions of firms during the crisis period by providing evidence from the perspective of UK private firms. As mentioned earlier, private firms are important for the UK economy but this sector of the economy is not thoroughly researched, which suggests that this issue is worth investigation in the UK market. This study, therefore, examines the leverage ratio, the behaviour of trade credit, alternative sources of finance, dividend, performance, and investment decisions of UK private firms during the recent crisis period. By conducting this investigation, the researcher hopes to shed light on these issues and fill the gaps in the existing literature. The findings of this study will also help to better understand the behaviour of private firms during the crisis period. In addition, understanding the effect of the financial crisis on private firms would help the design of appropriate policy response.

Third, the findings of this study will extend the existing literature on corporate finance and investment policy by providing evidence from the perspective of both private and public firms in the UK. It will help to better understand how the firms manage their finances and investment decisions during the crisis period. In addition, the results of this study will also help to check the robustness of the US findings. From another perspective, this study's results may be helpful in diminishing the controversies existing in the academic literature on the above mentioned issues and would also aid future researchers in this area.

Finally, the empirical strategy used in this study will help in better understanding the identification problem of the credit supply shocks. This problem is usually faced by researchers investigating the effect of the credit supply shocks on firms' behaviour (see for example, Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Gan 2007 a; Leary 2009; Love, Preve and Sarria-Allende 2007). The contribution of this study is the use of comprehensive identification strategy, which consists of three elements that helped to identify the effect of the credit crisis on firms' financial and investment policies. In addition, a number of robustness checks are also carried out, which will further validate the results.

## **1.4 Structure of the Thesis**

The remainder of the study proceeds as follows. Chapter 2 reviews capital structure theories and existing literature related to this research. The demand driven approach to corporate finance is highlighted and the recent literature which has called this approach into question is briefly discussed. Previous and most recent empirical studies on the financing mix, alternative sources of finance, trade credit, performance and investment behaviour of both private and public firm are discussed. Certain relevant points are raised and the gaps in the existing literature are identified. A brief summary is provided to conclude the chapter.

Chapter 3 discusses the research methodology of the study. It provides discussion of empirical strategy which explains the identification strategy used in the study. The identification strategy has three elements which are explained in detail in the chapter. There is discussion on the econometric issues (such as heteroscedasticity, serial correlation, and multicollinearity problem) and solution to these problems is provided. A brief explanation of determinants of firms' financing decisions and measurement of variables are provided. In short, all the empirical models derived and used in this study are discussed in this chapter.

The process of data collection is discussed in Chapter 4. It explains the nature of data, databases used for extracting the data, and the sample selection process of the study. This is followed by a brief discussion on the outlier problem in the data, and a solution to this problem is provided. A brief explanation of the FAME and the Datastream databases are also provided. The descriptive statistics of both the private and public firms' sample are presented in separate tables and discussed. A brief concluding summary is then presented. In short, Chapter 4 explains all the relevant points that were considered during the data collection process of the study.

Chapter 5 investigates the effect of the credit crisis on the financial and investment policies of UK private firms. A total of four sets of regressions are estimated and analysed for this purpose. The estimation results of the regression models are presented and the outcomes of the analysis are discussed in light of the existing

previous studies. A brief summary of the contributions of the study is presented; and the results of the robustness tests are provided and discussed with the help of the previous literature. There is also a brief summary which concludes the chapter.

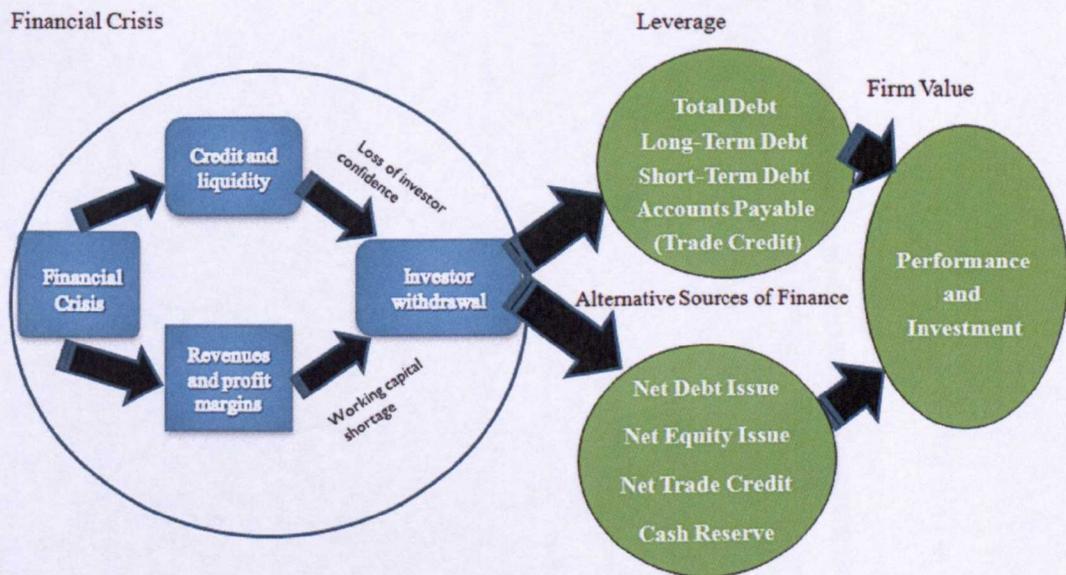
Chapter 6 investigates the financial and investment behaviour of the UK public listed firms. Specifically, it examines the effect of exogenous credit crises on the leverage ratios, trade credit, alternative sources of finance (such as net debt issue, net equity issue, net trade credit and internal fund), dividend, performance, and investment decisions of UK public listed firms. A total of four sets of regressions are estimated for this purpose. A brief recap of the empirical strategy is also provided in the chapter. The results of the fixed effects regression models are presented and discussed in light of the previously published studies; and the contributions of the study findings are presented in the respective sections. The comparison between the financial and investment decisions of private and public firms is also discussed. The chapter concludes with a brief summary.

Chapter 7 is the final chapter of the study. It brings together the main themes discussed in the study. It provides a brief summary of the main motivations underlying this study, the research objectives, methodology, and data used. It also summarises all the outcomes and main findings of the empirical part, as discussed in the two empirical chapters. Hence, it brings together and presents the main issues under the study's consideration. It also discusses the contributions the study's findings have made to the area of research. The chapter also describes the limitations of the study, and points out the avenues for further research.

## **1.5 Summary**

This chapter presented an overview of the whole thesis. It explained the background and the underlying motivations for pursuing the study, and discussed its justification and scope. The chapter also explained the potential contributions of the study's findings. It is hoped that the brief overview of all the chapters will make it easier for the reader to locate any particular areas of interest to them. The literature review in the next chapter presents an assessment of the theories and literature relevant to the study, highlighting pertinent points and identifying gaps in the subject area.

**Figure 1.1 A Diagrammatic Representation of the Objectives of the Study**



## **Chapter 2**

### **Literature Review**

#### **2.1 Introduction**

This chapter highlights the relevant theories and empirical literature on the relationship between financial crisis and firms' financial and investment policies. The main aims are, first, to pinpoint studies that have adopted the demand driven approach to corporate finance. For this purpose the literature on corporate finance that has modelled firms' financing and investment decisions as a function of various demand side factors is discussed. This is followed by discussion of the recent literature that has called into question the demand driven approach to corporate finance. Second, previous as well as the recent literature on the effect of credit supply shocks on the financing mix, alternative sources of finance, trade credit, performance and investment decisions of both private and public firms is reviewed. It highlights that there is little or no existing evidence regarding private firms. Further, what evidence does exist is mixed and inconclusive.

Similarly, the chapter highlights that evidence of the effects on firms' behaviour with respect to the financing and investment decisions of public firms is limited and the existing research has mainly concentrated on US publicly listed large firms (see for example, Allen and Carletti 2008; Bakke 2009; Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a, amongst others). The review of literature also highlights that empirical evidence regarding public firms is inconclusive. Finally, relevant points are raised and gaps in the existing literature are identified. The rest of the chapter is organized as follows.

Section 2.2 presents relevant theories and empirical literature related to the study. For this purpose, relevant theories of capital structure and empirical literature are discussed. The key variables which are likely to have an effect on the financing and investment decisions of firms are identified. In addition, the demand driven approach

to corporate finance is also discussed. Further, a brief discussion on the recent contributions which have called into question the demand driven approach to corporate finance is given in Section 2.3. Section 2.4 presents a discussion on the financial policies of private firms during the credit retrenchment period. It reviews past as well as recent literature on the effect of the financial crisis on private firms' financing decisions. This section also identifies gaps in the existing literature.

Section 2.4 also presents a review of the behaviour of alternative sources of finance during the crisis period. Theoretical and the most recent empirical contributions on the behaviour of alternative sources of finance during the credit drought period are discussed, and the section highlights that findings of the existing literature are mixed and inconclusive. Further, gaps in the existing literature are identified in this section. A summary of studies on the behaviour of trade credit during the crisis period is presented in Section 2.5, which also identifies gaps in this literature. Section 2.6 presents summaries of studies on the performance and investment decisions of private firms during the credit contractions period. It highlights that there is a lack of research on the behaviour of private firms during the crisis period.

A summary of studies on the effect of the credit crisis on financial policies of public firms is presented in Section 2.7. This section draws attention to the fact that most of the previous studies have utilized US market data and that there is limited international evidence. It further underlines that a large number of existing studies do not reach a unanimous conclusion. This section also discusses the theoretical and empirical evidence on the role of alternative sources of finance during the crisis period, from the perspective of public firms. Section 2.8 presents a summary of studies on the effect of credit crisis on the performance and investment decisions of public firms; this section also identifies gaps in the literature. A brief summary in Section 2.9 concludes the chapter and leads into Chapter 3.

## 2.2 Theories of Capital Structure and Empirical Evidence

Theoretical exposure on capital structure originates from Modigliani and Miller (M & M) (1958) '*Capital Structure Irrelevance*' proposition. They argue that in a perfect capital market and in the absence of transaction costs "*the market value of any firm is independent of its capital structure and is given by capitalizing its expected return at the rate  $\rho_k$  appropriate to its class*"(p. 268). In other words, in a frictionless market, the firm's financing decisions have no effect on its value. This highlights that, in a perfect information market, firms are indifferent between sources of finance. The chief financial officer cannot create or destroy a firm's value through their financing decisions in a perfect capital market. In a nutshell, the M & M model assumed that capital structure change is not a thing of value in the world of no taxes and no transaction costs. Since Modigliani and Miller's (1958) capital structure irrelevance proposition, capital structure has become the focus of a number of studies. Subsequently, many researchers have examined the relationship between capital structure and firms' value in less restrictive conditions.

In their second paper, Modigliani and Miller (1963) incorporate tax advantage as a potential determinant of capital structure. They argue that firms can maximize their value by employing more debt in their capital structure because of tax shield advantage associated with the use of debt. Since interest amount is deducted before calculating taxable income, firms could benefit by increasing the amount of debt in their capital structure. Hence, firms can maximize their value by employing maximum debt in their capital structure. However, Miller (1977, p. 262) argues that "*even in a world in which interest payments are fully deductible in computing corporate income taxes, the value of the firm, in equilibrium will still be independent of its capital structure*". He argues that the tax which investors in corporate debt pay in their personal income are offset by corporate tax shield, should the firm honour its tax obligations.

Subsequent studies have focused on the notion of optimal capital structure. As researchers continued to examine the notion of optimal capital structure, several theories emerged, such as agency theory (Jensen and Meckling 1976), signalling theory (Ross 1977), the bankruptcy cost (Titman 1984), and the pecking order theory (Myers

1984; Myers and Majluf 1984)<sup>12</sup>. These theories have relaxed the assumptions of perfect capital market and provide evidence that, in an imperfect capital market, the firms' financing affects their value. Hence, these theories highlight that firms' financing decisions matter in an imperfect capital market.

Jensen and Meckling (1976) for example, defined agency relationship and identified the agency cost. According to them, agency relationship is “... *a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent*” (p. 308). The study identified two types of conflict: that between shareholders and managers and that between shareholders and debt holders. The cost arising from these conflicts are referred to as agency cost. Agency costs include monitoring (which is done by bonding managers, auditing financial statements, and limiting management decisions) expenditure by the principal, budgeting, control and compensation system. The bonding expenditure and the residual loss of value due to divergence of interest reflect the agency cost. The study highlighted that optimum capital structure can be obtained by balancing off the costs and benefits of debt. Therefore, the optimum capital structure is obtained where managers choose a mix of debt and equity that minimizes the agency cost arising from the conflicts of interest<sup>13</sup>.

Jensen (1986) argues that debt financing reduces the conflict of interest between managers and shareholders. This is because high debt puts pressure on managers to generate cash flow to honour their debt obligations, thereby reducing the free cash flow available to them to invest in suboptimal projects or to misuse by consuming as their privilege (Jensen 1986). High leverage also gives an incentive to managers to act in the best interest of shareholders, by generating sufficient profit to repay their debt obligations and to reduce the expected cost of bankruptcy which causes personal losses to managers' salaries, reputation, perquisites, etc. (Grossman and Hart 1982). Further,

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<sup>12</sup> See for example, Harris and Raviv (1991) for various theories of capital structure.

<sup>13</sup> Berger and Udell (2006) test the theoretical predictions of agency theory on a large sample of the US banking industry; and Margaritis and Psillaki (2007) examine the SMEs in New Zealand and provide evidence in support of Jensen and Meckling's (1976) agency cost model.

the existing literature has also emphasized the signalling role of debt (see for example, Ross 1977, for details). The above-mentioned points suggest that optimal capital structure is determined at a point where the interest of the insider and outsider perfectly aligned.

Moreover, theories based on information asymmetry suggest that information imbalance plays an important role in determining firms' optimal capital structure (Bharath, Pasquariello and Wu 2009). In this respect, Gatchev, Spindt and Tarhan (2009) highlight that information asymmetry and agency cost play a significant role in the firms' financing decisions. The notion of information asymmetry as a determinant of optimal capital structure was primarily introduced by Myers (1984) and Myers and Majluf (1984). Information asymmetry between investors and managers creates a wedge between the cost of internal and external funds, thus making it expensive for firms to obtain external funds, which in turn affects the firms' investment. This also causes firms to follow the pecking order in their financing decisions (Myers 1984; Myers and Majluf 1984).

The essence of pecking order theory is that firms follow hierarchy in their financing decisions. This implies that firms have particular preferences for different types of finances, reflecting their relative cost. For example, firm prefer internal funds (retained earnings) to finance a project. If the financing needs of an investment exceed the retained earnings, firm resorts to external financing, i.e., firms issue the safest security (debt) first and then issue equity as the last resort (Myers 1984; Myers and Majluf 1984). Hence, the pecking order theory predicts that firms prefer internal finance over debt and then debt over equity. In other words, the pecking order theory proposes the negative relationship between internal funds and external debt.

Consistent with the predictions of the pecking order theory, the majority of previously published studies have found a negative relationship between profitability and debt. See for example, Van der Wijst and Thurik (1993), Chittenden, Hall and Hutchinson (1996), Michaelas, Chittenden and Poutziouris (1999 a and b), Hall, Hutchinson and Michaelas (2000), Cassar and Holmes (2003), Sogorb-Mira (2005), Heyman, Deloof and Ooghe (2008), Hol and Van der Wijst (2008), López-Gracia and Sogorb-Mira

(2008) and Psillaki and Daskalakis (2009), for evidence regarding small and medium-sized firms. Similarly, for evidence about large firms see for example, Titman and Wessels (1988), Friend and Lang (1988), Rajan and Zingales (1995), Shyam-Sunder and Myers (1999), Ozkan (2001), Booth et al (2001), Deesomsak, Paudyal and Pescetto (2004), Leary and Roberts (2005), Antoniou, Guney and Paudyal (2008) and Leary (2009). All the above-mentioned studies have reported a negative relationship between debt and profitability and, hence, confirmed that profitable firms use less debt in their capital structure.

The trade off theory however, predicts the opposite. It suggests that profitable firms would have a high level of debt in their capital structure in order to benefit from the tax shield advantage. In addition, the agency problem raised from the free cash flow (Jensen 1986) leads the profitable firms to use more debt because higher debt puts pressure on managers to generate cash flow to honour their debt obligations. This suggests a positive relationship between debt and profitability. In line with the predictions of the trade off theory, some empirical studies have found a positive relationship between profitability and debt (see for example, Hol and Van der Wijst 2008; Panno 2003). To summarize the above discussion, it seems that the findings of the above-mentioned studies are mixed and inconclusive. Although the predictions of the pecking order and the trade off theory are conflicting, they are still regarded as theoretical yardsticks in the area of corporate capital structure.

Subsequent studies of capital structure have identified a number of factors as potential determinant of firms' financing decisions. These factors are firm size, age, growth, profitability, risk, asset tangibility, and liquidity (see for example, Cassar and Holmes 2003; Chen 2004; Daskalakis and Psillaki 2008; Hall, Hutchinson and Michaelas 2004; Leary 2009; Michaelas, Chittenden and Poutziouris 1999 a; Michaelas, Chittenden and Poutziouris 1999 b; Ozkan 2001; Rajan and Zingales 1995). Similarly, other factors which help in explaining the diversity found in observed capital structure are industry effect (Hall, Hutchinson and Michaelas 2000), management behaviour (Williamson 1988), corporate strategy (Barton and Gordon 1988; Jordan, Lowe and Taylor 1998) and corporate control issues (Harris and Raviv 1988, 1990).

In essence, the above-mentioned factors identified by previous studies are demand side factors which help in explaining the debt equity choices of firms. Consistent with the demand driven approach to corporate finance, the study by Bolton and Freixas (2000) modelled the financing choice of firms across private debt (bank), public debt (bond) and equity finance in an imperfect capital market. Their model shows that a firm has to bear informational dilution cost when they issue equity, only if there is information asymmetry between borrowers and lenders. To put it another way, if there is information imbalance between firms and potential lenders, the firms bear informational dilution cost. This cost can however, be reduced or avoided if firms issue bonds.

The study further reveals that bond financing reduces the dilution cost but it imposes an inefficient liquidation cost on firms. For instance, if a firm's leverage is high it may be compelled into bankruptcy and liquidation; and the cost of bankruptcy may be high for good quality firms. To reduce or avoid this cost, firms may turn to the banks for financing. As banks have superior information and are regarded as efficient in restructuring a firm which is in financial distress, firms (especially risky firms) prefer to use bank loans. Nevertheless, bank finance is not without a cost, i.e., the cost of intermediation, which banks eventually passes onto borrowers. Their model suggests that riskier firms prefer to use bank finance, while good and sound firms prefer to use bond finance. Those in-between the two streams prefer to use both equity and bonds.

Cantillo (2004) explains how firms choose lenders. The study presents a model in which capital-rich firms borrow from the bond market while capital-poor firms borrow from financial intermediaries (such as banks). This is because the former seldom defaults and, therefore, needs little verification. In other words, the capital-rich firm is less concerned about the verification cost because it rarely defaults. What really matters for them is the low cost of capital. Therefore, they bypass the costly financial intermediaries in favour of lenders with a low cost of capital. Thereby, they borrow from the arms-length bondholders directly.

The study by Cantillo (2004) further highlights that capital-poor firms prefer to borrow from financial intermediaries because these firms are worried about defaulting and its

consequences. These firms need the reorganizational skills of the financial intermediaries. The costs of switching away from banks to bondholders are high for them because the verification cost of investors is higher than the middleman cost. Therefore, these firms prefer to borrow from the financial intermediaries because they are good at reorganization and handling firms in financial distress (Cantillo 2004). Similarly, other studies such as Cantillo and Wright (2000) find that large, financially sound companies borrow from the arms-length capital market while financially poor companies borrow from banks. In addition, their findings reveal that large firms, i.e., firms with a high cash flow, are more profitable and have ample collateral to tap the credit market, while companies with poor prospects borrow from banks.

It is also argued that large firms, which have high growth opportunities and low default risk, are more likely to use public debt (i.e., bond financing). Arikawa (2008), for example, uses data from the NIKKEI NEEDS and AMSUS database on listed Japanese firms. The results show that firms facing a high default risk are more likely to borrow from banks. These firms face information problems and, therefore, require flexibility in terms of renegotiating the loan contract. The results further highlight that firms which have more growth opportunities are likely to use public debt (i.e., bond financing) both during and after the deregulation (in the bond market during 1996-2004) periods; and firms which have low growth opportunities tend to borrow from banks. The study concludes that growth opportunities and default risk are the main determinants of firms' financing choices.

Hoshi, Kashyap and Scharfstein (1993) examine the choice between public and private debt financing. Using data on manufacturing firms listed on Tokyo Stock Exchange from 1964 to 1989, their results show that high leveraged firms use more bank finance because they need the monitoring of banks to invest efficiently. For low leveraged firms, the reverse is true. Similarly, firms with few assets in financial investments use more bank finance while firms with more of their assets in financial investments rely less on bank finance. In addition, the study also analyzes the effect of group affiliation on firms' financing choice. The results reveal that group affiliated firms with more investment opportunities are likely to use public finance while the non-group affiliated firms with more investment opportunities are likely to use bank finance. On balance,

the results suggest that high quality firms tap the public debt market while low quality firms use bank finance.

Similarly, the study by Denis and Mihov (2003) found that high credit quality firms borrow from the credit market while firms with medium and low credit quality borrow from bank and non-bank private lenders. The study examines the new debt financing decisions of US public firms. By using a sample of 1560 new debt financing by 1480 public companies during 1995-1996, the results found that high credit quality firms issue public debt in their incremental debt financing decisions, while medium credit quality firms borrow from banks, and low credit quality firms borrow from the private non-bank lenders. These financing choices reflect differences in firms' characteristics and the degree of information asymmetry they face.

The results further reveal that firms that issue public debts are quite different from those that issue bank debt and non-bank private debt. For example, firms that issue public debt are large, profitable, have more tangible assets, have high credit quality, and are characterized by lower information asymmetry than both bank and non-bank private borrowers. In comparison, firms with a high degree of information asymmetry borrow from private debt (both bank debt and non-bank private debt). As private lenders are good at alleviating information asymmetry and are efficient in renegotiations, therefore, these firms are more likely to borrow from private lenders (such as banks or non-banks). This highlights that information asymmetry, to a large extent, determines firms' financing mix. In this respect, Gatchev, Spindt and Tarhan (2009) argue that information asymmetry and agency cost play an important role in firms' financing decisions.

Brav (2009) examines the financial policies of both private and public firms in the United Kingdom over the period 1993 to 2003. Using data from the FAME database, the study finds differences between the financial policies of private and public firms. Private firms rely heavily on debt financing, having high short-term debt in their capital structure and, hence, have a higher leverage ratio than public firms. Private firms also use more debt to finance their deficit (such as dividends, investment, working capital and profitability) than public firms. In addition, these firms use less equity and rarely

visit external capital markets. In comparison, public firms rely more on equity finance, having low short-term debt in their capital structure and, thus, have a low leverage ratio.

The study acknowledges that these differences between the financing decisions of private and public firms are due to information asymmetry and the degree to which firms value control. As private firms are owned by few controlling shareholders, each shareholder can exercise significant control. The desire to control a firm makes the cost of issuing equity higher for private firms than for public firms because issuing equity means giving away control. Information asymmetry also explains why private firms use less equity. The information asymmetry between insiders and outsiders is high in private firms. In addition, these firms are more opaque and face high market frictions, which make the cost of equity issue additionally higher for private firms than for public firms. This is because equity is the junior security in the financial structure and is more vulnerable to information imbalance than is debt finance. A similar result is also reported by Michaelas, Chittenden and Poutziouris (1999 a). They argue that because of information asymmetry, control consideration and high flotation cost, small private firms are more like to issue debt than equity.

### **2.3 Credit Supply Fluctuations, Financial and Investment Decisions**

The above discussion seems to suggest that the majority of previous studies have modelled the financial and investment decisions of firms almost entirely as a function of demand side factors, and have implicitly assumed that supply of capital is frictionless. Consistent with Modigliani and Miller's (1958) assumption of frictionless supply of capital, most of the previous studies have assumed that firms can always secure a loan for the positive net present value (NPV) project and that firms' capital structure is determined almost entirely by demand side factors. In other words, these studies have alleged that supply of capital is frictionless and, hence, a firm's capital structure and investment depends solely on its characteristics.

Recent research, however, has called into question the assumption that supply of capital is frictionless (see for example, Choi et al. 2010; Faulkender and Petersen 2006;

Leary 2009; Lemmon and Roberts 2010; Morellec 2010; Rehman and Akbar 2011a; Rehman and Akbar 2011c; Rehman, Akbar and Ormrod 2011; Sufi 2009 a; Voutsinas and Werner 2011). There is evidence which suggests that credit supply condition is an important factor which affects a firm's financing (Graham and Harvey 2001; Rehman and Akbar 2011a; Rehman and Akbar 2011c; Rehman, Akbar and Ormrod 2011) and investment decisions (Campello, Graham and Harvey 2010; Rehman and Akbar 2011b). Campello, Graham and Harvey (2010, p. 470) for example, argue that "*... the inability to borrow externally caused many firms to bypass attractive investment opportunities...*". Lemmon, Roberts and Zender (2008) highlight that identified determinants of the capital structure explain little of the variations in leverage ratios. Likewise, Morellec (2010, p. 5) argues that "*our analysis raises doubts about the usefulness of models of corporate decision that focus exclusively on demand factors in several real-world applications*".

In this regard, Choi et al. (2010), for example, provide evidence that the supply of capital plays an important role in firms' issue decisions. They examine the relationship between the supply of capital from convertible bond arbitrageurs and firms' issue decisions. Using simultaneous equation methodology, the results show that increase in issue is positively related to the supply of fund. The supply of capital from the convertible bond arbitrageurs plays an important role in a firm's issuing decisions. As a robustness test, the study used the ban on short selling in September/October 2008 as a natural experiment to investigate whether the main result holds. By using the event-study approach, the results highlight that convertible bond issue decreased during the ban period. This implies that exogenous shocks to the supply of capital negatively affected the issue decisions of the US firms. Taken together, the results suggest that supply of capital affects firms' issuance decisions.

Tang (2009) develops Moody's 1982 credit rating refinement and its subsequent effect on firms' access to capital market, cost of borrowing and investment decisions. The credit rating reveals important information about the firms' underlying risk certified by the credit rating agency. It reveals important information about the firms' credit quality. As explained in Sufi (2009 a), investors are unwilling to invest in firms without such rating. By using data on US firms, Tang (2009) found that credit

refinements by Moody significantly affect firms' access to credit market and investment decisions.

The results further reveal that upgraded firms experience a lower cost of borrowing than firms that are downgraded. The upgraded borrowers increased the use of long-term debt and decreased the equity issue, in comparison with the low rated firms. The credit refinements also affect firms' investment. The upgraded borrowers increased investment and experienced greater asset growth than downgraded firms. Consistent with the capital market access, these firms saved less cash than downgraded firms. The study concludes that firms which are upgraded experience a low cost of borrowing. In addition, these firms issue more long-term debt, issue less equity, save less cash, and invest more than their downgraded peers.

In a similar context, the study by Sufi (2009 a) provides evidence that supply of capital affects the firms' financial and investment decisions. The study examines the introduction of syndicated bank loan rating by Moody's and Standard and Poor's in 1995 and its subsequent impact on the financial and investment decisions of firms. By using data on US firms over the period 1990 to 1998, the study shows that introduction of bank loan rating increased the availability of external debt for firms. Firms which obtained bank loan rating experience a significant increase in leverage ratio. This increase in leverage is, however, greater for firms without credit rating before the introduction of bank loan rating. In other words, the unrated firms that obtained rating experienced significant increase in leverage ratio than rated firms that obtained bank loan rating.

In addition, the study highlights that, among the unrated firms, those with low credit quality gained the most. In other words, out of the whole group of unrated firms, it was those with low credit quality that experienced a significant increase in net debt issue. Moreover, the introduction of bank loan rating positively impacted firms' investment. For example, the unrated firms which obtained a bank loan rating experienced significant increases in investment than firms with issuer credit rating before the introduction of a bank loan rating. In brief, the results suggest that introduction of bank loan rating increased the availability of credit for unrated low quality firms. The

bank loan rating also reduced the cost of obtaining credit from the uninformed investors and, thus, induced firms to expand their investment.

Faulkender and Petersen (2006) argue that supply of capital does matter in a firm's financing decisions. They examine the sources of firms' capital and its effects on the firms' financing decisions. By using data from the Compustat database for the period 1986-2000, the results reveal that firms with access to the public debt market (measured by having a bond rating) have higher leverage ratios than firms without bond rating<sup>14</sup>. The study finds that the results remained robust even after controlling for the debt demand and unobserved heterogeneity. Moreover, the results highlight significant differences between firms with and without bond rating. Firms with bond rating are quite large, having more tangible assets, are significantly older, and spend less on research and development (R & D) than firms without bond rating. The results again remained robust, after controlling for firms' characteristics. Overall, the findings show that, among the public traded firms, those which have access to the public debt market have a higher leverage ratio than those which do not have access to the public debt market. To conclude the above discussion, it seems to suggest that supply of capital plays an important role in the firms' financing and investment decisions. In the next section, the study reviews relevant literature on the financial policies of private firms during the crisis period.

## **2.4 Credit Crisis and the Financial Policies of Private Firms**

There is a growing consensus that small and medium sized firms play an important role in the economy. Their role in economic growth, innovation, employment growth, revenue generation and technological advancement is now well documented in the existing literature (Acs and Audretsch 1990; Kotey and Meredith 1997; Neck and Dockner 1987). They represent the huge majority of the total number of firms in both developed and developing countries alike (Daskalakis and Psillaki 2008). SMEs represent approximately 95% of enterprise and account for more than half of the labour force in OECD countries (Lukács 2005). Similarly, Brav (2009, p. 264) highlights

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<sup>14</sup> This point is also confirmed by Leary (2009). He observes low leverage ratio for firms which do not have bond market access.

private companies as “... representing 97.5% of all incorporated entities in the United Kingdom”.

However, despite their important role in the economic development of the global economy, research on private firms is limited. It seems that financial theories and empirical research have ignored this sector of the economy (Ang 1991; Michaelas, Chittenden and Poutziouris 1999 a). In this regard, Zingales (2000, p. 1629) argues that “*the emphasis on large companies has led us to ignore (or study less than necessary) the rest of the universe: the young and small firms, who do not have access to public markets*”. One of the reasons might be the lack of data availability on private firms. As these firms are not required by law to publish their financial statements, they are generally considered as being informationally opaque (Bartholdy and Mateus 2011; Berger and Udell 1998).

Berger and Udell (1998, p. 616) argue that

*Unlike large firms, small firms do not enter into contracts that are publicly visible or widely reported in the press-contracts with their labour force, their suppliers, and their customers are generally kept private. In addition, small businesses do not issue traded securities that are continuously priced in public markets and (in the US) are not registered with the Securities and Exchange Commission (SEC). Moreover, many of the smallest firms do not have audited financial statements that can be shared with any provider of outside finance. As a result, small firms often cannot credibly convey their quality.*

The other salient features of the private firms are that they are characterized by high information asymmetry (Bartholdy and Mateus 2011) and control considerations (Brav 2009; Michaelas, Chittenden and Poutziouris 1999 a). In brief, information asymmetry, lack of reliable hard information (audited financial statement), no access to the public market<sup>15</sup>, and control consideration are some of the factors which make private firms different from the large public firms<sup>16</sup>.

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<sup>15</sup> Private firms can only access private debt and private equity.

<sup>16</sup> Brav (2009) argues that information asymmetry and the desire for control are significant factors that make private firms different from their counterpart public firms. Further he adds that “... *maintaining control is probably one of the main reasons private firms are private to begin with*” (p. 266). Moreover,

Although private firms are different from the large public firms, they each use both debt and equity. In this regard, Berger and Udell (1998, 2002) report that US small firms use 50.37% debt and 49.63% equity. These figures indicate that small firms in the US rely more on debt than on private equity. Moreover, using the US data from the National Survey of Small Business Finances, Berger and Udell (1998) highlight that principal owner, commercial banks and trade credit represents 70% of small firms' total funding. Brav (2009) also highlights that private firms rely heavily on debt financing, rarely visit external markets and, hence, have a higher leverage ratio than public firms. These differences between the financing decisions of private and public firms are due to information asymmetry and the degree to which firms value control. Hence, because of information asymmetry, control considerations and high flotation costs, private firms rely more on debt than on equity finance (Brav 2009; Michaelas, Chittenden and Poutziouris 1999 a).

It is generally argued that private firms are informationally more opaque than public ones, therefore, they may suffer from a high level of moral hazard and adverse selection problems (Michaelas, Chittenden and Poutziouris 1999 a). Theory of credit rationing suggests that adverse selection and moral hazard problems result in credit rationing in the loan market (see for example, Stiglitz and Weiss 1981). Further, it suggests that the effect would be pronounced on informationally opaque firms. Similarly, because of information asymmetry, the cost of external finance is also high for such firms (Berger and Udell 2002). These problems may further worsen during an economic downturn (Michaelas, Chittenden and Poutziouris 1999 b), which suggests that the financing mix and investment decisions of private firms may be vulnerable to the credit supply shocks.

In this regard, Gertler and Gilchrist (1993) highlight that the financing mix of firms is sensitive to the supply of bank loans. They examine the effect of tight monetary policy on the firms' financing mix. In other words, how credit market imperfections amplify the effect of monetary policy shocks. By using data from the Quarterly Financial Report on manufacturing firms, the study classified sample firms into small and large

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Berger & Udell (1998, p. 628) argue that "*informational opacity is a major reason why small firms cannot issue publicly traded securities, but it is not the only reason*".

firms. The results highlight that the impact of tight monetary policy is higher for the financing mix of small manufacturing firms<sup>17</sup> as compared to large manufacturing firms. Further, the study disaggregated the loan data into bank versus non-bank loan, and found that non-bank loan also follows a similar pattern. In addition, the results confirm that the flow of short-term bank debt and non-bank short-term debt<sup>18</sup> increased to large firms but not to small firms. Similarly, other studies, such as Mateut, Bougheas and Mizen (2006) and Oliner and Rudebusch (1995), have also examined this issue and have reported similar results. This indicates that the financing mix of small manufacturing firms is more sensitive than large firms to shifts in monetary policy. This may be due to the vulnerability of small firms to market friction.

Moreover, the information asymmetry and idiosyncratic risk are likely to be high in small firms. These firms have few external financing options, as the majority of their short-term finance comes from banks. Specifically, 80% of their short-term finance comes from commercial banks (Gertler and Gilchrist 1993). In line with the above, Guariglia and Mateut (2010) report that bank finance represents more than half of small firms' short-term finance<sup>19</sup>. This implies that these firms are more bank-dependent<sup>20</sup> because, unlike large firms, they cannot issue commercial paper (Gertler and Gilchrist 1993). Gertler and Gilchrist (1993) conclude that credit market frictions are important factors which explain why some borrowers are more affected by tight monetary conditions than others. The study by Ehrmann (2000) also reports similar results for German firms.

In a related context, Gertler and Gilchrist (1994) examine the response of small and large US manufacturing firms to tight monetary conditions. They use data from the Quarterly Financial Report for Manufacturing Corporations (QFR). According to

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<sup>17</sup> Mateut, Bougheas and Mizen (2006) examine this issue. They report that bank lending to small firms reduced during tight monetary period; nevertheless its flow to large firms increased. In other words, bank lending to large firms is not much affected.

<sup>18</sup> Non-bank short-term credit consists of commercial paper for large firms, and finance companies for small firms (Gertler and Gilchrist 1993).

<sup>19</sup> Also see Bank of England (2001, p. 23) and Bank of England (2004, p. 35) for this point.

<sup>20</sup> It might be because the relative cost of equity issue is higher for small firms than for large firms (see for example, Pettit and Singer 1985; Smith (1977) in Titman and Wessels (1988)). The other reason might be that a bank has an advantage over other lenders to lend to informationally opaque firms (see for example, Hadlock and James 2002; James 1987).

them, QFR has an advantage over the Compustat database because the latter has focused exclusively on public trade firms and, therefore, under-represented the small firms. Their findings highlight differences in the response of small and large firms to stringent monetary policy. The results reveal that small firms' sales dropped more than those of large firms after monetary tightening. Inventory and short-term debt also mimic a similar pattern.

The results further reveal that large firms which have access to the commercial paper market and other short-term debt markets increased short-term borrowing to lessen the impact of the downturn. Small firms, which have limited access to the capital market, respond in different ways. They shed inventories when they experience a fall in the cash flow. They do not borrow to lessen the impact of declining sales. The study acknowledges that these differences are due to capital market imperfections faced by small firms. The results suggest that small firms shrink more than large firms after a period of tight monetary policy and account for a large proportion of the resulting decline in the manufacturing sector.

There is also evidence which suggests that the 'bank lending channel' and 'balance sheet channel' of monetary policy would be more pronounced on firms with limited access to the capital market (see for example, Bernanke, Gertler and Gilchrist 1996; Bernanke and Gertler 1995; Black and Rosen 2008; Gertler and Gilchrist 1993, 1994; Kashyap, Lamont and Stein 1994; Kashyap and Stein 2000). This is because a tight monetary policy reduces bank lending and affects the financing and investment policies of small firms (see for example, Bernanke, Gertler and Gilchrist 1996; Black and Rosen 2008; Gertler and Gilchrist 1993, 1994; Kashyap, Lamont and Stein 1994; Kashyap and Stein 2000; Kashyap, Stein and Wilcox 1993), possibly because of the reasons discussed above. In a related context, one study reports that the effect of tight monetary policy would be more pronounced on small banks than on large banks (Kashyap and Stein 1995).

Kashyap, Stein and Wilcox (1993) examine the impact of tight monetary policy on the firms' external financing mix. More specifically, they examine the behaviour of bank loan and commercial paper after tight monetary policy. By applying vector

autoregressions with aggregate data, the results show that, following monetary shocks, bank loans shrink relative to the commercial paper. In other words, the commercial paper issue increases while bank loan contracts or flattens. The results further reveal that tight monetary policy limits the flow of bank loan, which forces borrowers to substitute from bank loan to commercial paper. In addition, the results highlight that this shift in the financing mix of firms has also had an impact on investment. Overall, the results support the bank lending channel of broad credit view which is consistent with the results of Bernanke and Blinder (1988).

The studies by Oliner and Rudebusch (1995,1996) criticize the findings of Kashyap, Stein and Wilcox (1993) on the ground that the sources of external finances considered were relatively narrow and no distinction was made between small and large firms. Oliner and Rudebusch (1996) argue that “*in an economy with heterogeneous agents, aggregate results must always be treated with caution*”<sup>21</sup>. By using disaggregated data from the Quarterly Financial Report for Manufacturing, Mining and Trade Corporations for the period 1973.Q4 to 1991.Q1, they do not find evidence in favour of the bank lending channel. Their results do not support the theory that monetary contractions reduced bank loan relative to other forms of finance for small and large US firms. Their results show that credit has redirected from small firms to large firms following monetary tightening. Similarly, other studies such as Gertler and Gilchrist (1993, 1994) and Black and Rosen (2008) provide evidence that short-term bank borrowing is redirected from small firms towards large firms after monetary contractions.

Bernanke, Gertler and Gilchrist (1996) highlight ‘*flight to quality*’ in lending during economic downturn. Their study reveals that monetary contractions reduce borrowers’ net worth which increases the agency cost. As a result, the amount of credit available to firms reduces, which affects the firms’ investment (Bernanke and Gertler 1989; Bernanke and Gertler 1990). Firms facing severe information and agency problems at the beginning of a recession receive relatively less credit than firms facing low agency problems. Such firms face greater frictions in raising credit, which results in a

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<sup>21</sup> Also see Oliner and Rudebusch (1995, p. 15) for this point.

reduction in spending, production, and investment and, hence, exacerbate the effect of monetary shocks. These firms also feature more significantly in the ensuing decline in economic activity. This indicates that monetary tightening has a differential effect on firms facing high agency problems and on firms facing low agency problems (Bernanke, Gertler and Gilchrist 1996). To conclude, their results highlight the flight to quality effect in lending behaviour during stringent monetary conditions.

In a similar context, Bougheas, Mizen and Yalcin (2006) show that financially vulnerable firms (which are small, younger, risky and high leveraged) are more affected by monetary contractions because the supply of credit to these firms is significantly reduced during monetary contractions. They examine how firms' characteristics affect their financing mix after monetary policy shifts. By using data from the FAME database regarding a large panel of 16,000 UK manufacturing firms over the period 1990-1993, the study highlights that firms' characteristics (such as size, age, and risk score) play an important role in affecting their access to credit during tight monetary conditions. Further, the results show that, after a period of tight monetary policy, credit supply is squeezed to small, high risky, younger and highly indebted firms' more than to large, less risky and older firms.

Other studies, such as Black and Rosen (2008), also examine the effect of monetary policy on credit availability. Their results highlight that tight monetary policy reduces the supply of aggregate credit and that, in response, banks reduce the average maturity of their loan supply, i.e., banks reallocate their supply from long-maturity lending to short-maturity lending, which results in a reduction in loan supply over time. In other words, the study provides support for the bank lending channel. In addition, banks redistribute the short-maturity lending from small firms to large firms following monetary shocks. This indicates that banks may shift their lending towards safe and transparent firms, which is consistent with the balance sheet channel of monetary policy. Overall, the results suggest that tight monetary policy reduces the supply of bank loans, which has a greater effect on the financing activities of small firms.

It is also argued in the existing literature that small firms are more sensitive to a reduction in bank lending. Holmstrom and Tirole (1997), for example, present a

theoretical model in which firms as well as intermediaries are credit rationed. Their model show that firms with low net worth depend more on financial intermediaries. This is because financial intermediaries are good at reducing moral hazard problems faced by these firms through monitoring<sup>22</sup>. Hence, in a credit crunch period when banks reduce lending, it has a greater affect on the financing and investment of small, collaterally poor and high leveraged firms. On the other hand, large firms are less affected because they have several options to raise funds: they could either renegotiate their loan or go to the capital market. The findings suggest that all forms of credit tightening (such as credit crunch, collateral squeeze or a saving squeeze) have a significant effect on the financing and investment of small, collaterally poor and high leveraged firms (Holmstrom and Tirole 1997) because, unlike large firms, these firms cannot issue commercial paper when rationed by banks (Blinder and Stiglitz 1983; Carpenter et al. 1994).

The majority of the above-mentioned studies have examined the financing mix of firms during a tight monetary policy period. Domaç and Ferri (1998), however, investigate the impact of financial shocks on firms' financial and real economic activities in Korea. The study found an increase in spread between the bank lending rate and government bond rate. The spread which captures credit channels has significant effect on the economic activities. This effect is more pronounced on small and medium sized enterprises (SMEs). The increase in spread has also negatively affected the financing and economic activities of SMEs because these firms usually do not have close bank substitutes. This point is consistent with Kim, Lee and Park (2002), who find evidence of a credit crunch in the credit market for SMEs, while finding negligible evidence for large firms. The SMEs face a more severe credit crunch in the loan market than do large firms, which can rather easily avoid it.

The above-mentioned studies highlight that the credit crunch in Korea was the result of portfolio changes/adjustment of the depository institutions to meet the capital adequacy requirements. As a consequence, banks reduced lending to small firms because these

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<sup>22</sup> This might be because banks are better informed and are able to produce information about borrowers than other lenders (see for example, Diamond 1984; Leland and Pyle 1977; Rajan 1992; Sharpe 1990, for details). In addition, banks finance is also flexible in nature (see for example, Hoshi, Kashyap and Scharfstein 1990; Hoshi, Kashyap and Scharfstein 1991, for details).

firms faced severe information asymmetry and credibility problems during the crisis period. Using similar arguments, Domaç, Ferri and Kang (1999) found that SMEs are significantly affected in most East Asian crisis countries. Banks were reluctant to lend and, thus, caused a leftward supply shift in the credit supply. Lending to SMEs significantly reduced in most of the crisis-stricken countries, which disproportionately hurt these firms. Hence, the financial crisis has reduced the supply of bank credit to small firms more than to large firms, which has adversely affected the former's financing mix.

Lim (2003) examined the sources of corporate finance before and after the financial crisis in Korea and found contrasting results. Using firm-level data for the period 1992-2000, the study highlights differences in the pattern of credit allocation across firm size. Sources of finance for both small and large firms show distinct patterns after the crisis. The findings suggest that the proportion of loans from financial institutions decreased in the financial structure of large firms after the crisis while small, profitable firms had better access to credit from financial institutions after the crisis. In other words, there was a reallocation of bank credit away from large firms to small firms<sup>23</sup> following the Korean financial crisis.

Hancock and Wilcox (1998) investigate how much bank loan and economic activities in small business respond to changes in banks' capital. Using data from 1989-1992 by state, they argue that, when banks experience a shortage of capital, they reduce lending. The same point is also verified in the work of Woo (2003). This highlights that, when financial shocks hit the banking system, it has a greater effect on the lending of credit to small businesses than to larger ones (Berger and Udell 2002; Hancock and Wilcox 1998). The reduction in bank capital affects the lending of small banks more than that of large banks, due to which lending to small firms is reduced<sup>24</sup> & <sup>25</sup>, which affects their activities. This is because small firms have few close substitutes for a bank loan.

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<sup>23</sup> The author suggests that this shift in the reallocation of credit from large firms to small firms is at least partially due to improved bank lending practices in Korea after the crisis.

<sup>24</sup> It might be because small banks are specialized in lending to small firms. In addition, Strahan and Weston (1996) show a negative relationship between bank size and the supply of credit to small firms.

<sup>25</sup> Consistent with the flight to quality effect, Lang and Nakamura (1995) observe that banks relatively make safe loans during tight credit conditions.

Therefore, a reduction of loan to small businesses has a greater effect on their activities compared to those of large firms (Hancock and Wilcox 1998).

Bruno's (2009) theoretical model also shows that, when a financial shock hits the banking system it has a large affect on the financing and investment of small businesses. The study presents the theoretical model of a heterogeneous banking system in which two banks and investors differ from one another in terms of level of capital and monitoring efficiencies. One bank is specialized in the financing of small firms while the other bank is specialized in the financing of large firms. Due to information asymmetry, small firms (those with low wealth) are more likely to obtain credit from banks. This is because banks can reduce the moral hazard problem that these firms face. In addition, banks have a relative cost advantage in their monitoring of these firms.

The study further highlights that, when a capital shock hits the heterogeneous banking system, it has different effects on the availability of credit to firms. For instance, when a negative shock hits the banks which are specialized in the financing of small firms, it has a larger impact on the aggregate investment than if it were to hit the banks which are specialized in the financing of large firms. This is because when the former are hit by a negative shock, they contract lending and increase the interest rate. The firms with low wealth, which are mostly financed by small banks, are not able to reallocate their loan demand within the banking system. As a result, the financing and investment of small borrowers are more affected by the negative capital shock to small banks.

In contrast, when a negative shock hits the large banks, they also reduce lending and increase the interest rate. However, this reduction in lending has not much effect on the medium and large wealthy firms because these firms can find alternative sources of finance or reallocate their credit demand within the banking system (Bruno 2009). This suggests that the financing mix and investment of small firms are sensitive to variations in the supply of small banks' loan. Similarly, there are other studies which argue that the effect of the bank credit supply shocks would be stronger on small and unrated firms because these firms lack access to alternative sources of finance (Akiyoshi and Kobayashi 2010; Bae, Kang and Lim 2002; Becker and Ivashina 2010).

Leary (2009) presents a model in which firms' capital structure, with and without access to public debt markets, varies with the availability of bank loan. Using data from the Quarterly Financial Report for Manufacturing Corporations, Moody's Industrial Manuals, and the Annual Compustat database, the study finds that capital structure of small bank-dependent firms is sensitive to the availability of bank loan. The study investigates two changes in the bank funding constraints (i.e., the introduction of certificate of deposit in 1961 in the USA, and the 1966 credit crunch) and their impact on firms' financial structure. The results highlight that, following the expansion of the availability of bank loan in 1961, the proportion of bank debt in the capital structure of the bank-dependent firms increased compared to large firms, which have access to bond market.

The study further reveals that the proportion of bank debt in the financing mix of the small bank-dependent firms decreased relative to that of large firms during the 1966 credit crunch period. The study concludes that the leverage ratio of bank-dependent firms is more sensitive to the availability of bank loan than large firms with access to the public market. Other studies, such as Chava and Purnanandam (2011), show that leverage ratio of firms, which is dependent on bank loan, is sensitive to variations in the supply of bank loan. Iyer et al. (2010) highlight that the effect of credit supply shocks is more pronounced on small and younger firms because it is difficult for these firms to compensate for a decline in the supply of credit.

Leary (2009) further, argues that small bank-dependent firms are more likely to use a combination of internal equity, non bank debt and equity finance following credit crunch or contractions in the supply of bank loan. In other words, firms with no access to the public market are more likely to use internal finance and equity in a tight credit period. This highlights that availability of alternative sources of finance may lessen the adverse effect of the credit supply contractions. The alternative sources of finance may consist of internal cash reserve, equity and trade credit. Therefore, one would expect that private firms may substitute alternative sources of finance when the supply of credit is squeezed.

It is, however, argued that private firms face greater information problems, which may worsen during an economic downturn (see for example, Michaelas, Chittenden and Poutziouris 1999 b). As a result, these firms might prefer to use a funding source that is less sensitive to information problems. In this regard, internal finance is generally regarded as the cheapest source of finance. In addition, it is less sensitive to information problems (Myers 1984; Myers and Majluf 1984). The pecking order theory also suggests that firms prefer internal finance over external credit. Similarly, it is reported in the literature that firms with no access to capital markets rely more on internally generated funds and equity during credit crisis periods (Leary 2009). This implies that private firms may use more internal funds during the credit crisis period.

However, Baum et al. (2006) highlight that, when macroeconomic or idiosyncratic uncertainty increases, firms tend to hold more liquid assets. Private firms are more sensitive to both of these uncertainties (Rashid 2011); therefore, they may tend to hold more cash reserves. There are other studies which argue that, when the cash flow risk of firms increases, firms increase their cash holdings. In other words, firms respond to increased risk by holding more cash (Bates, Kahle and Stulz 2009). Similarly, firms hold more cash when they have more growth opportunities or a more volatile cash flow status, which is consistent with the precautionary saving motive (Opler et al. 1999).

The precautionary motive of cash holding would suggest that firms hold more cash when they face high information asymmetry because of the difficulty they face in raising the required funds. Cash holdings also give the firms an incentive to hedge themselves against the adverse shocks when access to external credit is expensive. Empirical studies have confirmed the predictions of the precautionary motive of cash holdings (see for example, Bates, Kahle and Stulz 2009; Baum et al. 2006; Custodio, Ferreira and Raposo 2005; Opler et al. 1999, for details). Using data from the DealScan and Compustat data on 1636 US publicly traded firms, Lin and Paravisini (2010 a) report that firms hold more cash following credit contractions, which is consistent with the precautionary saving motive. Similarly, it has also been reported that firms hold more cash during a period of tight credit conditions (see for example, Custodio, Ferreira and Raposo 2005; Lin and Paravisini 2010 a).

Since a private firm faces high information and agency problems, as explained earlier, these firms might hold more cash during the crisis period. Faulkender (2002) for example, argues that small firms face high information asymmetry problems and, as a result, they may not be able to raise cash in the future, so they therefore hold more cash. Stated differently, firms that perceive difficulty in obtaining cash in the future, due to information asymmetry problems, hold more cash. Similarly, other studies have shown that small, unrated firms, firms with more investment opportunities, and firms facing volatile cash flow hold more cash (see for example, Dittmar, Mahrt-Smith and Servaes 2003; Faulkender 2002; Opler et al. 1999; Ozkan and Ozkan 2004, for details).

In addition, firms might move to equity finance to hedge themselves from the adverse effect of the credit contractions. It is also argued that firms issue more equity during periods of economic growth because adverse selection problems are usually low during these periods (Choe, Masulis and Nanda 1993). Other studies have shown that equity issue decisions depends on the macroeconomic conditions (for example, Korajczyk and Levy 2003; Levy and Hennessy 2007). Moreover, equity issue decisions are also related to market conditions. In this regard, existing studies have shown that firms are more likely to issue equity than debt when stock prices are high (see for example, Asquith and Mullins 1986; Baker and Wurgler 2002; Dittmar and Thakor 2007; Jung, Kim and Stulz 1996; Mikkelson and Partch 1986).

The studies by Leary (2009) and Lin and Paravisini (2010 a) demonstrate that equity finance is an important substitute source of finance when availability of credit becomes scarce. This suggests that firms would resort to equity finance when negative shocks to the supply of capital squeeze credit availability. Brav (2009) argues that, because of information asymmetry and control considerations, the cost of equity would be higher for private firms than for public firms. As a result, these firms would be less likely to issue private equity during the normal time period. However, when a negative shock to supply of credit reduces credit availability, these firms tend to use equity finance. Leary (2009) finds that small firms use greater equity finance during tight monetary conditions. In a related context, Lin and Paravisini (2010 a) reveal that firms increase the use of equity financing following negative shocks to bank credit. There is,

however, limited evidence of substitution towards alternative sources of finance following negative shocks to the supply of credit (Lemmon and Roberts 2010).

To summarise the above discussion, it seems to suggest that the financing mix of firms is largely examined during a tight monetary policy regime, while fewer studies have examined the same issue during the crisis period. Also, a careful examination of the above-mentioned findings would reveal that the majority of these studies did not reach an unambiguous conclusion. Further, the focus of the majority of the reviewed studies is very narrow with respect to the components of the capital structure of firms. As a result, it is not clear from the existing literature which component of the capital structure is more sensitive to credit supply contractions than another. In addition, the notion of small firms as used in most of the above-mentioned studies is not the true representation of small private firms. This is because the quoted small firms are quite large when compared with the unquoted small firms (Kashyap, Lamont and Stein 1994).

Other studies have approached the issue by using the aggregate data (for example, Kashyap, Stein and Wilcox 1993). The problem with the aggregate data is that it does not reveal the underlying compositional changes (Oliner and Rudebusch 1996; Victoria and Bo 2010). Moreover, the empirical evidence on the role of alternative sources of finance is again mixed and inconclusive, which highlights the need for more research in this area. In addition, the majority of the above-mentioned studies have focused on US public listed firms only, with little or no evidence on private firms. Further, given the differences of degree of information opacity, funding sources (Bartholdy and Mateus 2011), and ownership structure (Brav 2009; Michaelas, Chittenden and Poutziouris 1999 a), between public and private firms, the need for more research on the behaviour of private firms in the UK is apparent. In the next section, this study reviews literature related to the behaviour of trade credit during the crisis period.

## 2.5 Credit Crisis and Trade Credit

It is argued that firms might change to other sources of finance in response to the credit drought. One such alternative source of finance is trade credit. It is often argued that firms offset the reduction of bank credit in the capital structure by increasing the use of trade credit<sup>26</sup>. The role of trade credit as a potential substitute of bank credit was pioneered by Meltzer (1960), who argues that “...when money was tightened, firms with relatively large cash balances increased the average length of time for which credit was extended. And this extension of trade credit appears to have favored these firms against whom credit rationing is said to discriminate”. Subsequent studies have confirmed these predictions. For example, it has been shown that firms increase the use of trade credit when rationed by banks (Nilsen 2002; Petersen and Rajan 1997). This suggests that trade credit plays an important hedging role during the crisis period.

Moreover, trade credit is one of the important sources of short-term finance (Berger and Udell 1998). Its importance can be seen from the fact that it is not only the significant source of short-term finance for small firms but also for large firms<sup>27</sup>. According to a federal reserve board study by Elliehausen and Wolken (1993), in US in 1987, trade credit represented 20% of all non-farm non-financial liability of small business and 15% of all non-farm non-financial liability of large firms. Berger and Udell (1998, 2002) argue that trade credit is a significant source of US small business finance. They found that 15.78% of small firms’ assets are financed by trade credit. Bevan and Danbolt (2002) highlight that trade credit accounts for 62% of total liabilities of UK firms. Kohler, Britton and Yates (2000, p. 13) also observed that “...70% of the total short-term (ie due in less than one year) credit extended and 55% of the credit received took the form of trade credit”. Further, in the corporate sector more than 80% of daily business transactions take place on credit (Wilson and Summer 2002).

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<sup>26</sup> Trade Credit is represented by accounts payable in the borrowers’ balance sheet and accounts receivable in the lenders’ (creditor) balance sheet.

<sup>27</sup> See for example Table (1, p.8 ) in Oliner and Rudebusch (1995). Similarly, the study by Beck, Demirgüç-Kunt and Maksimovic (2008) suggests that large firms also use more trade credit.

Deloof and Jegers (1999) highlight that trade credit is an important alternative not only for short-term bank loans but also for long-term debt. In addition, it has been argued that trade credit can alleviate the information problem. The terms and conditions of trade credit act as a screening device that extracts information about the default risks of buyers (Smith 1987). Information asymmetry between firms and banks can result in credit rationing, possibly due to adverse selection problems. As a consequence, firms may not be able to pursue the positive NPV projects. Trade credit mitigates this information asymmetry because sellers have private information about their buyers. The provision of trade credit to buyers reveals that information to the market. The provision of trade credit from the sellers conveys a signal of buyer credit worthiness to the banks and, hence, mitigates the credit rationing (Biais and Gollier 1997).

The information advantage of suppliers has also been emphasized by Petersen and Rajan (1997). By using data from the National Survey of Small Business Finance, they argue that the supplier has a relative advantage to provide trade credit to small, growing firms. This is because the supplier can obtain private information about a firm routinely and at relatively low cost. Suppliers do not use the information of other financial intermediaries; rather they collect and use different set of information. Hence, by monitoring repayment and observing the trade discount, the supplier can quickly and better judge the credit quality of a firm.

In addition, suppliers are also efficient to liquidate firms' assets, if firms fail to meet their commitments (Petersen and Rajan 1997). This highlights that firms which receive trade credit might have a higher likelihood of obtaining access to bank credit. This may be because banks use the presence of trade credit as a signal of a firm's quality (Cook 1999). The study by Elliehausen and Wolken (1993) found evidence consistent with the financing theory of trade credit. Their investigation of data on US small firms from the National Survey of Small Business Finance revealed that firms with a high amount of short-term finance use more trade credit. The study found that trade credit is a complement rather than a substitute for short-term financial institution loans.

However, other studies such as Petersen and Rajan (1997) highlight that small firms, which do not have access to capital markets, increase their use of trade credit when

faced by limited or no availability of credit from financial institutions. A similar result is also reported by Schwartz (1974). Nilsen's (2002) investigation of US data from the Quarterly Financial Reports and Compustat database reveals that small firms increase the use of trade credit during tight monetary conditions. These conditions reduce bank loan which forces small firms, which face greater information problems and have restricted access to capital market, to increase the use of trade credit as an undesirable substitute for bank loan. Interestingly, the study found that large firms also increased the use of trade credit. The study further investigated this by using the bond rating as a measure of access to market, and found that large firms without bond rating but having high cash holdings and low collateral are also credit constraint. These firms do not have alternative options and, therefore, use costly trade credit<sup>28</sup>. Overall, the study results support the role of trade credit as a potential substitute for bank loan, especially in the case of small firms. Other studies such as Blasio's (2005) found similar results for the Italian manufacturing firms.

It is also argued in the literature that firms with access to the capital market use less trade credit (Nilsen 2002; Petersen and Rajan 1994). Further, accessibility to financial intermediaries' credit increases the probability that firms will offer more trade credit to customers (Petersen and Rajan 1997). In addition, non-financial firms/suppliers provide more trade credit to firms, should they generate greater cash flow (Biais and Gollier 1997). Jain (2001) shows that when banks cannot observe firms' revenue then they may find it desirable to lend indirectly, i.e., to lend to an agent with superior information about buyers in order to enhance the profit. Hence, suppliers act as intermediaries between banks and final customers.

Atanasova and Wilson (2003, 2004) provide evidence that firms substitute bank credit with trade credit during stringent monetary conditions. They argue that, during tight monetary conditions, banks reduce the supply of credit. This contraction in the supply of bank credit is more pronounced for the informationally opaque small and medium-

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<sup>28</sup> Trade credit is quite an expensive source of short-term finance, if discount offered is not utilized. For instance, trade credit payment is usually due in full in 30 days. However, it gives 2% discount if the payment is made in 10 days' time (Smith 1987). It has also been reported that implicit interest rate is 2% for 20 days. However, it is rarely enforced. The high implicit interest rate suggests that it is an expensive source of finance and would more like be taken in a situation in which firms had exhausted the credit limit of the financial institutions (Berger and Udell 1998).

sized firms. The demand for bank credit, however, remains strong during this period. To minimize the effect of bank credit rationing, the borrowing-constrained small firms increase the use of trade credit. In other words, their reliance on less desirable alternative source of finance ( i.e., trade credit) increases. The study concludes that, when monetary conditions are tight, small, bank-dependent firms substitute bank credit with trade credit.

Kohler, Britton and Yates (2000) argue that quoted firms help out the unquoted firms by extending more trade credit to them during recession and tight monetary periods. The study used data on the UK quoted firms extracted from the Datastream database over the period 1983 to 1996. The results show that, during recession, trade credit extended rises, while in the booms it falls. Similarly, the trade credit received falls during recession and rises during boom periods. As a result, the net trade received falls during recession. This suggests that quoted firms, which have better access to the capital market, extend more trade credit to firms, which do not have direct access to the capital market, during periods of recession.

The results further highlight that, following a monetary contraction, the quoted firms extend and receive less trade credit. The reduction in trade credit received is, however, more than trade credit extended. The study concludes that quoted firms extend credit to unquoted firms during recession and tight monetary conditions. In a similar vein, Calomiris, Himmelberg and Wachtel (1995) find that financially sound, high quality firms issue commercial papers during economic duress. These firms issue more commercial papers during downturns in order to finance the accounts receivable. The financially sound, high quality firms extend more trade credit during economic downturns to support the short-term financing needs of those firms which do not have access to public capital markets. Thus, these firms serve as intermediaries during downturns.

Wilson, Le and Wetherhill (2004) re-examine Meltzer's hypothesis by using UK data, extracted from a UK Credit Reference Agency database - ICC Juniper - over the period 1983-1999. By classifying firms into different financial positions on the basis of their size, the study highlights differences in the behaviour of various sized firms. The

results reveal that large firms extend more trade credit during periods of monetary contraction, but, at the same time, also receive more trade credit. This suggests that large firms may not be able to obtain the required amount of credit from the banks and other financial institutions and, therefore, need more trade credit. The trade credit extended is, however, more than trade credit received; as a consequence, the net trade credit extension increases during stringent monetary periods.

The results further highlight that medium-sized firms extend less trade credit and receive more trade credit during tight monetary periods. Further, small firms receive more trade credit during periods of monetary contraction. Interestingly, the results reveal that small firms also extend more trade credit during tight monetary conditions. The study further investigates this issue and finds that this behaviour is found in financially distressed firms. This may explain why small firms run out of cash and eventually fail. Overall, the results support Meltzer's hypothesis.

Similarly, the study by Mateut, Bougheas and Mizen (2006) provides evidence which suggests that trade credit serves as a substitute for bank loans during tight monetary period. By using data on 16000 UK manufacturing firms over the period 1990-1999, the results found that, during stringent monetary conditions, bank loan reduced relative to trade credit. The study also investigates the effect of tight monetary condition on various sized firms in different time periods. For this purpose, the study divides the sample period into tight (1990-1992) and loose (1993-1999) monetary conditions and classified sample firms into small, medium and large categories. The results reveal that bank lending to small firms reduced during the tight monetary period, while the use of trade credit increased. The banks' lending to medium and large firms was not much affected during the tight monetary period, rather, it increased to large firms during the period of monetary contraction. It might be due to the flight to quality effect induced by tight monetary conditions. The trade credit ratios of these firms also increased, however, but not as much as that of the small firms. The study concludes that the UK

small manufacturing firms resort to trade credit when monetary conditions are tight. In other words, small firms substitute bank loan with trade credit<sup>29</sup>.

The above-mentioned studies have examined the behaviour of trade credit during tight monetary policy. Love, Preve and Sarria-Allende (2007), however, examine the effect of financial crisis on the behaviour of trade credit and bank credit for a sample of 890 publically traded firms in six emerging economies, namely Indonesia, Korea, Malaysia, the Philippines, Mexico and Thailand. By using data from the Worldscope database, the results reveal a short surge in trade credit right after the crisis. However, this surge falls back in the post-crisis period. To indentify whether the result is driven by demand or supply factors, the study used reliance on short-term debt in the pre-crisis as indicator of firms' vulnerability to crisis. The results show that firms with high short-term debt prior to the crisis reduced the provision of trade credit to their customers during and after the crisis period, but increased their reliance on trade credit from their suppliers. Gao and Yun (2009) also report similar results.

The study by Love, Preve and Sarria-Allende (2007) also used cash stock and cash flow as indicator of firms' vulnerability to the crisis. The empirical results show that firms with high levels of cash stock and greater cash flow generating capacity extend more trade credit to their customers both during and after the crisis and receive less credit from their suppliers. The researchers interpret this result as consistent with the redistribution view, in which financially sound firms redistribute the bank credit via trade credit to financially weak firms during the crisis period.

The findings of some other studies, however, do not support the notion that small firms increase the use of trade credit as a substitute for bank credit during tight monetary conditions (see for example, Bernanke and Gertler 1995; Gertler and Gilchrist 1993). This might be due to the unfavourable terms of credit offered to firms as a substitute for a bank loan<sup>30</sup>. Similarly, Oliner and Rudebusch (1996, p. 302) found "*no evidence that small firms increase their use of trade credit during period of tight money...*". In

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<sup>29</sup> Using data on UK firms, Brechling and Lipsey (1963) results reveal that trade credit rises during periods of tight monetary conditions.

<sup>30</sup> See for example footnote 15 on p. 38-39 in Bernanke and Gertler (1995)

other words, small firms do not use trade credit as a substitute for bank credit. Supporting similar arguments, Marotta (1997) does not find conclusive evidence for Italian firms that trade credit act as substitutes for bank lending<sup>31</sup>.

In this regard, Taketa and Udell (2007) examine the behaviour of trade credit channels during the crisis in Japan. The study uses data on SMEs extracted from the Financial Statements Statistics of Corporations compiled by Japanese Ministry of Finance and the Short Term Economic Survey of Enterprises in Japan compiled by the Bank of Japan. The results reveal that trade credit and financial institutions' lending complement each other rather than act as substitutes. In addition, different shocks have different affects on lending channels. For instance, during the bubble period (positive shocks), short-term borrowing and trade credit work as substitutes for each other. However, during the crisis period, short-term borrowings and trade credit work as complementary to each other. The study highlights that different shocks (Positive: bubble period and Negative: credit crunch) have different effects on the behaviour of trade credit and financial institutions' lending. Overall, the results suggest that, during financial crisis or credit crunch, the trade credit and bank lending work as complementary to rather than substitutions for each other.

Similarly, Love and Zaidi (2010) examine the behaviour of trade credit and bank credit during the 1998 financial crisis. In other words, they investigate the behaviour of trade credit and bank credit in a sample of SMEs in four East Asian countries, namely Thailand, Korea, the Philippines and Indonesia. The results show that, on average, the use of trade credit declined following the financial shocks. However, this effect is more pronounced in a sample of firms which are financially constraint. The financial disturbance not only reduced the availability of trade credit but also reduced its maturity and increased its cost for the financially constraint firms. As a result, these firms also reduced the extension of trade credit to their customers, and reduced the maturity and increased the cost of trade credit. The results reveal that trade credit and bank credit move in the same direction. This suggests that the 1998 financial crisis

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<sup>31</sup> Likewise, Beck, Demirgüç-Kunt and Maksimovic's (2008) results suggest that trade credit "*does not compensate for lower access to bank financing of small firms*" (p. 467).

reduced the availability of both bank credit and trade credit, which is consistent with the view that bank credit and trade credit are complementary to rather than substitutes of each other (Taketa and Udell 2007).

Arslan and Goknur (2009) examine the behaviour of trade credit and report contrasting results. They find that at the low level of trade credit, there is a positive relationship between bank loan and trade credit. In other words, at the low level of trade credit, the supply of bank loan increases with the rise in trade credit. This highlights that bank credit and trade credit serve as complementary at a low level of trade credit. At a high level of trade credit, the results show a negative relationship between bank credit and trade credit, which suggests that banks become unwilling to extend the loan to firms when they have high trade credit ratio. Hence, it reveals that at a high level of trade credit, bank loan and trade credit work as a substitute for each other.

To summarize the above discussion, it seems that the behaviour of trade credit is mostly investigated during a tight monetary policy regime, while few studies have examined the behaviour of trade credit during the crisis period. In addition, the empirical evidences on the role of trade credit during the crisis period are mixed and inconclusive. This highlights a clear gap in the existing literature. It is also not obvious from the findings of the existing literature whether trade credit serves as a complement or substitute for bank credit during a crisis period. As a result, this is still an unresolved dilemma. In this regard, some authors (see for example, Love and Zaidi 2010) have called for more research on this issue in order to better understand the behaviour of trade credit during a crisis period.

## **2.6 Credit Crisis - Firms' Investment Decisions and Performance**

It is argued in the existing literature that private firms are more opaque and, as a result, adverse selection and moral hazard problems are likely to be high in these firms (Berger and Udell 1998; Brav 2009; Michaelas, Chittenden and Poutziouris 1999 a). Such problems may further worsen during periods of recession (Michaelas, Chittenden and Poutziouris 1999 b). Information asymmetry, which is one of the main factors that creates adverse selection and moral hazard problems, may explain why certain

borrowers are credit rationed (see for example, Stiglitz and Weiss 1981). According to Gertler and Gilchrist (1993) and Ehrmann (2000), credit market friction is an important factor which explains why some borrowers are more affected by tight monetary conditions than others. In this regard, Claessens, Djankov and Xu (2000) highlight that capital market imperfections are one of the main factors responsible for deteriorating corporate performance during the 1997 financial crisis period.

As discussed above, small firms face greater information problems; therefore, it is likely that these firms would be sensitive to the credit supply conditions. Information and idiosyncratic risk are also high in these firms. In addition, they have few external financing options (Gertler and Gilchrist 1994). As a result, when tight monetary policy reduces bank loan it has a greater affect on the growth and investment of small firms than on large firms (Bernanke, Gertler and Gilchrist 1996; Gertler and Gilchrist 1994). Moreover, both channels of tight monetary policy ( i.e., balance sheet channel and bank lending channel) suggest that effects of tight monetary policy would be more pronounced on firms with restricted access to the capital market (Bernanke, Gertler and Gilchrist 1996; Bernanke and Gertler 1995; Gertler and Gilchrist 1994). This suggests that small firms' investments are sensitive to tightening of monetary policy (Bernanke, Gertler and Gilchrist 1996; Black and Rosen 2008; Gertler and Gilchrist 1993, 1994; Kashyap, Lamont and Stein 1994; Kashyap and Stein 2000; Kashyap, Stein and Wilcox 1993).

Chen and Hsu (2005) present a simple risk premium model to describe the output decline following the Asian financial crisis in four shock-stricken countries, namely Korea, Indonesia, Malaysia and Thailand. The study highlights the variations in output decline across firm size and county. It reveals that firms which have access to capital markets are able to accumulate capital and maintain production. In contrast, firms which have restricted access to capital markets are essentially accumulating less or no capital and thus become small. Such firms also have low collateral, which increases their risk premium and contributes to their output decline during the credit crunch<sup>32</sup>.

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<sup>32</sup> In a related context, Cover (1992) argues that money-supply shocks have an asymmetric effect on output. He further reveals that positive money-supply shocks have no effect on output, while negative money-supply shocks have a negative and significant effect on output.

This highlights that output decline is greater in small firms than in large firms. Hence, their model suggests that, following Asian financial crisis, the output decline was greater in small firms than in large firms, and in those economies dominated by small firms rather than large firms.

Similarly, the study by Kashyap, Lamont and Stein (1994) investigates the inventory investment of firms during different recession periods. By using data on US manufacturing firms extracted from the Compustat database over the period 1974 to 1989, the results show differential investment behaviour of firms with and without bond rating. The findings reveal that firms without access to the bond market and having low cash holdings experienced a significant reduction in inventory compared to firms with access to the capital market. In other words, bank-dependent, low cash reserve firms significantly reduced inventory investment during tight monetary period compared to firms with access to the bond market. This might be because tight monetary conditions not only squeeze the supply of credit but also increase the cost of credit.

It is also argued that banks charge high rates from the bank-dependent borrowers during recession period. Santos and Winton (2008), for example, argue that, during recession, banks charge high rates from the bank-dependent borrowers than from firms which have access to the capital market. In other words, bank charge high rates from borrowers with limited external financing options. The study by Kashyap, Lamont and Stein (1994) concludes that tight monetary conditions affect the supply of bank loans which adversely affects corporate investment. Moreover, it has been argued that reduction in the supply of bank credit, caused by monetary tightening, has an adverse impact on the financing and investment of small firms more than on large firms (Bernanke, Gertler and Gilchrist 1996; Gertler and Gilchrist 1993, 1994).

In addition to the above, it has also been argued that, when banks experience shortage of capital, they reduced lending. In other words, when a financial shock hits the banking system, it has a pronounced effect on the lending of credit to small businesses (Berger and Udell 2002; Hancock and Wilcox 1998). The reduction in bank capital affects the lending of small banks more than large banks, which adversely affects the

activities of small firms as compared to large firms (Hancock and Wilcox 1998). Similarly, another study has reported that, when a financial crisis hits the banking system, it has a larger effect on the investment of small firms (Bruno 2009).

Rungsomboon (2005) examines the impact of the 1997 financial crisis on firms' investment in the Thailand. The study uses firm-level data on Thai public firms extracted from the I-SIMS database of the stock exchange of Thailand, and the Department of Internal Trade, Ministry of Commerce Thailand over the period 1992-2001. The results show that the financial crisis has adversely affected firms' investment. Further, the study divides the sample period into pre-crisis (1992-1996) and post-crisis (1997-2001), and firms on the basis of size, ability to access other sources of finance, and degree of reliance on bank finance. The results highlight that the effect of the financial crisis is different on small and large firms. Both sizes of firms, however, face liquidity constraints after the crisis. This is because the adverse shocks have weakened the credit worthiness of both types of firm, affected their ability to raise external funds, and, hence, affected their investment. However, the effect of the financial shock is more pronounced on the small firms than on large firms. This is because small firms face high information problems, having poor net worth and few financing options.

The results further highlight that investment of firms which have access to alternative sources of finance (i.e., bond market), are less affected by the financial crisis than firms without such access. In other words, the investments of non-bond-issuing firms are more affected than those of bond-issuing firms. Similarly, investments of firms which depend more on bank finance, are more adversely affected by the crisis compared to firms which are less dependent on banks for finance. The study concludes that the 1997 financial crisis had a pronounced effect on the investment of small firms, non-bond issuing firms, and firms which are more dependent on banks for finance. However, the notion of small firms used in the above-mentioned study is not the true representation of the vast majority of small unquoted firms. This is because the small quoted firms are quite large when compared with the unquoted small firms (Kashyap, Lamont and Stein 1994). Also, Michaelas, Chittenden and Poutziouris (1999 a, p. 113)

argue that “*most empirical studies on capital structure use data for firms that would be classified as large by any definition of business size*”.

Domaç and Ferri (1998), however, examine the effect of the East Asian financial shocks on real economic activities of SMEs in Korea. They argue that financial shocks have adversely affected the economic activities of Korean firms. The effect is, however, more pronounced on small and medium sized firms. Similar results are also reported by Kim, Lee and Park (2002), who find contractions in the credit market for SMEs while finding negligible evidence for larger firms during the Korean financial crisis. The results highlight that the credit crunch in Korea was the result of portfolio adjustments by the depository institutions to meet the new capital adequacy requirement. As a result, banks reduced lending to small firms, which adversely affected the activities of these firms. This is due to severe information and credibility problems these firms face during crisis periods.

Using similar arguments, Domaç, Ferri and Kang (1999) argue that SMEs are significantly affected in most of the East Asian countries. They further argue that lending to SMEs significantly reduced in most of the crisis-stricken countries, which disproportionately hurt the SMEs. Similarly, other studies such as Gregory, Harvie and Lee (2002) find that the Asian financial crisis has adversely affected the Korean SMEs in the manufacturing sector. The industrial production growth rate dropped significantly in 1998. The SMEs, however, quickly rebounded and recovered in 1999-2000. In addition, the financial crisis has also affected the growth in exports, but decline in growth is more pronounced in large enterprises than in SMEs.

Ozar, Ozertan and Irfanoglu (2008) investigate whether the 2001 financial crisis affected the growth of micro and small enterprise in Turkey. The study uses data on urban micro and small enterprise extracted from the national field survey conducted in 2001. The results show that the financial crisis in Turkey has significantly disturbed the growth of the micro and small enterprises. The findings highlight that the manufacturing sector, which had fared better than the trade and service sector before the crisis, was severely affected during the crisis period. Further, the impact of the crisis was not symmetrical; rather the crisis affected those micro and small enterprises

which were located in clusters and industrial estates as well as those located in the less developed provinces. The study concludes that, on average, the 2001 financial crisis had a negative impact on the performance of Turkish micro and small enterprises.

Sato (2000) investigates how financial crisis affected the performance of SMEs in metal-working and machinery industry of Java in Indonesia. The study collected data through a survey which was conducted at the end of 1997 and in early 1999 in four selected locations of Java, namely East Jakarta, West Java, East Java and Central Java. The study found that 65% of SMEs in metal-working industry sector were negatively affected while 35% enjoyed positive growth, or at least kept their production level unchanged. The study by Tambunan (2000) shows that export-oriented small enterprises performed better during the 1997 financial crisis. One of the reasons the study highlights is that these firm do not rely heavily on credit from the financial institutions. Using similar arguments, Wengel and Rodriguez (2006) find that SMEs performed better during the Asian crisis than do large firms.

Berry, Rodriguez and Sandee (2001, 2002) argue that, although many small firms in Indonesia are hit hard, they are better able to respond to the crisis than large firms. The study highlights that one advantage of small firms is their flexibility, which makes them better able to deal with volatile macroeconomic conditions than large firms; another advantage is small firms' lower dependency on formal markets and funds'. Other studies such as Sandee (2002) cited in (Ozar, Ozertan and Irfanoglu 2008) find mixed results on SMEs' resilience. By comparing the performance of small scale industry before and after the crisis in Indonesia, the study finds that some SMEs were negatively affected by the crisis while others fared well. Similarly, the study by Wiboonchutikula (2002) highlights that micro and small firms grow fast during periods of slow industrial growth.

To summarize the above discussion, it seems to suggest that the effect of credit contraction on firms' investment behaviour is a matter of debate. The findings of existing published studies are not unequivocal, which suggests that the issue needs to be further investigated. Furthermore, the said issue has never been thoroughly investigated in the UK market from the perspective of the private firms, which further

signifies that research on the investment behaviour of private firms will add new insights. In addition, there is limited or no evidence in the existing literature on the performance of private firms during the crisis period, which strengthens the need for further research on this issue.

## **2.7 Financial Crisis and the Financial Policies of Public Listed Firms**

It is generally argued that empirical research has largely concentrated on large public firms. One of the reasons for this may be that information about listed firms is easily available, as it is obligatory to report the accounting and financial information for these firms. That is why they are informationally not as much opaque as small firms. In addition, these firms have several options to raise funds. For instance, large public firms can access the public market (Berger and Udell 1998) and the commercial paper market (Blinder and Stiglitz 1983; Gertler and Gilchrist 1993). Therefore, one may predict that large publically traded firms would be relatively better off during an economic downturn (Bernanke, Gertler and Gilchrist 1996).

It is also reported in the literature that the financing mix of large firms is not sensitive to variations in the supply of bank credit. Gertler and Gilchrist (1993), for example, observe that tight monetary policy has not significantly affected the flow of bank credit to large firms, highlighting that this flow has rather increased. The study also finds a similar pattern for non-bank debt. Other studies, such as Oliner and Rudebusch (1995), report similar findings. Their results confirm that proportion of debt (both bank and non-bank debt) in the capital structure of larger firms expanded during monetary contraction periods. The study also observed a similar pattern for trade credit.

Similarly, the study by Mateut, Bougheas and Mizen (2006) found that bank loans to small firms decreased while the flow to large firms increased during tight monetary periods. In other words, banks' lending to large firms is not much affected following stringent monetary policy. Previous studies of monetary policy have also provided evidence which suggest that, during tight monetary conditions, banks reallocate the supply of loan from small firms to large firms (see for example, Bernanke, Gertler and Gilchrist 1996; Black and Rosen 2008; Gertler and Gilchrist 1993, 1994; Oliner and

Rudebusch 1995; Oliner and Rudebusch 1996). In the context of the recent financial crisis (2007-2009), Iyer et al. (2010) highlight that it did not significantly disturb the credit flow to large firms in Portugal.

To summarize the findings of the above-mentioned studies, it seems to suggest that credit contractions do not have a significant impact on the financing mix of large firms. This may be because large firms usually have long track records and greater diversification. In addition, because of the economies of scale in generating and reporting information, they have lower agency cost of external finance (Bernanke, Gertler and Gilchrist 1996). The problem of information asymmetry and idiosyncratic risk are also likely to be low in these firms (Gertler and Gilchrist 1993). In addition, these firms can raise funds from a number of external sources of finance. For instance, they could obtain loan through public debt, equity, or commercial paper (Gertler and Gilchrist 1993, 1994; Holmstrom and Tirole 1997), or even reallocate their loan demand within the banking system (Bruno 2009). These points suggest that large quoted firms are relatively safe firms. It is reported in the literature that banks only consider safer loan options during tight credit conditions (for example, Lang and Nakamura 1995).

It is, however, also argued in the existing literature that firms' financing decisions are sensitive to the macroeconomic conditions. Korajczyk and Levy (2003), for example, examine the role of macroeconomic conditions in firms' financing choices. The study uses data extracted from the Compustat database over the period 1984-1998, and classified sample firms into financially constraint and unconstraint in order to investigate the effect of macroeconomic conditions on financing choice of these groups. By modelling the firms' target capital structure as a function of macroeconomic conditions and firm-specific variables, the results show that the leverage ratios of each group behave differently. The findings reveal that leverage ratio of financially unconstraint firms varies counter-cyclically with macroeconomic conditions while the leverage ratio of financially constraint firms varies pro-cyclically

with macroeconomic conditions<sup>33</sup>. This point is also supported in the existing literature (see for example, Kiyotaki and Moore 1997) which suggests that pro-cyclical collateral value leads to pro-cyclical movement in leverage for the relatively constraint firms.

The study also examines the issue choice of the sample firms. The results highlight that both marginal cost of equity issue and distance from the target leverage are important factors that firms consider. Further, the findings suggest that the decision to issue equity depends on the macroeconomic conditions for the unconstraint firms. This indicates their ability to adjust their issue choice according to favourable macroeconomic conditions, i.e., timing their issue choice to a period when assets' prices are favourable. In other words, the equity issue of the unconstraint firm varies pro-cyclically. The constraint firms, however, do not follow such behaviour. The study concludes that macroeconomic conditions play a significant role in the issue choice of unconstraint firm but plays a less significant role for the constraint firms.

Similarly, the study by Levy and Hennessy (2007) shows that the leverage ratio of less financially constraint firms varies counter-cyclically during contraction periods. The study presents a general equilibrium model to explain the financing pattern of firms over the business cycle. By using data from the Compustat database over the period 1974 to 1997, the results show that financially constraint and unconstraint firms exhibit distinct financing patterns over the business cycle. The findings further highlight that, during a contraction period, managers' wealth reduces relative to that of outside shareholders. This leads to increased agency problems and increases the amount of leverage in order to realign the managers' interest with that of outside shareholders. It also leads to counter-cyclical leverage for those firms that are less financially constraint. In other words, the leverage ratio of less constraint firms varies counter-cyclically, i.e., outstanding debt varies counter-cyclically and equity varies pro-cyclically during recession periods. In comparison, the outstanding debt and equity vary pro-cyclically for tighter financially constraint firms.

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<sup>33</sup> Baum, Stephan and Talavera ( 2009) find that macroeconomic and idiosyncratic uncertainty affects firms' leverage ratio. Their investigation of Quarterly Compustat data on non-financial US firms over the period 1993-2003 reveals a negative relationship between macroeconomic and idiosyncratic uncertainty, and optimal level of debt in the firms' capital structure.

Borensztein and Lee (2002) investigate credit crunch in Korea and its impact on listed firms. They classified sample firms into two groups: the first group consisted of firms which had an affiliation with large business groups (chaebols), and other group consisted of firms which did not have any group affiliations (non chaebols). Using firm-level data from the database constructed by the Korean Listed Companies Association, the results reveal striking differences in the magnitude of credit contractions across different types of borrowers. The findings show that following crisis, chaebols firms lost their incentives of easy accessibility to credit, which appeared to have been reallocated in favour of more efficient and profitable firms. In other words, during the credit crunch, the credit has been reallocated from inefficient firms to more efficient ones. This point has also been echoed in the work of Koo and Shin (2004), who argue that, following liberalization, chaebols firms lost their preferential access to finance. Small, non chaebol and established firms were more constraint before liberalization gained more from the liberalization.

The study by Borensztein and Lee (2002) further highlights that allocation of credit also has significant impact on output. For instance, firms which face restricted access to credit adjust their deficiency partly by reducing production. In comparison, high performing firms which find increased access to credit expand their production. In a similar context, Lim (2003) finds that large firms experienced reduction of loan from financial institutions following the financial crisis. The results reveal that small, profitable firms have better access to financial institutions' credit after a crisis. In other words, the results reveal that there is reallocation of credit away from large firms to small ones.

Other studies, such as Lemmon and Roberts (2010), demonstrate that large public firms are vulnerable to the credit supply shocks. They examine shocks to the supply of credit and the subsequent effect on firms' financial and investment decisions. The study takes the failure of Drexel Burnham Lambert Inc., the passage of the Financial Institution Reform, Recovery and Enforcement Act of 1989, and regulatory changes in the US insurance industry as exogenous shocks to the supply of below investment credit after 1989. By using data from the Compustat database over the period 1986 to 1993, the results find significant impact of the credit supply shocks on the financing

and investment decisions of below investment grade firms. Further, the study classified the sample period into pre- and post-supply shocks. The results of analysis reveal that total security issuance (net debt plus net equity) significantly reduced relative to the pre-shock level. This indicates that aggregate external financing activities were squeezed for below investment grade firms in response to the credit supply shocks.

Furthermore, the results reveal that reduction in the supply of credit is almost entirely concentrated in the net long-term debt issuance category, which highlights that there is lack of substitution towards other forms of debt. This is because long-term debt encompasses all other forms of debts with maturity longer than one year (such as bank debt, public debt, and private debt). In addition, the study finds little evidence of substitution towards alternative sources of finance (such as short-term debt, external equity, internal finance, trade credit, and change in dividend). Although the supply contractions affected the financing activities of below investment grade firms, their effect on the leverage ratio was negligible. This is because, firstly, both book and market value of equity significantly declined after the credit supply shock in 1989. Secondly, the contemporaneous decline in debt issuance and investment limits the asset growth.

In a related context, Lin and Paravisini (2010 a) examine whether and how credit shocks affect the firms' financial and investment policies. They take the bankruptcy of the WorldCom in 2002 as a natural experiment, to investigate whether supply of credit from its lenders is affected. In other words, whether the WorldCom events have a heterogeneous effect on the US banks' supply of credit and, consequently, to investigate whether it has a heterogeneous effect on firms' external cost of debt financing. The study uses data from several sources, such as DealScan, Call Reports, and CRSP. The empirical results find that banks which participated in the syndicate loan to the WorldCom reduced the supply of credit. To state this differently, banks

which were exposed to the WorldCom events reduced lending more than unexposed banks to the same firms they lent to before the post crisis period<sup>34</sup>.

Furthermore, the study uses absence of commercial paper rating as a proxy for bank dependency and reports that the WorldCom events have a significant impact on the bank-dependent firms. The empirical results further reveal that, among the bank-dependent firms, those whose main lenders were more exposed to the WorldCom events have faced high costs of raising new debt financing. Firms that substituted towards non-exposed banks faced high interest rates possibly due to the adverse selection problem. Similar findings are also reported by Lin and Paravisini (2010 b). However, Lin and Paravisini (2010 a) do not find that credit shortage has significant impact on firms' debt to assets ratio.

Massa, Yasuda and Zhang (2009) examine the effect of credit supply uncertainty of the bond investor base on firms' financing decisions. In other words, how credit supply uncertainty (or withdraw risk) of the institutional investors in the bond market affects firms' capital structure decisions. The study measured credit supply uncertainty by turnover rate of each bond issuer investor base. The reason behind the use of bond turnover as a measure of credit supply uncertainty is that high turnover of firm investors' base would expose firms to the risk of refinancing, i.e., make it difficult for firms to roll over the maturing portion of debt due to the credit supply uncertainty. The study collected data from various sources over the period 1998-2005. The main source of data collection was, however, eMaxx fixed income database by Lipper. The results highlight that credit supply uncertainty has an adverse impact on firms' leverage ratio (both book and market leverage). The increase in the credit supply uncertainty reduced the likelihood of issuing bonds in the firms' marginal financing decisions.

The study also used payout ratio as a measure of financial constraint and re-classified sample firms into constraint and unconstraint groups to examine their responses to the credit supply uncertainty. The findings reveal that the negative effect of the bond

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<sup>34</sup> In a similar vein, Khwaja and Mian (2008) find that banks which are more exposed to liquidity shock, caused by an unanticipated nuclear test by Pakistan, reduced lending more than less exposed banks to same firms. Similarly, using data on Portugal banks, Iyer et al. (2010) find that banks which were exposed more to interbank finance reduced their lending during the 2007-2009 crisis.

turnover on firms' bond issuing decision is concentrated among the financially constraint firms (measured as firms with low payout ratio). This highlights that, the more a firm is financially constraint, the less it considers bond issuance in its financing decisions. In other words, these firms would be less willing to take the refinancing risk, which implies that these firms would be more likely to substitute towards other instruments to avoid the risk of refinancing. Overall, the results suggest that firms' financing decisions are sensitive to the credit supply uncertainty.

Similarly, other studies, such as Massa and Zhang (2010), have found that lack of substitution between bond and bank financing affects the firms' leverage. In other words, the studies show how the lack of substitution or relative availability of bond and bank finance 'debt inflexibility' in the local market affect the flexibility of firms' financing decisions. By extracting data from the Lipper's eMaxx fixed income database over the period 1991-2005 for the US non-financial firms, the results show that firms are more likely to borrow locally. There is a strong local bias, i.e., suppliers of capital would rather lend locally. The higher debt inflexibility in the local market, however, affects firms' leverage. The lack of substitution in the debt market (between bond and bank financing) reduces the likelihood of issuing bond and induces the firms to issue equity. The positive relationship between the degree of debt inflexibility and the equity issue decision confirms that high debt inflexibility increases the likelihood of issuing equity. This implies that high debt inflexibility reduces the firm leverage. Massa and Zhang (2010) conclude that "*the relative availability of bond and bank financing affects the firm's ability to borrow and to use its leverage to buffer shocks.*"

Becker and Ivashina (2010) examine the effect of bank loan supply on the composition of external finance, to identify the bank loan supply shift. The intuition behind studying the composition of external finance is that, if bank loan supply squeezes, firms would substitute it with bond financing. They use data on the US firms issuing new debt between 1990 and 2009, extracted from the Reuters' DealScan database and Thomson one Banker database; and use four different variables ( i.e., i) tightening of lending standards based on loan officer opinion survey ii) ratio of non-performing loan to equity ratio for large banks iii) bank stock price index iv) measure of monetary policy shock) to proxy for relative availability of bank credit. The aggregate level

analysis reveals pro-cyclicality in aggregate total credit growth. However, aggregate data masks important compositional changes in firms raising new debt. Therefore, the study also conducted a firms' level analysis.

The firms' level analysis reveals a shift in firms' external financing composition. The study finds strong evidence that firms substitute towards external bond debt at times when the credit standard are tight; banks have a high ratio of non-performing loan to equity, low bank share and tight monetary conditions. This suggests that, when bank loan squeezes or banks are not willing to lend credit, firms substitute towards bond debt. Consistent with bank loan supply frictions, the effect is stronger among firms with high leverage and for speculative grade firms. The results further suggest that the effect of bank loan supply shock would be large on small and unrated firms for which the accessibility to bond market is not an option. The study concludes that shocks to the supply of bank credit affect the external financing mix of firms. Similarly, the study by Voutsinas and Werner (2011) shows that capital structure of firms is sensitive to variations in the supply of credit. The above-mentioned studies reveal that financing decisions of firms is sensitive to variations in the supply of credit. It is, however, not clear from the findings of the existing studies which components of capital structure are more sensitive to credit supply conditions than others, which highlights the need for more research on the issue.

There are other studies which argue that firms' substitute alternative sources of finance if they face credit constraint (Becker and Ivashina 2010; Leary 2009; Lin and Paravisini 2010 a; Massa, Yasuda and Zhang 2009; Massa and Zhang 2010). The availability of alternative sources of finance is likely to alleviate the credit constraint often associated with credit supply shocks (Bae, Kang and Lim 2002; Becker and Ivashina 2010; Kashyap, Lamont and Stein 1994; Leary 2009; Massa, Yasuda and Zhang 2009). These alternative sources of finance may consist of internal finance, debt (both bank and bond), trade credit and equity finance.

Survey evidence (for example, Graham and Harvey 2001) suggests that practitioners view 'Financial Flexibility' as an important factor in deciding what sources of finance to use. One of the ways to maintain financial flexibility is to use internal finance. The

importance of internal finance can be seen from the fact that “*Most of the aggregate gross investment by US non-financial corporations has been financed from internal cash flow (depreciation and retained earnings)*” (Myers 2001, p. 82). Similarly, most of the previously published studies on capital structure have shown that internal finance (e.g., cash flow) is an important determinant of firms’ financing decision (see for example, Frank and Goyal 2003; Jordan, Lowe and Taylor 1998; Ozkan 2001; Panno 2003). All these points suggest that firms would tend to rely more on internal finance, should they face restricted access to credit.

The other alternative source of finance is bond finance. It is reported in the existing literature that large firms substitute bond finance when relative availability of bank finance is squeezed. Becker and Ivashina’s (2010) firms’ level analysis provides evidence that firms rely more on bond finance when they face restricted access to bank finance. This suggests that large firms can immunize themselves from the negative shocks to the supply of bank credit by resorting to bond finance. In addition, the study split the sample on the basis of leverage and credit rating to examine whether the effect of bank loan supply varies across firms. The empirical results reveal that the effect of bank loan supply is pronounced on high leveraged and speculative grade firms. The results suggest that firms substitute to bond finance in response of negative shocks to the supply of bank credit<sup>35</sup>.

Massa, Yasuda and Zhang (2009) argue that high credit supply uncertainty of the bond investor base affects the firms’ financing decisions. They observe that high credit supply uncertainty in the bond market increases the probability of issuing equity and bank debt. This suggests that, the more a firm faces credit supply uncertainty, the more likely it will issue equity. Likewise, firms substitute to bank finance, if they face high credit supply uncertainty. The substitution of bond into bank finance occurs in firms with non-existent bank relationships. There is no substitution towards bank finance in firms which have exclusive bank relationships. This might be because these firms have attained or are close to their maximum credit limit and, as a result, have little or no room to enhance bank borrowing.

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<sup>35</sup> In a related work, Calomiris, Himmelberg and Wachtel (1995) show that financially sound high quality firms issue more commercial paper during an economic downturn.

In addition, the study finds that the effect of uncertainty in the bond market is concentrated in firms whose investor base is vulnerable to the credit supply imbalance (measured by geographical concentration, herding propensity, and local bond preference). This suggests that the credit supply uncertainty has a significant impact on the capital structure of firms which have access to the public bond market. The study concludes that firms substitute to bank finance and equity issues if the credit supply uncertainty of the bond investors' base is high.

Similarly, the study by Massa and Zhang (2010) shows that lack of substitution or relative availability of bond and bank finance 'debt inflexibility' in the local market affects the flexibility of firms' financing decisions. The lack of substitution in the debt market (between bond and bank finance) reduces the possibility of issuing debt and increases the possibility of equity issue. In other words, the higher debt inflexibility, the more likely firms will issue equity. In addition, "*debt inflexibility reduces dividend payment and the probability of paying cash in M & As*" (p. 27). The results suggest that firms substitute to equity issue when there is a lack of alternatives (between bank and bond finance) in the market.

Lin and Paravisini (2010 a) highlight that firms increase the use of equity financing following negative shocks to the supply of bank credit. In other words, firms facing credit constraint switch to equity financing. Generally, an increase in equity issue indicates that firms would experience a decline in leverage. To examine the effect of credit contractions on firms' leverage, the study takes debt to asset ratio as a dependent variable and finds that credit supply shocks did not significantly affect firms' debt to asset ratios. The results further highlight that cash hoardings of firms increased immediately after the credit supply shocks, i.e., cash to assets ratio increased after the credit shortage.

The findings further reveal that the effect on cash hoarding remains positive and significant in the long-term (i.e., two years after the shock). The increase in cash holdings after the credit contractions is consistent with the precautionary saving motive. In other words, firms hold cash for precautionary saving purposes. The results suggest that the stable debt and increase in cash balance reduced the firms' net leverage

(measured as debt minus cash). In addition, the net equity issuance and change in cash balance over two years are of the same magnitude, suggesting that increase in cash balance is financed through equity issuance and reduction in the payout. Lin and Paravisini's (2010 a) study concludes that, following negative shocks to bank credit, firms are more likely to change to equity finance and hold more cash.

There are, however, other empirical studies which do not support the notion that firms would resort to alternative sources of finance when supply of credit is squeezed. Lemmon and Roberts (2010), for example, investigate how exogenous shocks to the supply of below investment credit after 1989 affect the firms' financing decisions. The results find that shocks to supply of credit affect the long-term debt issuance activities of below investment grade firms. The results, however, find the lack of substitution towards other forms of debt (such as bank debt, public debt and private debt). The study also observes limited evidence of substitution towards alternative sources of finance (such as short-term debt, external equity, internal finance, trade credit and change in dividend) following negative shocks to the supply of credit. This suggests that these firms are not dipping into cash reserve, equity issue, or trade credit, nor scaling back shareholding distribution. Likewise, there is evidence which suggests that firms which have access to public debt market are less likely to use alternative sources of finance following the credit crunch (Leary 2009)<sup>36</sup>.

To summarize all the above discussion, it seems to suggest that the majority of the above-mentioned studies do not point toward a unanimous conclusion, which highlights the need for more research in this area. In addition, most of the studies have used the US market data while little or no evidence exists regarding the UK market. The differences in accounting regulations and reporting requirements, corporate governance, tax codes and insolvency procedure (Akbar, Shah and Stark 2011; Beattie, Goodacre and Thomson 2006; Dahya and Travlos 2000; Franks and Torous 1992) between the US and the UK further strengthen the need for more research on this issue. Also, it is not clear from the findings of the existing studies which components of the financing mix are sensitive to variations in the supply of credit. This shows a clear gap

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<sup>36</sup> However, Leary (2009) also reports that large firms substitute from private debt to public debt following contractions in the supply of credit.

in the existing literature and suggests that more research is needed on the issue to better understand it.

Similarly, the role of alternative sources of finance is not clear. It is not evident from the previous published literature that which sources of finance are sensitive to the credit supply shock. The lack of consensus and mixed evidences reported in published studies suggest that this issue needs to be further investigated. In addition, most of the above-mentioned studies have focused on the US market. As explained in the above paragraph, that there are important institutional differences between the US and the UK, which further justify the need for more research in this area.

## **2.8 The Financial Crisis – Investment and Performance Decisions of Public Firms**

The capital market imperfection which creates information asymmetry, moral hazard, and adverse selection problems may explain why certain firms are relatively more credit rationed (see for example, Stiglitz and Weiss 1981). In this regard, Claessens, Djankov and Xu (2000) highlight that information asymmetry and financial market imperfections are important factors that may explain deteriorating corporate performance during the 1997 financial crisis. The results reveal that high leverage and high short-term debt also contribute to firms' deteriorating performance during the post-crisis period. In other words, firms with high leverage and high short-term debt in their financial structure perform more poorly than those with low leverage and low short-term debt in their capital structure. In addition, the results suggest that firms' characteristics (both financial and non-financial) are significant factors that explain corporate poor performance during the post-crisis period.

Suto (2003) investigates the capital structure and investment behaviour of listed Malaysian firms before and after the 1997 financial crisis. By using data on public listed firms extracted from the PRIMARK company analysis and Kuala Lumpur Stock Exchange Annual Companies handbook over the period 1995-1999, the results show that leverage has a positive impact on firms' investment before the crisis. This highlights that high leveraged firms have more investment before the financial crisis.

However, after the financial crisis, this relationship becomes negative. The leverage then has a negative impact on investment during the crisis period. Firms which have a high debt ratio before the crisis suffer more than firms which have a low debt ratio during the period of financial turmoil. Similarly, as explained in Kim and Stone (1999), credit flow to high leveraged firms sharply cut-off following the East Asian crises. To stay afloat, these firms reduced investment, sold capital stock at discount and thus contributed to the aggregate output contractions. It has also been reported in the literature that financial crisis has a more negative impact on the performance of high leveraged firms than it does on low leveraged firms (Günay 2002).

Hong, Lee and Lee (2007) highlight that Korean firms experienced a reduction in investment following the 1997 financial crisis in Korea<sup>37</sup>. They examine the investment behaviour of chaebol and non-chaebol firms both before and after the financial crisis. By using data on the listed firms over the period 1994-2001, extracted from the Korea Listed Companies Association, the study found that, before the crisis, chaebol affiliated firms, especially those with weaker corporate ownership structure, had higher investment than non-chaebol firms. The majority of their investments were financed by using debt. However, when the availability of credit was squeezed after the crisis, the investment of chaebol affiliated firms also declined. In other words, the difference in investment between the chaebol and non-chaebol affiliated firms disappeared.

The study further reveals that significant financial and corporate restructuring took place after the financial crisis. As a result, the chaebol affiliated firms decreased their borrowing and investment in order to reduce their default risk. The empirical analysis also shows that reduction in investment is more pronounced among those chaebol affiliated firms which have a high debt ratio before the 1997 financial crisis. Similarly, the study by Kim and Lee (2003) examines the performance of Korean listed firms during the crisis period. Their univariate regression analysis shows that, during the crisis period, among chaebol affiliated firms, those with high leverage ratio experienced significantly lower stock return than those firms with low leverage ratio.

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<sup>37</sup> Similarly, another study argues that high gearing ratio (debt to equity ratio) at the onset of the crisis has an adverse effect on firms' investment (Davis and Stone 2004).

Jeon and Miller (2004) examine the effect of the Asian financial crisis on the performance of Korean nationwide banks, and document that the Asian financial crisis has had a significant effect on these banks. The study focuses on the performance of Korean banks both before and after the financial turmoil. Using data on all nationwide Korean banks which operate in any year from 1991 to 1999, the results find that performance (measured by Return on Assets and Return on Equity) of Korean nationwide banks received a big setback in 1998. The Asian crisis has adversely affected the performance of the Korean nationwide bank particularly in 1998<sup>38</sup>.

The study by Bae, Kang and Lim (2002) examines how exogenous shocks to the Korean banks affect the client firms' value. In other words, how bad news about the Korean banks (which includes bankruptcy of client firm, credit downgrading of a bank, and deterioration of the bank for international settlements ratio) affects their client firms' value. Using event-study methodology, the results find that exogenous shocks to banks' financial health during the 1997-1998 periods not only affected their own value but also negatively affected the client firms' market value. The results further reveal that the effect of adverse shocks to bank lending and firms' value is a decreasing function of the financial soundness of both banks and firms. For example, the adverse shock has less effect on the lending of banks, if a bank is financially healthy, and vice versa. Similarly, reduction in bank lending has less effect on firms' value, if a firm has sufficient liquid assets and has access to alternative sources of finance.

The results suggest that firms suffer more during the crisis when their main bank has a weaker financial position. In addition, firms that depend more on banks for financing would suffer more, if their main bank was experiencing difficulties. However, firms which have alternative sources of finance, sufficient liquidity, and low leverage ratios suffer less during the crisis period. The study concludes that adverse shocks to banks are more costly for the firms. Similarly, there are other studies which argue that banks' failure/closure has adverse effect on firms' value (see for example, Djankov, Jindra and Klapper 2005; Slovin, Sushka and Polonchek 1993).

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<sup>38</sup> However, they argue that most of these banks showed positive signs of recovery in 1999.

In a related context, Peek and Rosengren (1997, 2000) examine the loan supply shocks and their effect on real economic activity. They take the Japanese banking crisis as a natural experiment to examine its effect on the real activities in the US. The results reveal that equity and land prices declined in Japan, which significantly affected the lending activities of Japanese banks in the US. This reduction in lending activities adversely affected the construction activities in some US commercial and real estate markets where there the Japanese banks had a significant presence. The study concludes that loan supply shock has a significant effect on the real economic activities<sup>39</sup>. However, there are other studies which argue that bank loan supply and stringent monetary policy has no significant effect on the output. Driscoll (2004), for example, does not provide evidence in this regard. Using state level data on US firms, his study did not find that bank loan supply has a significant effect on the output of firms. Other studies, such as Ashcraft (2006), do not find evidence that monetary contraction has an effect on the firms' output.

Similarly, the study by Ongena, Smith and Michalsen (2003) did not find evidence that announcement of bank distress had a significant effect on firms' performance. The study investigates the impact of bank distress announcement on the stock return of public listed borrowers during the Norwegian banking crisis of 1988-1991. The findings reveal that announcement of bank distress has smaller/lesser impact on the stock return of those borrowers which have a relationship with the distressed banks. During the Norwegian crisis, banks experienced significant decline in their equity value. Their borrowers, however, experienced little and temporary stock return decline during the event period. The results suggest that bank distress announcement has little aggregate impact. In other words, the results suggest that bank distress does not significantly interrupt the financing and investment behaviour of public listed borrowers.

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<sup>39</sup> The study by Akiyoshi and Kobayashi (2010), find that decline in bank capital to asset ratio has adversely affected the productivity of borrowers in Japan. To state this differently, deterioration in the financial health of banks affected the productivity of borrowers during the severe financial crisis (1997-1998) in Japan. The results further reveal that the effect of bank distress is more pronounced for bank-dependent firms than for firms with less dependence on bank loans. The study also highlights that deterioration of bank health has a significant impact on firms, whose access to capital market is constrained.

Recently, Chava and Purnanandam (2011) investigated the exogenous adverse capital shocks to the US banking system and their impact on the bank-dependent borrowers. More specifically, the study examines the short-run impact of the Russian crisis of autumn 1998 on banks' capital, and its subsequent effect on firms' performance. By using data from the Compustat database and CRSP tapes, the results show that crisis-stricken banks reduced lending and increased interest rates more than the unaffected banks during crisis. As a result, firms which were primarily dependent on bank finance (measured by the absence of public debt rating), were more affected than firms which had access to public debt market.

Similarly, it has been argued that banks which suffered large loan losses during the crisis period reduced their lending. Santos (2011), for example, provides evidence in support of this argument. The study uses data from several sources such as the Loan Pricing Corporation's DealScan database; the Securities Data Corporation's Domestic New Bond Issuances database; the Centre for Research on Securities' Prices stock prices database; the Saomon Brothers' bond yields indices; Compustat; and from the Federal Reserve's Bank Call Reports. The results find that banks which experienced large loan losses as a consequence of the subprime crisis passed on a part of these losses to their borrowers in the form of increased spread on their loan, even if the bank lent to the same borrowers to whom they had previously lent. The results further highlight that banks charged high interest rates on loans to bank-dependent borrowers than to firms which had access to the bond market<sup>40</sup>. Other studies such as, Santos and Winton (2008), Steffen and Wahrenburg (2008) and Hale and Santos (2010), have also reported similar findings. The reason may be because these firms face high market frictions and are generally considered risky.

The study by Chava and Purnanandam (2011) further reveals that, following supply shocks, bank-dependent firms experience lower equity return than public firms, which have access to public debt market. The bank-dependent firms also reduce capital expenditure, and experience a more significant drop in sales growth and operating

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<sup>40</sup> This is consistent with the findings of existing studies which argue that banks exploit their information monopoly by charging high interest rates to the informationally opaque firms (see for example, Hale and Santos 2010; Rajan 1992; Santos and Winton 2008, for details).

profit than firms which have access to the public debt market. In addition, the empirical results highlight heterogeneity among the bank-dependent borrowers. The firms whose main bank was more exposed to the Russian crisis suffered a larger decline in valuation than firms whose main bank was not exposed to the crisis. The study concludes that the credit supply shocks have adversely affected the performance and investment of the bank-dependent borrowers.

Similarly, other studies such as Tong and Wei (2008) provide evidence that the subprime crisis has a significant adverse effect on performance of US firms. They examine the effect of the subprime crisis on US firms' stock price performance. By classifying firms into different categories based on their ex-ante degree of liquidity constraint, the results find that the subprime crisis has a pronounced effect on the financially constraint firms. In other words, stock prices of the financially constraint firms dropped following the subprime mortgage crisis. This implies that financial constraint is the key factor which helps in explaining the effect of the crisis on firms' performance. In addition, the results highlight that firms which depend more on external finance for operations also experienced pronounced declines in their stock prices following the subprime crisis. The results suggest that the subprime crisis has a pronounced effect on those firms that are ex-ante financially constraint and are more dependent on external finance. Hence, the study documents that the subprime crisis has a negative effect on the real economy.

Evidence from the macro level research also shows that those industries which depend on external finance are more affected during the contraction phase of the business cycle. Braun and Larrain (2005), for example, investigate whether the growth rate of industries which rely heavily on external finance varies with the economic business cycles. They focus on short-run variations in production and how it is exacerbated by the financial fractions. By using a dataset that contains yearly production observations for 28 manufacturing industries over 100 countries for the period 1963-1999, they find that industries which rely heavily on external finance are severely affected during recession. The effect is pronounced in industries which also face high financial fractions. In addition, their findings reveal that highly externally dependent industries with poor accounting standards, few tangible assets, low creditor protection rights, and

weak financial contractibility experienced significant drop in growth during recession than industries without such characteristics. They conclude that recession has a large effect on industries which are more dependent on external finance.

Ariccia, Detragiache and Rajan (2008) investigate whether sectors that depend more on external finance perform poorly during a banking crisis. Using panel data from 41 countries over the period 1980-2000, the results find that industrial sectors which depend more on external finance perform poorly during banking crises. The effects of a banking crisis on capital formation, employment growth, and growth in the number of establishments are more pronounced in sectors dependent on external finance than in sectors less dependent on external finance. The authors interpret this as the real cost of the banking crisis. This effect would be larger in countries with poor accounting standards and in those industries which rely heavily on intangible assets. The results reveal that differential effect across sectors is stronger in developing countries; in countries with less foreign capital access; and in countries where the crisis is more severe. This may be because the bond and equity markets in these countries are not much developed and alternative sources of finance are relatively limited.

The study by Kroszner, Laeven and Klingebie (2007) investigates the banking crisis and its impact on the real activities. More specifically, the study investigates the impact of the banking crisis on those sectors which are more dependent on external finance in countries with a different level of financial development. The study uses data from 38 developed and developing countries which experienced financial crisis during the last 25 years. The sectors which depend more on external finance include younger firms (which usually have a short history), and firms with a large fraction of intangible assets. These firms usually find it hard to obtain funds from the capital market and thus depend more on bank finance. The results reveal that, in countries with a developed financial system, sectors which depend more on external finance tend to grow relatively faster than sectors less dependent on external finance in 'normal' times. However, in a financial crisis, the reverse is true. For instance, the banking crisis has a more significant adverse impact on sectors dependent on external finance in countries with a deep financial system than in countries with a shallow financial system. As a robustness check, the study also used firm level data. The firm-level

analysis confirmed that the banking crisis has a negative impact on the real growth in sales, earnings and stock return for firms in externally dependent industries in a deep financial system.

Lemmon and Roberts (2010) find that credit supply shock has an adverse affect on the firms' net investment. They argue that contractions in the supply of credit and the relative lack of substitution towards alternative sources of fund have adversely affected firms' net investment. As a result, net investment decreases with the decrease in net debt issuance activity. Most of this decline in net investment is concentrated in the acquisition activity. As a robustness check, the study used geographical heterogeneity in the cost of bank debt and borrowers' risk to explore the cross-sectional variations in response to the credit supply contractions. The results confirm that the impact of credit supply shocks on firms' financing and investment decisions varies cross-sectionally, with geographical heterogeneity in the cost of bank loan and borrowers' credit risk. The study concludes that variations in the supply of funds affect firms' financing and investment decisions. Similarly, Morellec's (2010) theoretical model highlights that variations in the supply of capital have an impact on corporate investment.

Consistent with the supply effect of the crisis, Saarenheimo (1995) finds that credit contraction have a negative effect on firms' investment. The study examines the effect of change in bank credit supply on private investment in 1990s Finland. By using the vector autoregressive econometric model, the results reveal that supply of credit plays an important role in determining the firms' investment. However, the effect of credit contractions on investment appears with a lag of a year and is then persistent thereafter for several years. Furthermore, different shocks have different effects on investment. For instance, a positive shock to the supply of credit has a strong and positive impact on investment. Similarly, a negative shock has a negative impact on investment. The study concludes that credit crunch or reduction in the credit supply has a negative impact on private investment and vice versa. Similarly, other studies, such as Becker (2007), show that variations in the local deposit affects the local banks' loan supply which, in turn, affects the local investment.

Gibson (1995) links corporate investment with the financial health of a firm's main bank. He investigates the financial health of the firm's main bank and its impact on the corporate investment of Japanese firms during the period 1991-1992. By using data from the NIKKEI interim database and other published sources on 1355 listed Japanese non-financial firms, and after controlling for stock market valuation and cash flow, the study provides evidence which suggests that a firm's investment is sensitive to the health of its main bank. The results show that investment is 30% less in firms whose main bank is in the lowest rated bank than in firms with the highest rated bank as their main bank. The results suggest that changes in the financial health of a firm's main bank can adversely affect the firm's investment.

Similarly, other studies, such as Kang and Stulz (2000), examine shocks to banks and the impact on performance and investment of borrowing firms. More specifically, the study examines the impact of the Japanese banking crisis on borrowers' performance. The study uses data from the Pacific-Basin Capital Market Research database on 1380 firms over the period 1986-1993. The study classified sample periods into the bubble period (1986-1989) and the crisis period (1990-1993). The results reveal that, in the bubble period, when banks fared well, firms with more bank loans or which depended more on bank finance also exhibited good stock performance. In contrast, during the crisis period, firms with high bank debt experienced lower stock return than firms with no bank loan in their capital structure.

The results further reveal that, during the Japanese banking crisis in the 1990s, Japanese banks faced considerable problems, which forced them to contract lending. This impaired their ability to renew or lend new loans. With this reduction in lending, the investment of bank-dependent borrowers also contracted more than that of other firms. One of the reasons for this behaviour is that firms in Japan depend heavily on banks for external financing, as there are relatively few alternatives available. The heavy dependence on bank finance could be due to the fact that banks have the ability to restructure firms in times of financial distress. Credit rationing by the bank means that firm has no other option except to go to the expensive capital markets. The capital market assumes that the bank has superior information, so when a firm comes to the capital market, investors consider it risky because it is rationed by the banks.

Therefore, it is more likely that investors discount the firm's value and charge high interest rates. Hence, reduction of bank financing significantly reduces the investment of bank-dependent borrowers. The study concludes that a bank's distress imposes a significant cost on its borrowers.

In a similar vein, Gan (2007 a) examines how the collapse of the real estate market in Japan affects the financial condition of banks and, consequently, how it affects investment and performance of the bank-dependent firms. In other words, how liquidity shocks to banks caused by the burst of the real estate market affect the real economy. By using data from the Development Bank of Japan's database on public traded manufacturing firms and banks, and the financial data on banks from the NIKKEI NEEDS database, the results find that the collapse of the real estate market in Japan affected the financial condition of banks. More specifically, those banks which had more real estate exposure prior to the shocks were affected by the collapse of the real estate market. The losses of the real estate loan negatively affected the ability of banks to grant loans.

The study also examines whether such reduction in loan affects banks' client firms' investment decisions. The results reveal a significant negative impact on firms' fixed investment, if a firm's top lender is more exposed to the real estate shocks. Similarly, firms lose market value, if a firm's top lender is more exposed to the real estate loan. On balance, the results suggest that shocks to the financial conditions of banks, caused by the land market collapse in Japan, affected the ability of banks to grant loan. Hence, these shocks have real consequences, by affecting a firm's ability to invest in a profitable project, and at the same time negatively affecting the market value of firms.

In another paper, Gan (2007 b) examines how shock to collateral value affects firms' debt capacity and investment decisions. The study uses data on public traded non-financial manufacturing firms from the Development of Bank of Japan. By using the 1990s land market collapse in Japan as a natural experiment, the results highlight that the value of collateral decreased following the land market collapse. The reduction in collateral value significantly reduced firms' ability to raise funds, especially from the banks. Since most of the bank lending is secured, therefore, firms which suffer great

collateral losses are less likely to raise fund from banks. In other words, it affects firms' ability to obtain a loan from the banks, which ultimately affects the firms' investment. The results provide support for the collateral channel, which is independent of the worsening bank financial position. To summarize, the results reveal that reduction in collateral value caused by the real estate collapse reduced firms' debt capacity, which affected firms' investment in the manufacturing sector.

The findings of Gibson (1995), Kang and Stulz (2000), Gan (2007 a) and Gan (2007 b) suggest that reduction in the supply of bank credit can adversely affect the performance and investment of firms. However, these studies were carried out in Japan, which has the bank-centred system (Antoniou, Guney and Paudyal 2008; Kang and Stulz 2000). In this system the effect of bank poor performance on firms would be high. This is because in this system firms have few options or alternatives to bank finance (Antoniou, Guney and Paudyal 2008; Kang and Stulz 2000). This might suggest that the reduction in the supply of bank credit would have low or no effect on performance and investment of firms operating in market-based economies such as the US and the UK<sup>41</sup>. Also, as noted by Antoniou, Guney and Paudyal (2008, p. 60) “... *the lessons learned from one environment cannot be generalized to countries with different legal and institutional traditions*”.

It is, however, shown that reduction in bank credit also has a significant impact on the performance and investment of firms operating in the market-based system. The study by Slovin, Sushka and Polonchek (1993) found that impending bank insolvency of the Continental National Illinois Bank in the USA negatively affected firms' share prices. Other studies, such as Bernanke (1983) and Calomiris and Mason's (2003), investigation of data on the Great Depression reveal that contractions of bank credit have a significant impact on the real economies. Recently, Chava and Purnanandam (2011) find that adverse capital shock to the US banking system has an adverse effect on firms' performance.

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<sup>41</sup> For more information about market-based and bank-based economies and determinants of leverage in these economies, see for example, Antoniou, Guney and Paudyal (2008).

In the context of the recent financial crisis, which is considered the most severe financial crisis since the Great Depression (see for example, IMF 2008; Kahle and Stulz 2010; Melvin and Taylor 2009; Mian and Sufi 2009; Tong and Wei 2008), empirical studies have shown that banks reduced lending. Ivashina and Scharfstein (2010) for example, find that banks reduced lending as a consequence of the subprime crisis<sup>42</sup> & <sup>43</sup>. They further argue that this reduction is driven by supply effect. This is because banks which have access to deposit financing reduced lending less than banks which do not have access to deposit financing. Moreover, it is reported that banks also changed their pricing policies during the recent crisis period (Santos 2011). In other words, banks raised their interest rates (Hale and Santos 2010; Santos 2011; Santos and Winton 2008) and tightened their lending standard (Campello et al. 2009; De Haas and Van Horen 2009; Gao and Yun 2009).

Other studies, such as Campello et al. (2009), examine the effect of liquidity on corporate investment and other real-side decisions during the crisis period. They surveyed 800 chief financial officers (CFO) in early 2009 in the US, Europe and Asia. Their findings highlight differences in the line of credit ratio across different categories of firms. The constraint firms (which are small, private, below investment-grade and unprofitable) have a higher credit line to asset ratios than unconstraint firms (which are large, public, investment grade and profitable) both before and during the crisis period. The results reveal that constraint firms draw down more heavily during the crisis

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<sup>42</sup> Using aggregate data, Chari, Christiano and Kehoe (2008) claim that bank credit is not reduced during the recent financial crisis. They argue that bank lending is rather increased during the financial crisis. Likewise, using aggregate data, Kahle and Stulz (2010) did not find that net debt issuance of public firms are different in the first year of crisis from the last year of credit boom. However, Cohen-Cole et al.(2008) argue that aggregate data mask important underlying dynamics. By using disaggregate data they find that banks reduced new lending. Recently, Contessi and Francis (2009, p. 1) find that “*until 2008:Q3 net credit growth was not dissimilar to the 1980 and 2001 recessions*”. They further argue that credit was squeezed largely between the third and fourth quarters of 2008. Nevertheless, the fact whether this contraction was caused by demand or supply factors is missing in their paper, which they have also realized.

<sup>43</sup> Puri, Rocholl and Steffen (2010) show that those German saving banks that have substantial exposure to the US financial crisis through their ownership in Landesbanken reduced lending to retail customers. Similarly, other studies, such as Albertazzi and Marchetti (2010), find that supply of credit was squeezed in Italy following the Lehman’s bankruptcy, which is mainly associated with low bank capitalization. In other words, low capitalized banks reduced credit supply more than high capitalized banks after the collapse of Lehman’s. They find some evidence that the ability of borrowers to substitute loans from low capitalized bank with those from other banks is limited. In addition, they find the flight to quality effect in lending behaviour of large less capitalized banks while they do not observe such behaviour for small less capitalized banks.

period than unconstrained firms. The crisis also changed the terms of credit, i.e., there is an increase in commission fees, interest rate and decline in maturity. Such changes in turn have pronounced effects on the constrained firms. The results further reveal that firms with high cash balances can increase their investment during the crisis period, if they have access to the lines of credit. In cases of absence of access to the credit line, high cash firms even plan to cut investment.

Gao and Yun (2009) examine the effect of the 2008 financial crisis on short-term borrowings and performance of US non-financial public listed firms. Using firm-level quarterly data, they find that commercial paper borrowings decreased significantly for the manufacturing firms after Lehman Brothers' default. This decline is, however, more pronounced for firms in a high risk class in comparing with firms in a low risk class. To make up for this fall in liquidity caused by a decrease in commercial paper borrowings, high-risk firms draw down the existing lines of credit and use more cash balance. The authors' results highlight that total commitment lines of credit from banks (unused lines of credit) and liquidity (cash balance) does not change in their sample period.

The study further reveals that the recent credit crisis has tightened the terms and conditions of new lines of credit, i.e., maturity decreased and interest rate increased. The results also reveal that the financial crisis has adversely affected firms' investment and performance. Firms which had low liquidity before the crisis experienced a decline in investment (measured by asset growth, capital expenditure and inventory) and performance. However, disruptions in the financial market have not much affected the investment and performance of firms with high ex-ante liquidity. Overall, the results suggest that disruptions in the financial sector have a more pronounced effect on the investment and performance of low liquidity firms than on firms which have access to the liquidity.

The study by Almeida et al. (2009) investigates the effect of long-term debt maturity on corporate behaviour following the 2007 credit crisis. By using data from the Compustat North America Fundamentals Annual, Fundamentals Quarterly and Rating files, the study finds that firms' debt maturity structure had an impact on corporate

behaviour following the 2007 credit panic. This effect is more pronounced on firms whose large fraction of long-term debt matured during the crisis. The negative effect of debt maturity on corporate behaviour (investment) may be explained by difficulties the firms face in refinancing the matured portion of debt due to credit contractions. In other words, firms whose long-term debt matured right after the crisis reduced investment relative to otherwise similar firms whose debt matures well beyond 2008. By conducting a number of robustness tests, the study confirms that firms whose debt matured during the crisis period find it difficult to raise funds, and thus reduced their investment spending. These firms also adjusted their real and financial policies such as draw down their cash reserves, reduced inventory stocks, repurchased fewer shares and cut dividend.

Campello, Graham and Harvey (2010) examine the effect of financial constraint on corporate behaviour during the 2008 credit crisis. They surveyed 1050 CFOs in the US, Europe and Asia. Using the survey-based measure of financial constraint, the results find that the effect of the financial crisis is more pronounced on the financially constraint firms than on unconstraint firms. The results reveal that constraint firms reduced investment, cut research and development expenditure, and marketing and employment relative to unconstraint firms during the 2008 credit crisis. Further, the financial crisis also affected corporate cash management behaviour. The constraint firms burned through more cash and sold assets to finance their operations. These firms also reduced dividend payout. The unconstraint firms, however, do not exhibit such behaviour.

The results further reveal that financially constraint firms also drew down their lines of credit. This behaviour is driven by the concern that banks will limit firms' access to credit in the near future; while such behaviour is not exhibited by the unconstraint firms, rather they avoid the use of lines of credit. It might be that unconstraint firms want to preserve their reputation among the banks and financial markets. The results highlight that the majority of the financially constraint firms bypassed attractive investment projects due 2008 crisis. As the credit crisis drains credit from the market, it makes it harder for these firms to raise external funds. As a result, they bypass attractive investments projects. The results suggest that more than half of the

constraint firms cancelled their investment projects. Those firms which did not cancel their projects used more internal funds and sold more assets to finance their operations in comparison with the unconstrained firms.

Similar results are also reported by Campello, Graham and Harvey (2009), whose paper documents the long-term cost of the financial crisis. By using a survey of 1000 CFOs in the US, Europe and Asia, the results find reduction in the firms' investment. The results reveal that some firms have even cancelled investment in profitable projects. The cancellation of profitable projects has a negative impact on firms, especially on financially constrained ones. Financial constraint affects the firms' ability to raise external funds to finance value-enhancing projects. As a result, these firms bypass value-enhancing projects, which, the authors state, is the real cost of the current financial crisis.

Similarly, the study by Duchin, Ozbas and Sensoy (2010) provides evidence which suggests that reduction in lending reduced investment of US corporate borrowers. They investigate the impact of the 2007 credit crisis on corporate investment using quarterly data on US public listed firms taken from the Standard and Poor's Compustat database over the period 1<sup>st</sup> July 2007 to 30<sup>th</sup> June 2008. By using the differences in differences approach (DID), and after controlling for the firms' fixed effects and investment opportunities, the results highlight a reduction in corporate investment following the financial crisis 2007. To deal with the endogeneity problem, the authors measure firms' financial position prior to the onset of the crisis and report that this reduction in investment is more pronounced for firms with low cash reserves, high net short-term debt (measured as short-term debt minus cash reserve), are financially constrained, and which operate in industries historically dependent on external finance and in industries facing high information asymmetry.

The results highlight that the financial crisis had a negative effect on the supply of external finance, which adversely affected public listed firms' investment. Duchin, Ozbas and Sensoy (2010) use several measures to demonstrate that post-crisis changes in investment are due to the negative external credit supply shock. The study also extends the post-crisis sample period from 1<sup>st</sup> July 2008 to 31<sup>st</sup> March 2009, to check

whether the main result still holds. The findings confirm that investment continued to decline over the extended period. However, this time the decline in investment is largely explained by demand side factors, which is captured by changing investment opportunities and cash flow. Overall, the results suggest that the credit crisis represents an unexplored negative supply shock for the non-financial firms, which affected their investment activities.

It is also argued in the literature that, although the terms and conditions tightened on both commercial and real estate loans during the recent financial crisis, availability of credit to non-financial firms was not significantly affected in the earlier stage of the crisis. Similarly, the investment of firms is not restricted due to non-availability of funds (Allen and Carletti 2008). Other studies, such as Iyer et al. (2010), did not find evidence that credit supply was squeezed to large firms. It was also found that the credit crisis had little effect on firms' investment (Bakke 2009). Moreover, the study by Bakke (2009) finds insignificant differences in firms' investment behaviour, which are *a priori* financially constraint.

To summarize the above discussion, it seems to suggest that existing studies provide mixed and inconclusive evidence regarding the effect of the credit supply contractions on the financial and investment decisions of firms. This highlights a clear gap in the exiting literature. In this respect, some authors have called for more research on this and related issues (see for example, Bakke 2009; Lemmon and Roberts 2010; Mian and Sufi 2009)<sup>44</sup>. In addition, most of the existing studies have used data on the US market while limited or no evidence exists on the UK market. To the best of the author's knowledge, the performance and investment decisions of UK pubic firms during the recent crisis period have not yet been thoroughly investigated, which strengthens the need for further research on this issue.

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<sup>44</sup> To the best of the author's knowledge, until now no study has examined the effect of the recent credit supply shocks on the financial and investment decisions of private and public listed UK firms.

## 2.9 Summary

This chapter reviewed and discussed the relevant theories and empirical literature on the relationship between the financial crisis and financial and investment policies of firms. Previous studies which have adopted the demand driven approach to corporate finance were highlighted. The recent contributions which have called into question the demand driven approach to corporate finance were identified and discussed. This was followed by discussion on the effect of credit supply shock on financial policies, trade credit, performance, and investment decisions of private firms. Relevant points and gaps in the existing literature were identified.

Empirical evidence on the effect of credit supply shock on the financial and investment policies of public firms was also discussed. This highlighted that evidence of the effects on firms' behaviour with respect to the financing and investment decisions of public firms is limited, and that the existing research has mainly concentrated on US publicly listed large firms (see for example, Allen and Carletti 2008; Bakke 2009; Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a, amongst others). Further, the review of literature highlighted that empirical evidence is mixed and inconclusive, which suggests the need for more research on this issue. Finally, relevant points were raised, and gaps in the existing literature were identified.

The next chapter presents the research methodology of the study. It explains the study's empirical strategy, which consists of three elements that are discussed in detail. This is followed by discussion on the econometric issues such as heteroscedasticity, serial correlations, and multicollinearity problems; and solutions to these problems are also provided. There is a discussion on determinants of firms' financing decisions, which is followed by a brief explanation of how variables are measured. Finally, a summary of the main variables, their proxy and measurement, Datastream variable codes, and description is presented in tabular form at the end of the chapter.

## **Chapter 3**

### **The Research Methodology**

#### **3.1 Introduction**

The previous chapter reviewed the main theories and relevant literature relating to the study. This chapter explains the study's research questions and methodology. It develops and discusses the regression models which will be estimated in the empirical chapters. The chapter proceeds by briefly explaining the main theories about firms. Previous empirical studies which have modelled firms' financing decisions as a function of various firms' characteristics are highlighted. Previous as well as recent empirical studies which have used the demand driven approach to corporate financing are identified and briefly discussed. There is also a brief discussion on recent studies which have called into question the demand driven approach to corporate finance. This is followed by discussion of empirical strategy which explains the identification strategy of the study. The identification strategy has three elements (namely the exogenous credit crisis, the fixed effects regression model, and firms' level control variables) which are discussed in detail in this chapter.

Evidence in support of the empirical strategy is also discussed in this chapter. Prior empirical studies which have used the fixed effects regression model are identified and discussed. This is followed by a brief account of the econometric issues (such as heteroscedasticity, serial correlation and multicollinearity) and a short discussion on why it is important to control for these problems in the regression model. Solutions to these problems are identified in this chapter. There is a brief discussion on determinants of firms' financing decisions. A definition of variables and how they are measured is provided. A short summary concludes the chapter. In brief, all the empirical models used in the study are discussed in this chapter. That is why this chapter is the backbone of this study because the validity of the results is directly linked to the specification of the models developed here.

### **3.2 Research Questions**

As highlighted in Chapter 2, that financial and investment policy of firms are not fully explored in the context of the recent financial crisis. There are only a handful of studies that have examined either financial (see for example, Becker and Ivashina 2010; Gao and Yun 2009; Iyer et al. 2010) or investment policy (see for example, Bakke 2009; Campello, Graham and Harvey 2010; Duchin, Ozbas and Sensoy 2010; Gao and Yun 2009) of firms and these have reported contrasting results. It is not clear from the findings of the existing studies whether the credit supply shocks have an impact on firms' leverage or not. In addition, the focus of the above mentioned studies are very narrow with respect to the components of the capital structure of firms. As a result, it is not clear from their findings which component of the capital structure is more sensitive to credit supply shocks than others.

Moreover, the existing literature do not fully explored the role of alternative sources of finance such as equity issues, trade credit, net trade credit, and cash reserve during the recent crisis period. The behaviour of dividend payout of firms is also not thoroughly examined during the crisis period. In addition, majority of studies have used data concerning the US market. It is, however, not clear whether the results of the US are generalisable to other jurisdictions. Further, the differences between the US and the UK, as explained in Chapter 1 and 2, highlight the need for more research in this area. The main aims of this study are, therefore, to address the following questions,

1. Does the financial crisis affect the leverage of firms?
2. Which components of capital structure are affected by the credit supply contractions?
3. Does the accounts receivable of firms decreased during the recent financial crisis (2007-2009) period?
4. Do firms resort to alternative sources of finance (such as internal funds, net debt issue, net trade credit and net equity issue) for minimizing the effect of credit contractions?
5. Do firms reduce their dividend payment during the financial crisis period for maintaining their financial slack?

6. Does the recent financial crisis affect firms operating performance?
7. Does the credit contraction affect firms' investment decisions?

### **3.3 Empirical Strategy**

There are various theories about firms (such as, Transaction cost theory, Agency theory, Behavioural theory, etc.) that explain why firms exist. Transaction cost theory sees firms as an alternative to market mechanism, which exists to reduce some of the transaction cost (see for example, Coase 1937, for details). Agency theory assumes that management and ownership of firms are separated. This separation of ownership from management induces the manager to pursue objectives that maximize their own value rather than pursue the wealth maximization that is favoured by owners. This results in conflict of interest which has also implications on firms' behaviour. Jensen and Meckling (1976), for example, provide detailed explanations of principal-agent conflicts of interest and the resulting cost accrued by firms.

In comparison, the Behavioural theory of firms sees the firm as a group, which consists of manager, shareholders, workers, etc., each of which with their own interest. Thus, a firm's manager should aim to set a goal that satisfies the interest of the firm's various stakeholders (Griffiths and Wall 1995). The firm's manager should select positive NPV projects which best serve the interests of the various stakeholders. In other words, the manager should act in the best interests of various stakeholders by pursuing the value-enhancing project.

Once the manager identifies the positive NPV projects, their next task is to arrange financing for it. Exploring and identifying the different combinations of various sources of funds in order to achieve optimal capital structure is a challenging task. To deal with this challenge, the manager has to decide which source or combination of sources to use to finance the project. In other words, the manager has options to finance the project by using internal funds, external debt, equity, a combination of any of these sources, or by using all of them. Due to capital market imperfection the cost of external finance is usually higher than that of internal finance. Since external finance is costly, firms would resort to it only if they had exhausted the internal funds

(Myers 1984; Myers and Majluf 1984). The usual sources of external finance thus include debt and equity. This combination of debt and equity represents the liability side of a firm's balance sheet.

The firm's decision to use external finance - particularly debt - depends on the trade-off between cost (such as bankruptcy cost, agency cost etc.) and benefit (such as tax advantage)<sup>45</sup>. Empirically, studies have modelled the level of debt in the firm financing mix as a function of firms' various characteristics such as size, age, growth, profitability, risk, asset tangibility and liquidity (see for example, Bhaird and Lucey 2010; Bharath, Pasquariello and Wu 2009; Cassar and Holmes 2003; Chen 2004; Daskalakis and Psillaki 2008; Hall, Hutchinson and Michaelas 2004; Michaelas, Chittenden and Poutziouris 1999 a; Michaelas, Chittenden and Poutziouris 1999 b; Ozkan 2001; Psillaki and Daskalakis 2009; Rajan and Zingales 1995). Consistent with Modigliani and Miller's (1958) assumption of frictionless supply of capital, most of the previously published studies have modelled the firm financing mix almost entirely as a function of demand side frictions while assuming that there is no supply side friction. In other words, these studies have assumed that supply of capital is infinite and, therefore, modelled firms' financing decisions as a function of firms' various characteristics.

However, as highlighted in Lemmon, Roberts and Zender (2008), traditional determinants of capital structure do not fully account for the variations in leverage ratios. In this regard, Morellec (2010) cast doubt on the usefulness of the existing corporate financing decision model that has focused exclusively on demand side factors. At the same time, some recent studies provide evidence suggesting that the supply of capital is not frictionless (see for example, Chava and Purnanandam 2011; Choi et al. 2010; Duchin, Ozbas and Sensoy 2010; Faulkender and Petersen 2006; Gan 2007 a; Ivashina and Scharfstein 2010; Leary 2009; Lemmon and Roberts 2010; Rehman and Akbar 2011a, 2011b; Rehman, Akbar and Ormrod 2011; Sufi 2009 a; Voutsinas and Werner 2011). Hence, if the supply of capital is uncertain, then firms' financing and investment decisions will depend on both demand and supply factors.

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<sup>45</sup> See for example, Kim and Sorensen (1986) for details about the agency cost of debt, and Graham (2000) for the tax advantage of debt.

The study, therefore, addresses this problem by modelling firms' financing and investment decisions as a function of both demand and supply side factors.

In order to pursue the empirical design, the study considers a two period model in which firms finance the project by using debt and equity. For simplicity, the study assumes that debt consists of private debt only (i.e., financial intermediaries such as banks and other private debt). This assumption is quite plausible because, for a great majority of firms (particularly for small and growing firms), bank finance is the main external source of finance (Gertler and Gilchrist 1993, 1994; Guariglia and Mateut 2010). This is because the bank has an advantage over other lenders of debt to lend to informationally opaque firms (see for example, Hadlock and James 2002; James 1987). In addition, bank finance has greater flexibility, i.e., the bank is efficient in restructuring of firms in times of financial distress (Arikawa 2008; Bolton and Freixas 2000). In the first period 't' the bank agrees to finance the project and issues  $D_b$  to the firms. In order to pursue the project, firms also need alternative financing such as equity (E) and  $T_c$  (trade credit). Hence, at any point in time 't', the liability and equity side of firms' balance sheet, might consist of debt, equity and trade debt and is given by

$$L = D_b + E + T_c \quad (A)$$

Generally, equation (A) represents the various sources of funds that firms use to finance the project. On demand side explanation, this combination of various components of capital structure is a function of different firms' characteristics. As mentioned above, these factors are firm size, age, growth, profitability, risk, asset tangibility and liquidity (Cassar and Holmes 2003; Chen 2004; Daskalakis and Psillaki 2008; Ozkan 2001). To state differently, the financing (or investment) decisions of firms is a function of demand side factors and is given by

$Y$  (financing/investment) =  $f$  (size, age, asset tangibility, risk, liquidity, growth, profitability/size, cash flow, sales growth)<sup>46</sup>

or

$$Y = f(\text{Demand factors}) \quad (\text{B})$$

The equation (B) model the financing (or investment decisions) of firms as a function of demand side factors, which is consistent with the previous literature. The equation (B) however, assumes that the supply of capital is frictionless, which is consistent with Modigliani and Miller's (1958) assumption of frictionless supply of capital. This means that firms financing (or investment decisions) at period "t" (when the supply of capital is frictionless) depend on demand side factors only.

However, when the supply of capital is not frictionless, then firms financing (or investment decisions) will depend on both demand and supply side factors. For instance, at the end of first period 't' the economy (i.e., banks and firms) receives two types of shocks. The first is the credit supply shock and the second is credit demand shock. The former determines the level of credit available to each firm in period t+1. In other words, it represents the shock to supply of external credit to non-financial firms in time t+1 and is represented by  $\delta$ . The second shock is credit demand shock which firms receive in the form of shock to its productivity (or profitability) and is given by  $\xi + \gamma$ . This reflects an economy-wide production shock ( $\xi$ ) and the firm specific shock ( $\gamma$ ). The equation (B) is therefore, further extended to incorporate supply side factor, as follows

$$Y = \alpha_0 + \alpha_1 (\xi + \gamma) + \alpha_2 \delta + \mu \quad (\text{C})$$

Let  $\eta = \xi + \gamma$  reflect the demand side shock and  $\delta$  represent the supply shock. Further, let  $\alpha_0 = \beta_0$  be intercept,  $\alpha_1 = \beta_1$  to capture the demand shock and  $\alpha_2 = \beta_2$  (the main

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<sup>46</sup> Other factors which help in explaining the diversity found in the observed financial structure are industry factor (Abor 2007; Hall, Hutchinson and Michaelas 2000), management behaviour (Williamson 1988), and the corporate strategy (Barton and Gordon 1988; Jordan, Lowe and Taylor 1998).

coefficient of interest) to capture the credit supply channel. So we can re-write equation (C) as follows

$$Y = \beta_0 + \beta_1 \eta + \beta_2 \delta + \mu \quad (D)$$

The equation (D) models the firms' financing and investment decisions as a function of both demand and supply factors. This equation reveals that if the supply of capital is not frictionless then firms' financing and investment decisions will depend on both demand and supply side factors, which is consistent with Rehman, Akbar and Ormrod (2011) and Rehman and Akbar (2011a), who argue that accounting for both demand and supply side factors is critical in understanding the firms' financing decisions. Hence, it suggests that accounting for both of these factors is significant in understanding the firms' financing and investment decisions.

### **3.3.1 Estimating the Effect of the Credit Supply Shocks on Firms' Financing and Investment Decisions**

In order to better understand the effect of the credit supply shocks on firms' financing and investment decisions, the research considers equation (D) for further investigation. Let  $Y$  be the outcome of interest (such as firms' financial or investment decisions). The above equation (D) can be re-written in general form as

$$Y_{it} = \alpha_0 + \beta_1 f(\text{demand shocks})_{it} + \beta_2 g(\text{supply shocks})_{it} + \mu_{it} \quad (E)$$

$Y_{it}$  is a measure of firms' financial (or investment decisions). The subscript  $i$  indexes for firm  $i$  and  $t$  indexes for time,  $\alpha_0$  is intercept and  $f(\text{demand shocks})_{it}$  are firm specific factors which includes firm age, firm size, growth, profitability, and asset tangibility (or size, cash flow, sales growth) which are likely to have an impact on firms' financial (or investment decisions). The coefficient of interest is  $\beta_2$  which measures the supply shocks. The research aims to estimate  $\beta_2$  as it measures the effect of the supply shocks on the variable of interest (i.e., total debt ratio, long-term debt, firm performance, investment, etc).

Investigating the effect of the credit supply shocks on firms' behaviour, however, poses an identification problem<sup>47</sup>. In other words, the main challenge arises from clearly disentangling the credit supply effect from the endogenous demand effect on corporate behaviour (Chava and Purnanandam 2011; Gan 2007 a). The simultaneity of corporate financing and investment decisions make it a challenging task to clearly identify the credit supply shocks. For instance, the estimation may be biased if the study does not clearly control for the endogenous demand effect, because changes in firms' capital structure and investment policy as a crisis unfolds may simply reflect the unobserved shift in firms' demand for capital, or it may reflect unobserved variations in investment opportunities (Duchin, Ozbas and Sensoy 2010). For example, a financial crisis often leads to deterioration of the financial health of the banking sector as well as reducing corporate sector investment opportunities at the same time (Chava and Purnanandam 2011).

To address this challenge, the empirical strategy of this research has three elements that help to overcome this problem. First, the empirical strategy is aimed to identify the exogenous variations in the supply of credit. The recent credit crisis 2007-2009 provides such an event, and this has been argued in some recent papers (Duchin, Ozbas and Sensoy 2010; Kahle and Stulz 2010). Duchin, Ozbas and Sensoy (2010, p. 418), for example, argue that "*The crisis represents an unexplored negative shock to the supply of external finance for non-financial firms*". Since the recent financial crisis originated from the subprime market, therefore, it is reasonably exogenous to credit demand and hence the exogenous shocks make it possible to identify the effect of the credit supply shocks on corporate capital structure and investment. Study of the recent credit crisis is also interesting in the sense that, unlike previous financial crises, this one has originated from the subprime mortgage market and is not driven by worsening corporate fundamentals. Another interesting point about this crisis is that it was not only sudden but also very severe (Gorton 2008; Greenlaw et al. 2008). Therefore, it is unlikely that problems in the subprime sector are predicted to spread to the credit

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<sup>47</sup> This kind of identification problem is usually faced by researchers investigating the effect of credit supply shocks on firms' behaviour (see for example, Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Gan 2007 a; Leary 2009; Love, Preve and Sarria-Allende 2007). Love, Preve and Sarria-Allende (2007), for example, addressed this problem by using the firm fixed effect and by measuring the ex-ante financial position of firms as indicator of firms' vulnerability to crisis.

market. Even if this is predicted, it is not likely that firms can predict how fast it would spread to the financial market.

Secondly, our empirical strategy relies on the firm fixed effects regression model. As this study employs panel data, there is a potential concern of unobserved heterogeneity. This is because the data contains multiple observations per firm. In this regard, Mínguez-Vera and Martín-Ugedo (2007, p. 85) argue that “*unobservable heterogeneity might result in spurious correlations with the dependent variables, which would bias the coefficients obtained*”. It can, therefore, be argued that the fixed effects model will help to account for this concern. The study avoid using pooled ordinary least square (OLS) regression because it assumes that omitted variables are independent of the explanatory variables, i.e.,  $E(X_{it} \mu_i) = 0$  (see for example, Gujarati 2003; Petersen 2009, for details). This creates a problem when firm-specific variables (both observed and unobserved) correlate with the explanatory variables. In such a case the pooled OLS produces biased estimates (see for example, Gujarati 2003; Petersen 2009, for details). Furthermore, it has high restrictive assumptions which may destroy the exact relationship between dependent and independent variables (Gujarati 2003). The fixed effects model is used to account for this problem because it does not require this assumption. Moreover, it is also highlighted in the existing literature that the fixed effects model produces unbiased and consistent estimates of the coefficients (Jeon and Miller 2004).

The fixed effects regression has quite appealing properties, some of which are discussed below (see for example, Baltagi 2005; Gujarati 2003; Judge et al. 1982, for further details). Some of the pioneer authors who discussed this method include but not limited to Mundlak (1978), Kiefer (1980), Hausman and Taylor (1981), Bhargava, and Franzini and Narendranathan (1982). Later on, this regression model was used in the field of sociology (see for example, England et al. 1988; Jasso 1985). Himmelberg and Petersen (1994), for example, used the fixed effects model to examine the relationship between research and development and internal funds for small firms in the high tech industries, and Michaelas, Chittenden and Poutziouris (1999 a) used the fixed effects model to examine the financial policies of the small firms in the UK. A similar model has been used in previous literature (see for example, Bougheas, Mizen

and Yalcin 2006; Gan 2007 a; Love, Preve and Sarria-Allende 2007; Mateut, Bougheas and Mizen 2006).

A variant of the fixed effects model is used by Khwaja and Mian (2008) to examine the shocks to bank liquidity and its effect on borrowers in the emerging market context. With the help of an identification strategy which relies on the firm fixed effects, they removed all firm-specific demand effects. A similar model of Khwaja and Mian (2008) was recently used by Lin and Paravisini (2010 a). Sufi (2009 a) also used the fixed effects model to examine the effect of the third party rating agency on the firms' financial and investment policy. He argues that this method has the advantage that it effectively controls for all firm-specific time-invariant omitted variables. This regression model has also been used by some recent papers (see for example, Albertazzi and Marchetti 2010; Massa, Yasuda and Zhang 2009; Massa and Zhang 2010; Santos 2011).

As this study identifies the credit supply channel, the fixed effects model can be regarded as the most appropriate for this investigation. This is because it allows identification of the credit supply effect by controlling for the unobserved firm-specific effects. In this regard, Love, Preve and Sarria-Allende (2007) argue that this model not only captures the unobserved time-invariant heterogeneous firm characteristics but also allows researchers to disentangle the post-crisis effect from the pre-crisis effect. Sufi (2009 a, p. 1677) also argues that "*The fixed effects specification removes all firm-specific time-invariant omitted variables*". Similarly, the fixed effects model can effectively account for both observable and unobservable firm characteristics (Gan 2007 a) and firm heterogeneity (Bougheas, Mizen and Yalcin 2006; Mateut, Bougheas and Mizen 2006). Previous published studies have also used this model to identify the effect of the crisis on firm behaviour (see for example, Chava and Purnanandam 2011; Gan 2007 a; Jeon and Miller 2004; Love, Preve and Sarria-Allende 2007). In light of the above mentioned points, the study further extends model (E) by incorporating interactive terms to capture the change from the pre-crisis period to crisis period. Model (1) is thus formed which is highlighted below

$$Y_{it} = \beta_0 + \beta_1 * \Sigma X_{it} + \beta_2 * Crisis_{it} * \Sigma X_{it} + \beta_3 * Crisis_{it} + \mu_{it} \quad (1)$$

Where,  $Y_{it}$  is a measure of firm leverage ratios (or performance and investment); Crisis is a dummy variable equal to 1 for the period 2007-2009 and 0 otherwise (2004-2006);  $\beta_3$  will capture the effect of credit supply shock on dependent variable. It will also indicate how much the slope coefficient of the second period (2007-2009) or crisis period that receive 1 differ from that of the pre-crisis period (2004-2006). The interactive term  $\beta_2$  will identify the change relative to the pre-crisis period. In other words, it will identify the effect of demand factors on dependent variable during the crisis period.  $X_{it}$  is a set of firm level control variable(s) which are discussed below;  $\beta_1$  will capture the effect of demand factors on dependent variable during pre-crisis period. Estimation of the above model will show how much firms' financing and value (performance and investment) is affected by the recent disruptions in the financial market.

The last element of the empirical strategy is the inclusion of a set of control variables that minimize the effect of demand factors on the variable of interest. In other words, to minimize concern about the potential demand effect, the study controls for demand effect by including firm characteristics (i.e., firm level control variables) in a regression, which are proxies for firm demand. Previously published studies have identified a number of variables that affect firms' financing and investment decisions, but some variables (such as size, growth and profitability) are highlighted to be consistently and closely related to firms' financing decisions (Abor 2007; Chava and Purnanandam 2011; Dissanaikie and Markar 2009; Harris and Raviv 1991; Leary 2009; Rajan and Zingales 1995).

As discussed above, the study uses the fixed effects model which captures both observed and unobserved firms' characteristics (Gan 2007 a). Love, Preve and Sarria-Allende (2007, p. 459) however, observe that “... *causal factors that are either time-invariant (e.g. industry) or slow changing (e.g., Size) should be captured by the fixed effect*”. This implies that the effect of size and industry is accounted for by the fixed effects and, therefore, there is no need to put these variables into the regression model. The study, therefore, includes Return on Assets (ROA), sales growth (GT) and their

interaction with the crisis dummy in the regression model as a proxy for firms' demand. The control variables, however, change with the dependent variables. For example, if the dependent variable is trade credit or investment, the study uses the crisis dummy (CR), sales growth (GT), cash flow (CF), and their interaction with the crisis dummy as control variables. In light of all these points, the study constructs the following models.

First, the study takes model 1 as the benchmark model for firm total leverage ratio, which will be regressed on firm demand and supply side factors. In order to examine the components of total debt ratio (TD), the study incorporates long-term debt, short-term debt and trade credit as the dependent variables in model 1, which will be regressed against the demand and supply side factors. In addition, the study also incorporates accounts receivable (trade debtor) as the dependent variable in model 1, which will again be regressed against the above-mentioned factors. Thus models 2, 3, 4 and 5 are formed which are highlighted below.

$$\text{Long-term debt} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_4 * \text{GT} * \text{CR} + \beta_5 * \text{ROA} * \text{CR} + \mu_{it} \quad (2)$$

$$\text{Short-term debt} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_4 * \text{GT} * \text{CR} + \beta_5 * \text{ROA} * \text{CR} + \mu_{it} \quad (3)$$

$$\text{Trade Credit} = \beta_0 + \beta_1 * \text{CF} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_4 * \text{GT} * \text{CR} + \beta_5 * \text{CF} * \text{CR} + \mu_{it} \quad (4)$$

$$\text{Accounts Receivable} = \beta_0 + \beta_1 * \text{CF} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_4 * \text{GT} * \text{CR} + \beta_5 * \text{CF} * \text{CR} + \mu_{it} \quad (5)$$

One of the objectives of the study is to find out whether firms substitute towards alternative sources of finance when the supply of credit is squeezed. Generally, if the firm faces limited availability of credit or high cost of borrowing, then it substitutes towards alternative sources of finance such as internal fund (cash reserve), trade credit, equity issue and debt or both. Substitution towards alternative sources of fund mitigates the credit constraint usually associated with credit supply shocks (see for example, Kashyap, Lamont and Stein 1994; Leary 2009; Lemmon and Roberts 2010). Leary (2009), for example, finds that firms without bond market access are more likely to use alternative sources of finance (such as internal funds and equity) following contractions of credit. Lemmon and Roberts (2010), however, find limited evidence of substitution towards alternative sources of finance following shocks to supply of credit to below investment grade firms.

Second, to investigate the effect of the credit supply shocks on firms' propensity to use alternative sources of funds such as internal fund, trade credit, equity, debt or both, the study further extends model 1 by incorporating the net debt issue, net equity issue, net trade credit, cash reserve and dividend, which will be regressed against the firm level control variables and supply side factors. Models are thus formed which are highlighted below.

$$\text{Net Debt Issue} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_4 * \text{GT} * \text{CR} + \beta_5 * \text{ROA} * \text{CR} + \mu_{it} \quad (6)$$

$$\text{Net Equity Issue} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_4 * \text{GT} * \text{CR} + \beta_5 * \text{ROA} * \text{CR} + \mu_{it} \quad (7)$$

$$\text{Net Trade Credit} = \beta_0 + \beta_1 * \text{CF} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_4 * \text{GT} * \text{CR} + \beta_5 * \text{CF} * \text{CR} + \mu_{it} \quad (8)$$

$$\text{Cash Reserve} = \beta_0 + \beta_1 * \text{CF} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_4 * \text{GT} * \text{CR} + \beta_5 * \text{CF} * \text{CR} + \mu_{it} \quad (9)$$

$$\text{Dividend} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_4 * \text{GT} * \text{CR} + \beta_5 * \text{ROA} * \text{CR} + \mu_{it} \quad (10)$$

The dependent variable in model 6 is net debt issued. Following previous studies (Brav 2009; Hovakimian, Opler and Titman 2001; Korajczyk and Levy 2003; Leary 2009) this study defines debt issuance as change in the sum of short-term debt and long-term debt divided by the sum of start period of short-term debt plus long-term debt<sup>48</sup>. The change in this measure will show the percentage change in net debt issued. Before defining equity issue, it is important to mention that data is not available for the sale (repurchase) of common and preferred stock in the cash flow statement of the private firms. This data is usually not available for most of the medium sized firms (Brav 2009).

However, following previous studies (Brav 2009) this study measures firms' equity issue as change in the issued capital divided in the start of the period issued capital. A percentage change in this measure will show a percentage change in sale (repurchase)

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<sup>48</sup> Other studies such as Hovakimian, Opler and Titman (2001), Korajczyk and Levy (2003) and Brav (2009) have defined net debt issue as the change in the sum of short-term debt and long-term debt divided by the sum of start period of short-term debt plus long-term debt greater than 5% of beginning-of-year book assets. Whereas, Leary (2009) used change in net debt issued greater than 1% of beginning of year book assets. Likewise, these authors have defined the equity issuance in a similar fashion. However, this study does not adopt these criteria because using these criteria results in losses of large numbers of observations, especially in the private firms' sample.

of the ownership of the company. For consistency, the study used the same definitions of variables for the public firms' sample. The rest of the specification is the same as explained above<sup>49</sup>. Finally, the study examines the effect of the credit crisis on the performance (which is measured as return on total assets) and investment (which is measured as change in fixed assets divided by total assets) of firms. For this purpose, the study extends model 1 in incorporating investment and performance as dependent variables which will be regressed against firm level control variables and the crisis dummy, as highlighted below.

$$\text{Investment} = \beta_0 + \beta_1 * \text{CF} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_4 * \text{GT} * \text{CR} + \beta_5 * \text{CF} * \text{CR} + \mu_{it} \quad (11)$$

$$\text{Performance} = \beta_0 + \beta_1 * \text{TD} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_4 * \text{GT} * \text{CR} + \beta_5 * \text{TD} * \text{CR} + \mu_{it} \quad (12)$$

### 3.4 Econometric Issues

#### 3.4.1 Heteroscedasticity

Previous studies have highlighted a number of benefits of using panel data (see for example, Baltagi 2005; Psillaki and Daskalakis 2009; Wooldridge 2002, for details). However, panel data also poses several estimation problems; for example, it is two dimensional data, i.e., they both have cross-sectional and time series dimensions. Therefore, they may suffer from problems such as heteroscedasticity and serial correlation. If such problems are not properly addressed then the conclusions that can be drawn may be very misleading (Gujarati 2003). Heteroscedasticity can symbolically be written as,  $\text{var}(u_i | X_i) = \sigma_i^2$ <sup>50</sup>

The presence of heteroscedasticity results in biased estimates of standard error. As a consequence the 't' and 'f' tests give incorrect results (see for example, Gujarati 2003, for details). In other words, it invalidates the test of significance. It also results in inefficient least square estimates. Such problems usually arise because of the scale differences among the firms included in the sample (Akbar 2001). Scale differences arise because the sample usually includes both sizes (small and large) of firms. The

<sup>49</sup> However, the control variables change with the dependent variables.

<sup>50</sup> For more details see for example, Gujarati (2003)

differences between the values of these firms potentially result in a heteroscedasticity problem. As this study's sample includes firms of different sizes, therefore, its estimation results may be biased because of a heteroscedasticity problem. Hence, an important question is how to mitigate these issues.

There are several methods suggested in the literature for treating the heteroscedasticity problem. One commonly used one is deflation of data by some measure of size (Maddala 1992). In this method both dependent and independent variables are deflated by some measure, e.g., size. The purpose of deflation is to control for the size or scale effect. All variables used in this study are scaled by total assets of firms<sup>51</sup> in order to control for the scale effect and to mitigate the heteroscedasticity problem (Brav 2009; Carpenter et al. 1994). Furthermore, the study also used White (1980) heteroscedasticity-consistent variances and standard errors for mitigating the heteroscedasticity concern.

### 3.4.2 Serial Correlation

As mentioned above, panel data may suffer from problems such as heteroscedasticity and serial correlation<sup>52</sup>. Serial correlation is defined as "*Correlation between members of series of observations ordered in time [as in time series data] or space [as in cross-sectional data]*" (Gujarati 2003, p. 442). If there is autocorrelation in data then symbolically it can be represented as

$$E(u_i u_j) \neq 0 \quad i \neq j$$

The presence of serial correlation affects the estimation results. As a consequence, the results from estimation may be misleading (Wooldridge 2002). Moreover, in the presence of serial correlation the 't', 'F', ' $\chi^2$ ' statistics give incorrect results (Gujarati 2003). The problem of heteroscedasticity and serial correlation is common in studies

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51 Except sales growth (Atanasova and Wilson 2003).

52 Gujarati (2003, p. 443) argues that "Although it is now a common practice to treat the terms autocorrelation and serial correlation synonymously, some authors prefer to distinguish the two terms". However, in the context of this research the terms autocorrelation and serial correlation are used interchangeably.

that have used panel data set (see for example, Aivazian, Ge and Qiu 2005; Brav 2009; Leary 2009). These researchers have dealt with this problem by making adjustment and reported standard error that is robust to both heteroscedasticity and serial correlations. In order to deal with this problem the study computes standard error that is robust to both heteroscedasticity and serial correlation (Arellano 1987; White 1980).

### 3.4.3 Multicollinearity

Multicollinearity is another important econometric issue that one may consider when estimating the multiple regression model. According to Gujarati (2003, p. 342) multicollinearity refers to “*the existence of a ‘perfect’, or exact, linear relationship among some or all explanatory variables of a regression mode*”. The existence of correlation makes it difficult to precisely estimate the regression model. To put it another way, if there is high correlation between independent variables, then interpretation of the regression coefficients would be very difficult. Furthermore, it has been argued that “*The high correlation among the variables may affect the efficiency of the estimated coefficients*” (Aivazian, Ge and Qiu 2005, p. 284).

Other symptoms of the multicollinearity are the larger value of standard error, low value of t-statistics, the very high value of goodness of fit,  $R^2$ , etc (Gujarati 2003). Similarly, it has also been reported that the high correlations among the independent variables are one of the symptoms of the existence of multicollinearity (Akbar 2001). To cover this problem the study calculates simple correlation among the independent variables, looks at the estimated  $R^2$ s and gives a careful consideration to the t-statistics. As the study uses two different samples, therefore, a separate correlation among independent variables is calculated for each sample.

The results of the correlation test for the private firms’ sample are presented in Table 3.1; and those for the public firms’ sample are given in Table 3.2. It was not found that there were high correlations between independent variables in both samples. For instance, the high correlation observed between independent variables is 0.23 in the private firms’ sample and 0.055 in the public firms’ sample, which is less than the threshold suggested by the existing literature (see for example, Aivazian, Ge and Qiu

2005; Gujarati 2003). Aivazian, Ge and Qiu (2005), for example, report that a correlation value of more than 0.30 describes a multicollinearity problem. Generally, it is argued that correlation less than 0.8 does not pose a serious multicollinearity problem. In other words, if correlations are greater than 0.8, it indicates that multicollinearity is a serious problem (Gujarati 2003). In light of these points, this study argues that, as the highest correlation among its independent variables is 0.23 in the private firms sample and 0.055 in the public firms sample, the symptom of multicollinearity is not present in this study's data.

### **3.5 Determinants of Firms' Financing Decisions**

Previous studies have identified a number of variables that might affect the firms' capital structure and investment decisions but some variables are, however, believed to be consistently and closely related with the leverage (Abor 2007; Chava and Purnanandam 2011; Dissanaïke and Markar 2009; Harris and Raviv 1991; Leary 2009; Rajan and Zingales 1995). These variables are firm size, profitability and growth. As the study uses the fixed effects model, therefore, it accounts for the size effect. As mentioned before “ *..Causal factors that are either time-invariant (e.g Industry) or slow changing (e.g Size) should be captured by the fixed effects*” (Love, Preve and Sarria-Allende 2007, p. 459). Therefore, the study uses ROA and sales growth and their interaction with the crisis dummy as control variables in the leverage regression models. The following provides an explanation of some of the variables.

Growth is an important factor that affects the firm leverage ratios. Myers (1977) argues that growth potential should be negatively related to leverage. This is because the high growth opportunities produce a moral hazard problem and thus induce firms to take more risk. Barclay and Smith (1995 ), for example, argue that firms with more growth have a low level of long-term debt in their capital structure. In other words, they find a negative relationship between growth and long-term debt. Consistent with the above argument, most of the previously published studies have also reported a negative relationship between growth and leverage (see for example, Dissanaïke and

Markar 2009; Eriotis, Vasiliou and Ventoura-Neokosmidi 2007; Leary 2009; Ozkan 2001; Rajan and Zingales 1995)<sup>53</sup>.

However, some studies have reported a positive rather than a negative relationship between growth and leverage<sup>54</sup>. For instance, Michaelas, Chittenden and Poutziouris (1999 a), find a positive relationship between growth and leverage ratio for small firms. They argue that small, growing firms usually do not have sufficient internal funds to finance investment and, therefore, are more likely to issue debt. Bhaird and Lucey (2010) also support a similar argument. Other studies, such as Sogorb-Mira (2005), argue that SMEs with more growth opportunities are likely to use more debt in their capital structure. Cassar and Holmes (2003) report that growth is an important determinant of firms' leverage ratio.

There are other studies which have reported insignificant results. Chittenden, Hall and Hutchinson (1996) and Jordan, Lowe and Taylor (1998) both report statistically insignificant relationships between growth and leverage ratios. Psillaki and Daskalakis (2009) observe that growth is not a significant determinant of firms' leverage ratios in their sample of firms. Krishnan and Moyer (1997) also did not find negative relationship between growth opportunities and leverage ratio. Given that the relationship between growth and leverage is less straightforward, however, this current study argues that growth affects the firms demand for capital and its subsequent investment decisions. Therefore, the study controls for this factor in all regression models.

Profitability is another important factor which affects the financing decisions of firms. According to the pecking order theory firms follows hierarchy in their financial decisions. In other words, they have particular preferences for different types of finances, that is, they first prefer to finance a project by using internal finance (retained

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<sup>53</sup> Studies that have found a negative relationship between leverage and growth for SMEs are Eriotis, Vasiliou and Ventoura-Neokosmidi (2007) and López-Gracia and Sogorb-Mira (2008); and for the public firms see for example, Rajan and Zingales (1995), Ozkan (2001), Antoniou, Guney and Paudyal (2008) and Leary (2009).

<sup>54</sup> Positive relationship between growth and leverage ratio is also reported for SMEs by Cassar and Holmes (2003) and Nguyen and Ramachandran (2006). Similarly, for the public firms, positive relationship is reported by Colombo (2001) and Chen (2004).

earnings). If the financing needs of investment exceed the retained earnings, they then resort to external financing, i.e., firms issue the safest security first (debt), and then issue equity as the last resort (Myers 1984; Myers and Majluf 1984). Hence, according to this theory, profitable firms would use less debt in their capital structure. In other words, negative relationship between profitability and debt ratio would be expected.

Consistent with the predictions of the pecking order theory, most previously published studies have found negative relationship between profitability and leverage ratio. For example, for small and medium-sized firms, see Van der Wijst and Thurik (1993), Chittenden, Hall and Hutchinson (1996), Michaelas, Chittenden and Poutziouris (1999 a), Hall, Hutchinson and Michaelas (2000), Cassar and Holmes (2003), Sogorb-Mira (2005), Heyman, Deloof and Ooghe (2008), Hol and Van der Wijst (2008), López-Gracia and Sogorb-Mira (2008) and Psillaki and Daskalakis (2009). Similarly for the evidence for large firms see for example, Titman and Wessels (1988), Friend and Lang (1988), Rajan and Zingales (1995), Ozkan (2001), Booth et al. (2001), Deesomsak, Paudyal and Pescetto (2004), Antoniou, Guney and Paudyal (2008) and Leary (2009). All the above-mentioned studies have confirmed that profitable firms use less debt in their capital structure. In other words, they reported negative relationship between debt and profitability.

Modigliani and Miller (1963), however, argue that firms can maximize their value by employing more debt in their capital structure because of tax shield advantage associated with the use of debt. This suggests that firms may prefer debt over equity because of the tax deductibility of interest income from the taxable income. Likewise, the trade-off theory suggests that profitable firms would have a high level of debt in their capital structure in order to benefit from the tax shield advantage. In addition, the agency problem raised from the free cash flow (Jensen 1986) leads the profitable firms to use more debt because higher debt puts pressure on managers to generate cash flow to honour the firm's debt obligations. This suggests a positive relationship between debt and profitability.

There are, however, other studies which did not provide conclusive evidence that profitability is important determinant of firms' capital structure. Krishnan and Moyer

(1997), for example, did not find that profitability is negatively related with leverage ratio. Likewise, Jordan, Lowe and Taylor (1998) did not find conclusive evidence of the negative effect of profitability on debt. To summarize the above discussion, it seems to suggest that the findings of the existing published studies are mixed and inconclusive. However, this study argues that profitability affects the firms' demand for external finance and, therefore, the study controls for this factor in all regression models.

### 3.6 Definition of Variables

All variables used in this study are measured using book value. This is consistent with the previous literature because the majority of the previous studies on firms' capital structure have used book value of variables in their investigation (see for example, Brav 2009; Campello 2006; Cassar and Holmes 2003; Hall, Hutchinson and Michaelas 2000; Michaelas, Chittenden and Poutziouris 1999 a). It is also argued that the use of book value does not pose serious problems (see for example, Brav 2009). Myers (1977, p. 150) contends that "*there is an element of sense in the practical procedures. It is not that book values are more accurate than stock market values, but simply that they refer to assets already in place*". Following a previous study (Brav 2009), this study used the book value of variables for both the private and public firms' sample, in order to facilitate comparison between these two groups. The measurement of variables is as follows:

**Leverage ratio:** The study uses the following measures of leverage.

**Total Debt Ratio:** This is measured as total debt divided by total assets (Gaud et al. 2005; Michaelas, Chittenden and Poutziouris 1999 a; Psillaki and Daskalakis 2009; Rajan and Zingales 1995; Voutsinas and Werner 2011). The total debt of the firm is measured as the sum of short-term debt, long-term debt and trade credit. The use of this ratio is motivated by the fact that Bevan and Danbolt (2002) argue that trade credit and equivalent is significant source of firm financing in the UK. This suggests that it must be taken into account when investigating the firms' financing decisions.

**Short-Term Debt:** Short-term debt is defined as the firms' debt repayable within one year (Gertler and Gilchrist 1993). This is measured as short-term debt divided by total assets (Michaelas, Chittenden and Poutziouris 1999 a; Sogorb-Mira 2005; Voutsinas and Werner 2011).

**Long-Term Debt:** Long-term debt is defined as debt which is repayable beyond one year. This is measured as long-term debt divided by total assets (Michaelas, Chittenden and Poutziouris 1999 a; Sogorb-Mira 2005; Voutsinas and Werner 2011).

**Trade Credit:** This is measured as trade credit divided by total assets (see for example, Atanasova and Wilson 2003; Atanasova and Wilson 2004; Choi and Kim 2005; Mateut, Bougheas and Mizen 2006; Voutsinas and Werner 2011). The use of this ratio is motivated by the fact that Atanasova and Wilson (2003, p. 510) argue that “... it is a better measure for studying the role of trade credit as a source of finance for firms' assets”. Since this study is interested in the financing role of the trade credit, this ratio is the most appropriate for its investigation. Likewise, the study measured trade debtor (accounts receivable) as accounts receivable divided by total assets.

**Net Trade Credit:** This is measured as accounts receivable less accounts payable divided by total assets (Choi and Kim 2005; Love, Preve and Sarria-Allende 2007; Wilson, Le and Wetherhill 2004).

**Net Debt Issue:** This is measured as change in the sum of short-term debt and long-term debt divided by sum of the start period of short-term debt plus long-term debt (Brav 2009).

**Net Equity Issue:** This is measured as change in the issued capital divided by the start of the period issued capital (Brav 2009).

**Investment:** This is measured as change in fixed assets divided by total assets (Arslan, Florackis and Ozkan 2006; Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010).

**Growth:** This is a measure of firms' growth opportunity. The standard proxy for measuring the growth opportunity as suggested by the financial theory is tobin's q. However, for the private firms' sample, the study is not able to measure such statistics. Therefore, the study measures growth as turnover divided by lagged turnover, i.e.,  $\text{turnover}_t / \text{turnover}_{t-1}$  (Billett, Dolly King and Mauer 2007; Brav 2009). For consistency, the study uses the same definition for measuring the growth opportunity for the public listed firms.

**Cash Flow:** This is measured as cash flow from operating activities plus net interest income minus income tax divided by total assets<sup>55</sup> (Akbar 2001).

**Cash Reserve:** This is measured as change in cash and cash equivalent divided by the start of the period cash and cash equivalent.

**Dividend:** This is measured as change in dividend divided by start of the period dividend.

**Performance (ROA):** This is measured as Earnings Before Interest and Tax divided by total assets i.e.,  $\text{EBIT} / \text{total asset}$  (Brav 2009; Jeon and Miller 2004; López-Gracia and Sogorb-Mira 2008; Titman and Wessels 1988; Voutsinas and Werner 2011).

A summary of the main variables, their proxy and code and measurements is given in Table 3.3. Moreover, a brief summary of the Datastream variable code, its notation and description are given at the end of the chapter, in Table 3.4. In addition, the Datastream variable codes, variable names and how they are calculated is given in Appendix 1 at the end of the thesis.

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<sup>55</sup> This definition is used for calculation of cash flow for the public listed firms, only for the year 2004 in line with International Accounting Standard (IAS). From 2005 and onwards cash flow is taken from the cash flow statement as given. Similarly, this definition is used for the calculation of cash flow for the private firms' sample until 2006. From 2007 and onwards cash flow is taken from the cash flow statement as given, consistent with the rule of international accounting standard.

### **3.7 Summary**

This chapter explained the research methodology of the study; and developed and discussed the regression models which will be used in the subsequent chapters. It briefly discussed the identification problem, which was followed by an explanation of the empirical strategy, which has three elements (i.e., the exogenous credit crisis, the fixed effects regression model and the use of firm level control variables), which are discussed in detail in this chapter. Evidence in support of the empirical strategy was also discussed. Econometrics' issues such as heteroscedasticity, serial correlation and multicollinearity problem were discussed and solutions to these problems were provided. This was followed by a brief discussion of determinants of firms' financing decisions; and a definition of variables.

The next chapter explains the data collection process. It describes the nature of data, databases used for extracting the data, and how the samples are constructed for the empirical models discussed above. A brief explanation of the FAME and the Datastream databases is also presented. There is also a brief discussion on outlier problem in the data and a solution to this problem is given. This is followed by an explanation of the descriptive statistics for both the private and public firms' sample. A short summary is presented at the end which concludes the chapter. In short, Chapter 4 explains all the relevant points that are considered during the data collection process.

**Table 3.1 Correlation among Independent Variables for Private Firms Sample**

	ROA	GT	CF	TD	CR
ROA	1	---	---	---	---
GT	0.235	1	---	---	---
CF	0.442	0.086	1	---	---
TD	-0.197	0.043	-0.126	1	---
CR	-0.055	-0.154	-0.075	0.008	1

Whereas; ROA is return on assets, GT is sales growth , CF is cash flow, TD is total debt and CR is the crisis dummy variable.

**Table 3.2 Correlation among Independent Variables for Public Firms Sample**

	ROA	GT	CF	TD	CR
ROA	1	---	---	---	---
GT	-0.021	1	---	---	---
CF	0.778	-0.055	1	---	---
TD	-0.049	0.018	-0.044	1	---
CR	-0.035	-0.029	0.026	-0.028	1

Whereas; ROA is return on assets, GT is sales growth , CF is cash flow, TD is total debt and CR is the crisis dummy variable.

**Table 3.3 Summary of the Main Variables, their Proxy and Measurement**

<b>S. No</b>	<b>Main Variables</b>	<b>Proxy and Code</b>	<b>Measurement</b>
1	Growth Opportunities	Growth in total sales (GT)	This is measured as sales divided by the start of the period sales.
2	Cash Reserve	Cash and cash equivalent (Cash Reserve)	This is measured as change in cash and cash equivalent (which is calculated as sum of cash at hand, cash at bank & short-term investment) divided by start of the period cash and cash equivalent.
3	Cash flow	Cash flow (CF)	Cash flow from operating activities plus net interest income minus tax divided by total asset.
4	Short-term debt	Short-term debt (ST)	It is measured as short-term debt divided by total assets
5	Long-term debt	Long-term debt (LT)	It is measured as long-term debt divided by total assets.
6	Total debt	Total debt (TD)	It is measured as total debt divided by total assets.
7	Trade credit	Trade credit (TC).	This is equal to trade credit divided by total assets.
8	Trade debtor (Accounts receivable)	Trade debtor (TB)	This is defined as trade debtor divided by total assets.
9	Net trade credit	Net trade credit (NTC)	It is measured as accounts receivable minus accounts payable divided by total assets.
10	Ne debt issue	Net debt issue (NDI)	It is defined as sum of change in the short-term debt & long-term debt divided by start of the period short-term debt and long-term debt.
11	Net equity issue	Net equity issue (NEI)	It is defined as change in the issued capital divided by start of the period issued capital.
12	Dividend	Dividend (CDiv)	It is measured as change in the dividend divided by the start of the period dividend.
13	Return on Assets	Performance (ROA)	It is defined as Earnings Before Interest and Tax (EBIT) divided by total assets.

**Table 3.4 Summary of the Notation, Datastream Mnemonic and Description**

<b>Notation</b>	<b>DataStream Mnemonic</b>	<b>Description</b>
GT	$WC01001_t / Wc01001_{t-1}$	Net sales or revenues divided by previous year net sales
CF	$[WC04860 + (WC01266 - (WC01251 - WC01255)) - WC01451] / WC02999$	[Cash flow from operating activities+ (Interest income-(Interest expense on debt- interest capitalized) –Income tax)] divided by total asset
ST	$WC03051 / WC02999$	Short-term debt & current portion of long-term debt divided by total assets
LT	$WC03251 / WC02999$	Long-term debt divided by total assets
TD	$WC03255 / WC02999$	Total debt divided by total assets
TC	$WC03040 / WC02999$	Accounts payable divided by total assets
TB	$WC02051 / WC02999$	Receivables (net) divided by total assets
ROA	$WC18191 / WC02999$	Earnings Before Interest and Tax (EBIT) divided by total assets
Inv	$(WC02501_t - WC02501_{t-1}) / WC02999$	Change in tangible assets divided by total assets
CDiv	$(WC18192_t - WC18192_{t-1}) / WC18192_{t-1}$	Change in dividends provided for or paid-common divided by previous year dividend

# **Chapter 4**

## **Data and Sample**

### **4.1 Introduction**

Chapter 3 discussed the econometrics models which will be estimated in Chapter 5 and 6. The current chapter explains the data collection process of the study, including the nature of the data, and it highlights the advantages of panel data set. There is also an explanation of databases used for extracting the data, which explains that two different databases are used for collecting the study's data, i.e., the private firms' sample data is extracted from the FAME dataset while data for the public firms' sample is collected from the Datastream database. The FAME database contains accounting information (such as balance sheet, profit and loss, cash flow, income statement, etc) for the private firms in the UK while Datastream database contains accounting data not only for the UK public firms but also for the majority of countries. This database also contains market value of equity for the public firms.

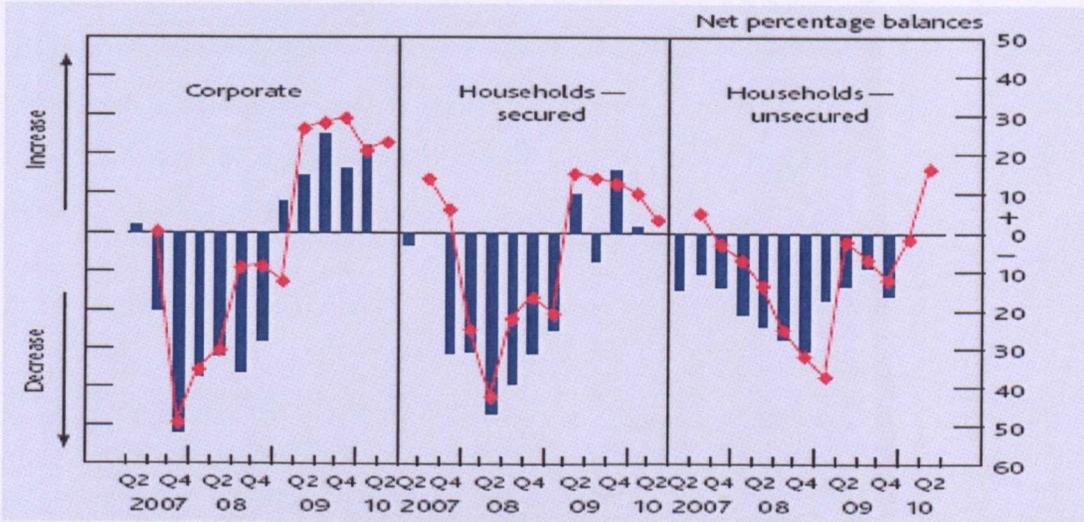
The sample selection process of both the private and public firms is then discussed in this chapter. It explains in detail how the sample of private and public firms is constructed for the empirical models discussed in the previous chapter. There is a short discussion of outlier problem in the data and solution to the problem is provided. The chapter also provides and explains descriptive statistics of both the private and public firms' sample which highlight the general characteristics of the sample of firms. The chapter also highlights the similarities and differences in the way both firms finance their activities both before and during the crisis period. A brief summary is presented to conclude the chapter. In short, this chapter explains all the relevant points that were considered during the data collection process of the study.

## 4.2 The Data and Sample of the Study

This study employs the panel data set of UK private and public firms for the financial years 2004-2009. In the context of the study, the panel data set is constructed by observing a cross-section of firms over a period of time. Panel data is appropriate in this case as it allow researchers to discover and measure effect, which is not possible in pure cross-sectional and time series data (Baltagi 2005; Psillaki and Daskalakis 2009). In addition, panel data can take into account firms' heterogeneity to greater extent (Baltagi 2005; Psillaki and Daskalakis 2009). Panel data is also most appropriate for studying the dynamics of change (Baltagi 2005). Baltagi (2005, p. 5) for example, argues that panel data provides "*more informative data, more variability, less collinearity among the variables, more degree of freedom and more efficiency*". Hence, panel data estimation provides an appropriate basis for studying the effect of the credit supply shocks on firms' financing and investment decisions.

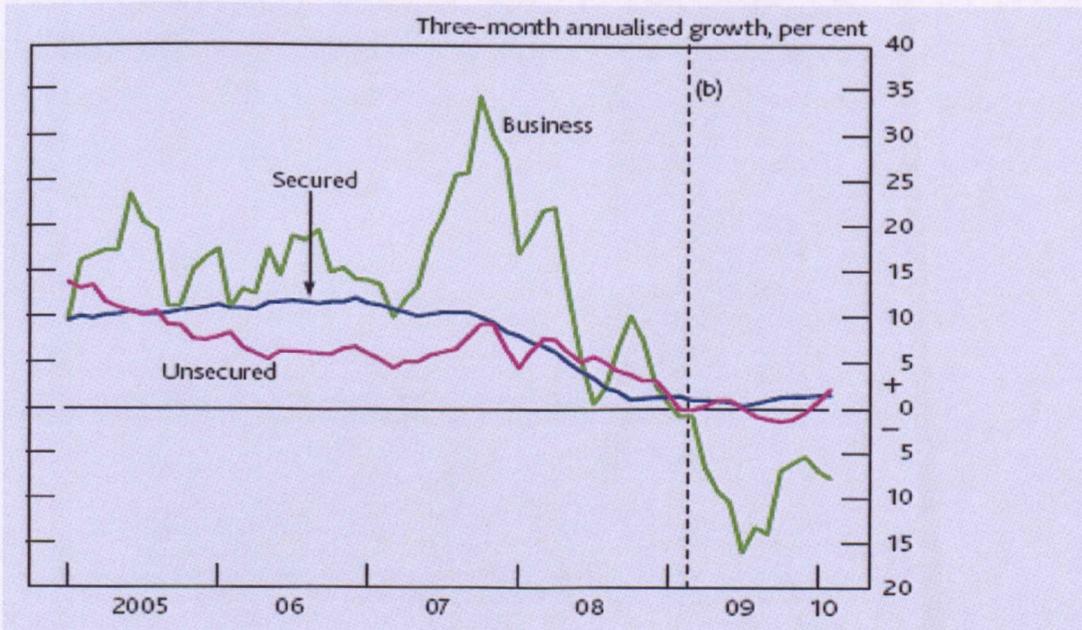
As mentioned above, this study uses data over the financial years 2004-2009. Most of the previous studies which have focused on the financing decisions of UK firms have not included this time period in their empirical investigation. The use of a comprehensive and up-to-date dataset makes this study different from the rest of the existing studies of the UK market. The study splits the sample period into two time periods and took the 2004-2006 as the pre-crisis period, and 2007-2009 as the crisis period. Recent studies on the US market have used either July or August 2007 as the beginning of the recent financial crisis (see for example, De Haas and Van Horen 2009; Duchin, Ozbas and Sensoy 2010). However, other studies, such as Dietrich and Wanzenried (2011), have defined 2007-2009 as the crisis period. Similarly, figures (a) and (b) below, from a Bank of England (2010) survey, also reveal that supply of credit fell sharply in 2007. Ideally, quarterly data should be used to identify the effect of the credit supply shock on firms' financing and investment decisions. However, due to limitation of data availability, this study uses annual data. Since the Financial Analysis Made Easy (FAME) database reports only annualized data, this study uses 2007 as the crisis period. For consistency, the study also collected annualized data from the Datastream database for the public listed firms.

**Figure 4.1 Credit Conditions Survey: Availability of Credit**



Source: Bank of England (2010, p. 4) 'Trends in lending'

**Figure 4.2 Lending to UK Businesses and Individuals**



Source: Bank of England (2010, p. 4) 'Trends in lending'

The use of the FAME database is relatively novel (see for example, Brav 2009; Michaely and Roberts 2007, for details). Primarily, it contains accounting information

(such as balance sheet, profit and loss, cash flow, income statement, etc.) for the unquoted companies in the UK. The majority of firms in this database are not traded on the stock exchange<sup>56</sup>. This database is compiled by Bureau van Dijk (BvD), and it records up to ten years of data for both dead and active firms. For example, companies whose last year of reported data is 2009 may have accounting data in the FAME database that dates back to 1999.

### **4.3 Sample Selection and Deletion of Outliers**

#### **4.3.1 Private Firms' Sample Selection Process**

The data for the private firms are collected from the FAME database for the years 2004-2009. The study extracted only private firms from the FAME database and includes it in the sample<sup>57</sup>. Consistent with the previous literature (for example, Brav 2009; Michaely and Roberts 2007), the study excluded assurance company, guarantees, limited liability partnership, public investment trusts, and unlimited companies. The study did so in order to restrict the analysis to limited liability companies - the type of companies which are most appropriate for both the company act and capital structure theories (Brav 2009; Michaely and Roberts 2007). The study constructed private firms' sample as follows:

1. This study focuses on the UK market, therefore, the sample only includes firms whose office is registered in England, Wales, Northern Ireland or Scotland<sup>58</sup>.
2. Following previous studies, this study excluded firms that operate in the financial sectors (such as banks and insurance sector) for standard reasons (see for example, Akbar, Shah and Stark 2011; Bhaird and Lucey 2010; Brav 2009; Heyman, Deloof and Ooghe 2008; Hol and Van der Wijst 2008; López-Gracia

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<sup>56</sup> However, the FAME database contains some information on firms quoted on the London Stock Exchange and other alternative exchanges, such as Alternative Investment Market (AIM) and Off-Exchange Market (OFEX). Nevertheless, the majority of firms in this database do not have access to any stock market.

<sup>57</sup> Firms quoted on the London Stock Exchange, Public AIM (Alternative Investment Market), Public quoted OFEX (Off Exchange Market) and Public Not quoted firms were excluded from this study.

<sup>58</sup> FAME database also contain data on firms in the Republic of Ireland and British Crown dependencies.

and Sogorb-Mira 2008; Nguyen and Ramachandran 2006; Psillaki and Daskalakis 2009; Rajan and Zingales 1995; Randøy and Goel 2003; Rehman, Akbar and Ormrod 2011; Sogorb-Mira 2005). In this regard, Rajan and Zingales (1995, p. 1424) for example, argue that

*... their leverage is strongly influenced by explicit (or implicit) investor insurance schemes such as deposit insurance. Furthermore, their debt-like liabilities are not strictly comparable to the debt issued by non-financial firms. Finally, regulations such as minimum capital requirements may directly affect capital structure.*

Similarly, other studies, such as Psillaki and Daskalakis (2009, p. 326 footnote 310), argue that “*banks differ substantially from non-financial firms because they are protected by a regulatory safety net*”.

3. In addition, consistent with the previously published studies (see for example, Brav 2009; Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010) the study exclude firms in public sector and regulated industries. This is also in line with the Brav (2009, p. 272) who argues that “ *... these companies are intrinsically different in the nature of their operations and accounting information, and since their capital structure are governed by regulation*”.
4. The issue of missing observations is a serious problem in any research study (especially in studies on private firms). In order to avoid this problem, this study took insight from the existing literature (Chava and Purnanandam 2011; Lemmon and Roberts 2010; Sufi 2009 a & b), and required that firms must have non-missing values for the key variables of the study (such as short-term debt, long-term debt, trade credit, trade debtor, issued capital, cash and cash equivalent, EBIT, tangible assets and total assets)<sup>59</sup>.
5. Finally, while most of the existing studies have focused on the effect of the credit supply shock on the manufacturing sector (see for example, Akiyoshi and Kobayashi 2010; Bougheas, Mizen and Yalcin 2006; Gan 2007 a; Gertler and

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<sup>59</sup> However, this condition may introduce survivorship bias, as the firms included in the sample are all live firms.

Gilchrist 1993, 1994; Leary 2009), this study utilizes data on multiple sectors of the economy. Literature suggests (see for example, Bernanke, Gertler and Gilchrist 1996; Guariglia 2008) that firms (especially small firms) play an important role in other sectors of the economy.

This extensive dataset will help analyze the data in a comprehensive manner. The final sample after taking all of the above steps results in a total number of 4973 private firms. Next, the study discusses the outlier problem in the data and the method used to minimize its effect. This is followed by descriptive statistics for the private firms.

#### **4.3.2 Deletion of Outliers**

The existence of outliers in data is a common problem faced by researchers, and exists in almost every data set. An outlier is an observation that is markedly different from the rest of the observations in the sample (Gujarati 2003). This could be due to several reasons such as reporting errors, other type of errors or even correctly reported values (Akbar 2001) which create problems in the least square regression. The presence of outliers can also raise the heteroscedasticity problem (see for example, Gujarati 2003). It is therefore, important that great care should be taken when dealing with this kind of observations.

The commonly-used method for dealing with the outlier problem is to delete 1% from the top and bottom of all variables. This method has been frequently used in previous studies (see for example, Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Lemmon and Roberts 2010; Lemmon, Roberts and Zender 2008; Sufi 2009 a; Tang 2009). This study also followed the existing literature and removed the top and bottom 1% of all variables to mitigate the influence of outliers. However, to maintain the sample size, the study set outlier observations to 'missing' rather than deleting them (Love, Preve and Sarria-Allende 2007).

#### **4.4 Descriptive Statistics for the Private Firms' Sample**

Table 4.1 presents descriptive statistics for, and reveals the general characteristics of, the private firms' sample. This also highlights several useful facts. The total debt of the private firms, which is captured by the sum of short-term debt, long-term and trade credit scaled by total assets, is quite high in the pre-crisis period. This underlines the fact that private firms issue more debt. The high debt ratios of these firms could be due to the fact that they cannot issue equity on the stock market. As a result, they rely heavily on debt financing (especially on bank finance). This is consistent with the findings of Berger and Udell (1998, 2002) and Brav (2009). Berger and Udell (1998, 2002), for example, observed a debt ratio of 50.37% for small US firms.

Table 4.1 further highlights that difference in means test is significant at the level of 5% which suggest that total debt ratio as a fraction of total assets of the private firms declines during the move from the pre-crisis period to the crisis period. The study also compared the total debt ratio of private firms and public listed firms, as reported in Table 4.2. The comparison of total debt ratio shows that, on average, private firms have higher debt ratios than public listed firms. This is in line with the findings reported in the existing studies. Brav (2009), for example, examines the capital structure of UK private and public listed firms and reports that private firms have higher debt ratios than public listed ones. His results show that private firms have approximately 50% higher leverage ratio than public firms.

Furthermore, Table 4.1 shows that average (median) long-term debt as a fraction of total assets is 22% (13%), short-term debt is 17% (12%), and trade credit represents 18% (15%) of total external finance in the pre-crisis period. Long-term debt is higher than short-term debt as a proportion of total assets, which indicates that private firms rely more on long-term debt. Similarly, trade credit is more than short-term debt, which means that private firms use more trade credit during normal time periods. In other words, it suggests that trade credit is an important source of short-term finance for these firms. This is in line with Oliner and Rudebusch (1995) who argue that trade credit is an important source of short-term finance for both small and large firms. Taken together, the average (median) short-term debt and trade credit constitute

approximately 35% (27%) of the sampled private firms' total debt, which finds that the proportion of short-term finance is higher in the sampled private firms.

However, moving from the pre-crisis period to crisis period column, a reduction in the above-mentioned ratios in comparison with their pre-crisis level is seen. For instance, average (median) long term debt slightly reduced from 22% (13%) in the pre-crisis to 21% (12%) in the crisis period. The difference in means test for the long term debt is significant at the level of 5%, which suggests that long term reduced during the crisis period. The average (median) short-term debt also slightly reduced from 17% (12%) in the pre-crisis to 16% (11%) in the crisis period. The difference in means is significant at the level of 10%, which indicates that these firms experienced reduction in short-term external finance during the crisis period. It is, however, not clear from this table which factors are responsible for causing these ratios to decline. The study explains in detail in the empirical chapters whether this reduction is caused by demand side factors or supply side factors.

Table 4.1 also reveals several other useful facts, for instance, the average (median) trade debtor (accounts receivable) as a fraction of total assets is 24% (22%) in the pre-crisis period. Surprisingly, this figure is more than trade credit, which implies that in tranquil periods private firms extend more trade credit to their customers than the trade credit they receive from their suppliers. In addition, the ratio of net debt issue is 42% in the pre-crisis period. If the crisis period column is considered, both of these ratios show a similar pattern. In other words, both trade debtor and net debt issue reduced during the crisis period. However, the difference in means test is significant only for the trade debtor.

The net equity issue of the private firms is positive in the pre-crisis period, which means that in the normal time period these firms issue more equity. This is in contrast with the view that private firms are generally reluctant to issue equity<sup>60</sup> in normal time periods, due to the fear of losing control (Brav 2009). If the crisis period column is considered the net equity issue of private firms reduced, which indicates that these

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<sup>60</sup> These firms can have access to private debt and private equity market.

firms have a low proportion of equity in their capital structure in comparison with the pre-crisis level. However, the difference in means test for the net equity issue is not significant. As a result, robust conclusion cannot be drawn at this point.

The dividend payout of the average private firms is positive in the pre-crisis period. This signifies that private firms distribute dividend among the shareholders during a normal time period. Dividend payout, however, increases from the pre-crisis period to the crisis period column. This may indicate that private firms do not adjust their dividend policies during the crisis period. However, the difference in means test for dividend is not significant; therefore robust conclusion cannot be drawn at this point. This table, however, provides the basic characteristics of the data and does not provide much detail information. As mentioned earlier, the study will explain in detail in the empirical chapters whether this behaviour is driven by demand side factors or caused by deteriorating credit conditions in the financial market. Moreover, cash and cash equivalent as a fraction of total assets is 7%. If the crisis period column is considered, this figure slightly increases. The cash reserve becomes 8% of the sampled private firms' total assets. The difference in means tests is significant at the level of 1%, which indicates an increase in the cash reserves of the sampled private firms.

Investment as a fraction of total assets in the pre-crisis period is 3% and return on assets is approximately 5%. The difference in means test for the investment is significant at the level of 5%, which indicates that investment of the sampled private firms decreased in the crisis period column of Table 4.1. However, performance of the private firms slightly increased in the crisis period. The difference in means test for performance is not significant; therefore, robust conclusion cannot be drawn. The table also reveals that sales growth as a proxy for growth opportunity is positive in the pre-crisis period. However, sales growth of private firms declines from the pre-crisis column of Table 4.1 to crisis period column. The difference in means test for the sales growth is significant at the level of 5%, which suggests sales growth dropped during the crisis period. Next, the study explains the sample construction of public firms and presents the descriptive statistics for these firms.

## 4.5 Public Firms' Sample Selection and Descriptive Statistics

### 4.5.1 Public Firms' Sample Selection Process

The data for the public listed firms are collected from the Datastream database. This database provides not only accounting data on firms but it also contains market value of equity. This database contains accounting information (such as balance sheet, profit and loss, cash flow, income statement etc) for the UK companies and also for the majority of countries. Since the focus of this study is on UK firms, therefore, the sample potentially consists of all UK non-financial firms listed on the London Stock Exchange for the years 2004-2009. The study constructed the public firms' sample as follows:

1. First, the study removed all those firms from the sample whose currency is other than Pound sterling.
2. Following previous studies (see for example, Akbar, Shah and Stark 2011; Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Lasfer 1995; Love, Preve and Sarria-Allende 2007; Rajan and Zingales 1995) the study removed firms operating in the financial sector (such as banks and insurance sector) for the reasons discussed in Section 4.3.1.
3. In line with the previous studies (Brav 2009; Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Lin and Paravisini 2010 a; Ozkan 2002), the study removed utilities' firms (i.e., firms providing public service such as electricity, gas and telephone). In this respect, Ozkan (2002, p. 22 footnote 25) argue that "*Their debt-like securities are not strictly comparable to those issued by non-financial firms and hence it is not clear whether the various theoretical predictions of debt maturity structure apply to such firms*".
4. Next, the study removed unclassified and unquoted equities from the sample.

5. Finally, after carefully examining the codes and names of the companies, it was discovered that some companies were entered (with the same value) into the sample two or three times. In such cases, the recurrent entries were deleted<sup>61</sup>(Akbar 2001). The final sample after taking the above step yielded a total of 2039 firms. The study also adjusted the data for outlier problem. As mentioned before, outlier observations were not deleted, but rather set to missing in order to preserve the sample size (Love, Preve and Sarria-Allende 2007).

#### **4.5.2 Descriptive Statistics for the Public Firms' Sample**

Descriptive statistics for the public listed firms are presented in Table 4.2. This table reveals several useful facts. For instance, the average (median) total debt ratio of public listed firms is approximately 30% (26%) as a proportion of total assets in the pre-crisis period, which indicates that these firms are not relying more on debt. This implies that these firms rely more on equity finance. This may be because the cost of equity issue is low for these firms (Brav 2009). If this figure is compared with the total debt ratio reported in Table 4.1 for private firms, then it seems that the total leverage ratios of public firms are not as high as those of private firms. In other words, the average public firm has a low leverage ratio. This is in line with Brav (2009), who found from their sample of UK firms that public listed firms have lower debt ratios than private firms. The low leverage ratio of sampled public firms is consistent with the fact that these firms issue more equity (Brav 2009). This ratio falls slightly when the crisis period column is considered. However, the difference in means test for the total debt ratio is not significant, which means that total debt ratio is not affected during the crisis period.

The average (median) long-term debt as a fraction of total assets is 11% (5%), short-term debt is 7% (3%) and trade credit represents 12% (8%) of total external finance for public listed firms in the pre-crisis period. Long-term debt is greater than short-term debt, which signifies that public firms use more long-term debt. Surprisingly, trade

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<sup>61</sup> If the firm is entered thrice in the sample then in such case two of the firms is deleted.

credit is greater than both short-term debt and long-term debt for public firms. This suggests that public firms use more trade credit during periods of normality. This means that trade credit is also an important source of short-term finance for these firms. This is consistent with Oliner and Rudebusch (1995), who argue that trade credit is an important source of short-term finance for both small and large firms. However, focusing on the crisis period column in Table 4.2, it reveals that all the above-mentioned ratios declined during the crisis period. In other words, Table 4.2 highlights that long-term debt, short-term debt and trade credit ratio decreased in comparison with their pre-crisis levels. However, the difference in means test is significant only for the trade credit. This suggests that there is no statistical significant impact on short term debt and long term debt during the crisis period. As mentioned above, it is not clear at this point whether this reduction is driven by worsening corporate fundamentals or disturbance in the financial market.

Table 4.2 further highlights that average (median) accounts receivable as a fraction of total assets is approximately 25% (9%) of the sampled public firms' total assets in the pre-crisis period. Not surprisingly, there are more trade debtors (accounts receivable) than trade credit in the pre-crisis period. This indicates that public firms extend more trade credit to their customers during normal time periods, while receiving less trade credit from their suppliers. The study also documents similar behaviour for the private firms' sample. This shows that both private and public firms extend more trade credit to their customer in times of normality while receiving less trade credit from their supplier. However, in the crisis period the accounts receivable is approximately 29% (10%), which implies an increase in accounts receivable during the crisis period. The difference in means test is also significant at the level of 5%, which indicates that public firms may extend more trade credit during the crisis period. In other words, public firms may extend trade credit to those firms which do not have access to capital market during the crisis period. The increase in trade credit (accounts receivable) during the crisis period is also consistent with Wilson, Le and Wetherhill (2004).

In addition, Table 4.2 highlights that net debt issue of the average public listed firms decreased, moving from the pre-crisis period to the crisis period column. The difference in means test is not significant. As a result, robust conclusion cannot be

drawn at this point. Not surprisingly, the net equity issue of the public firms is high in the pre-crisis period. This is consistent with the view that public firms issue more equity (Brav 2009). However, in the crisis period the net equity issue of the average public listed firms decreased. The difference in means test is significant at the level of 1%, which also suggests that these firms repurchase more equity during the crisis period.

Dividend and cash reserve show similar patterns. Dividend payout is positive in the pre-crisis period, which indicates that average public listed firms distribute dividend among the shareholders during normal times. However, dividend payout becomes negative during the crisis period. The difference in means test is significant at the level of 1% which suggests that public firms have reduced the dividend payout. As mentioned earlier, it is not clear from this table whether this reduction in payout is driven by worsening firm investment opportunities or deteriorating conditions in the credit market. The study explains this in detail in the empirical chapters. Furthermore, the average (median) cash reserve is 21% (14%) of the sampled public firms' total assets in the pre-crisis period. This reveals that public firms hold more assets in the form of cash during normal time periods. However, during the crisis period, this ratio reduced. The difference in means test is significant at the level of 1% which suggests that these firms rely more on internal finance during periods of turmoil in the market.

Both investment as a fraction of total assets and return on assets exhibit a slightly similar pattern. The pre-crisis column in Table 4.2 reveals that investment in fixed assets is approximately 5% of total assets. This ratio gradually declined from 5% to 3% during the crisis period. The difference in means test is also significant which suggests that investment of public firms declined during the crisis period. Public firms' performance also follows a similar pattern. However, the difference in means test is not statistically significant. In addition, growth as a proxy for growth opportunity is positive in the pre-crisis period. This ratio, however, also decreased during the crisis period. The difference in means test for the growth is significant at the level of 1%, which indicates sales growth of public firms decreased during the crisis period.

## 4.7 Summary

This chapter discussed the data collection process of the study. It explained all the relevant points which were considered during the data collection process. It briefly explained the panel data and highlighted its advantages. It provided a discussion of the FAME and the Datastream databases which were used for collecting data, the criteria to select the sample, and the final study sample. The outlier problem in the data was also briefly discussed and a solution to the problem was provided. This was followed by an explanation of descriptive statistics of both private and public firms' sample, which highlighted the general characteristics of the sampled firms. In a nutshell, this chapter described the detailed procedures that are followed in the data collection process.

After explaining the data collection process and descriptive statistics of the study, the study proceeds in the next two chapters to report and analyse the results of the regression models. In Chapter 5, the study presents the results of the fixed effects regression models for the private firms' sample. It explains the effect of the credit crisis on the financial and investment policies of the private firms. A number of alternative tests are also carried out at the end of the chapter to check the robustness of the empirical strategy of the study. Contributions of the study findings to the existing literature are also highlighted. In Chapter 6, the study discusses the financial and investment policies of the public firms during the crisis period; and highlights the differences between the financial and investment policies of private and public firms during the crisis period.

**Table 4.1 Descriptive Statistics for the Private Firms'**

	Pre-Crisis Period (2004-2006)			Crisis Period (2007-2009)			Difference
	N	Mean	Median	N	Mean	Median	
<i>Dependent Variables</i>							
Total Debt	4973	.5698	.5164	4973	.5563	.5003	2.790**
Long-Term Debt	4973	.2236	.1322	4973	.2147	.1255	2.138**
Short-Term Debt	4973	.1721	.1232	4973	.1677	.1145	1.846*
Trade Credit	4973	.1790	.1456	4973	.1738	.1421	1.846***
Trade Debtor	4973	.2419	.2260	4973	.2366	.2201	5.641***
Net Debt Issue	4973	.4229	.084	4973	.3490	.0776	1.460
Net Equity Issue	4277	2.3499	.0000	4304	1.0907	.0000	1.468
Change in Dividend	2107	1.6005	.13363	2033	2.5285	.1515	-.206
Investment	4973	.0315	.0120	4973	.0124	.0045	12.481***
<i>Control Variables</i>							
ROA	4973	.0520	.0508	4973	.0535	.0505	-.720
Growth	4066	1.2366	1.076	4079	1.0586	1.0351	4.183***
Cash	4973	.0747	.0361	4973	.0842	.0424	-9.221***

Note: N refers to number of observations. The difference column report paired t-test of equality of means. \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

**Table 4.2 Descriptive Statistics for the Public Firms'**

	Pre-Crisis Period (2004-2006)			Crisis Period (2007-2009)			Difference
	N	Mean	Median	N	Mean	Median	
<i>Dependent Variables</i>							
Total Debt	1741	.2994	.2612	1479	.2869	.2533	-.101
Long-Term Debt	1729	.1092	.0453	1474	.1070	.0480	-.985
Short-Term Debt	1727	.0657	.0276	1472	.0637	.0264	-1.189
Trade Credit	1684	.1153	.0845	1444	.1085	.0795	2.233**
Trade Debtor	1556	.2469	.0994	1356	.2867	.1010	1.932**
Net Debt Issue	1392	1.181	.0322	1224	1.057	.1143	1.345
Net Equity Issue	1593	1.464	.0302	1456	.2935	.0302	4.510***
Change in Dividend	727	.1053	.1032	660	-.0239	.0440	9.859***
Investment	1633	.0483	.0054	1466	.0336	.0050	4.753***
<i>Control Variables</i>							
ROA	1734	-.0888	.0275	1481	-.1087	.0238	1.315
Growth	1660	1.359	1.1094	1455	1.232	1.1027	4.402***
Cash	1738	.2099	.1366	1480	.1843	.1141	8.946***

Note: N refers to number of observations. The difference column report paired t-test of equality of means. \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

## **Chapter 5**

# **The Effect of the Recent Financial Crisis on the Financial and Investment Policies of Private Firms**

### **5.1 Introduction**

This chapter discusses the results of the panel fixed effects regression models. A total of four different sets of regressions are estimated. The first set investigates the effect of financial crisis on leverage ratios of private firms. Its purpose is to understand whether the external financing activities of private firms are affected by the credit crisis, and to determine precisely which component(s) of capital structure is/are affected by the credit supply contractions. The second set of regression examines the behaviour of trade credit and trade debtor during the recent crisis period. Empirical results of the trade credit regression will help to comprehend the exact role of trade credit and trade debtor during the crisis period.

The third set of regression investigates the effect of credit crisis on the behaviour of alternative sources of finance (such as net debt issue, net trade credit, net equity issue and internal fund). Its aim is to better comprehend whether private firms minimize the effect of the credit crisis by resorting to alternative sources of finance. In other words, to investigate how private firms manage their finances during the crisis period. The fixed effects regression is also run on dividend to examine whether private firms adjust their dividend payout policy to maintain their financial slack. The final set of regression investigates the effect of financial shocks on the investment and performance of private firms. A summary of each set of regression results is presented at the end of the respective sections.

The main aim of this chapter is to investigate the effect of the recent credit crisis on the financial and investment policies of UK private firms. The research has been conducted because this issue has not been thoroughly investigated to-date from the perspective of private firms during the recent credit crisis period. Relatively few

known studies have examined the effect of the credit supply shock on public firms' financial and investment decisions (using specific individual events) (see for example, Chava and Purnanandam 2011; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a; Massa and Zhang 2010; Voutsinas and Werner 2011).

Similarly, in the context of the recent financial crisis, few studies have focused on these issues, which may signify the need for further research in this area of research. An examination of the findings of the existing published studies reveals that the majority of these studies did not reach a unanimous conclusion (see for example, Allen and Carletti 2008; Bakke 2009; Duchin, Ozbas and Sensoy 2010; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a). Moreover, the degree of information opacity, funding sources (Bartholdy and Mateus 2011), and ownership structure (Brav 2009; Michaelas, Chittenden and Poutziouris 1999 a) between the private and public firms are different, thus, further research about the behaviour of private firms will add new insights. In addition, private firms' financing and investment decisions during the crisis period have never been investigated to-date in the UK market. Investigating these issues is the main purpose of this chapter, which will hopefully shed further light on these issues. The rest of the chapter is organized as follows.

Section 5.2 provides empirical results of the leverage regressions and explains which components of capital structure are affected by the recent credit supply shocks. Empirical results of the trade credit regression are discussed in Section 5.3, which also explains the behaviour of trade debtor (accounts receivable) during the crisis period. Section 5.4 explains the role of alternative sources of finance (such as net debt issue, net trade credit, net equity issue and cash reserve) during the crisis period. Results of the dividend regression are also explained in this section. The effect of credit contractions on the performance and investment of private firms during the crisis period is explained in Section 5.5. Robustness checks are explained in Section 5.6. The final Section 5.7 concludes the main findings of the regression estimation discussed in the results.

## 5.2 Financial Crisis and Leverage Ratio

Chapter 3 discussed in detail the regression models used in this chapter; however, the main points of the empirical strategy are briefly reviewed here. The empirical strategy which explains the identification strategy of the study consists of three elements namely, identification of exogenous variations in the supply of credit, the firm fixed effects regression model, and the use of control variables. As discussed in Chapter 3, the recent credit crisis 2007-2009 provided such an event, which is reasonably <sup>exogenous</sup> ~~exogenous~~ to credit demand. The use of the fixed effects model accounts for unobserved time-invariant heterogeneous firms' characteristics and, hence, allows researchers to disentangle the post-crisis effect from the pre-crisis effect (Love, Preve and Sarria-Allende 2007). Finally, the use of control variables helps to minimize any remaining demand side concern.

In order to examine the effect of the credit crisis on the leverage ratios of private firms, the study first ran the fixed effects model on the total debt ratio of private firms over the period 2004-2009, to see whether the total debt ratios of these firms are affected by the recent disruptions in the financial market. Next, the study divided the total debt into its components, such as long-term debt, short-term debt and trade credit, and then ran separate regressions on each of these variables. The purpose of examining each component of total debt individually is to understand better the precise channel(s) through which the supply shocks travel. It also helps to better understand and quantify the substitution across credit sources.

In model 1 the fixed effects regression is run on total debt ratio of private firms and the results are reported in Table 5.1. The coefficients in Table 5.1 and subsequent tables should be interpreted as follows: 'Cr' represents crisis dummy for the crisis period. The impact on dependent variable during the crisis period is given by the sum of the coefficient associated with the given variable and variable interacted with the crisis dummy. Crisis dummy is interacted with the control variables to determine the change in response to the pre-crisis period, and the net response during the crisis period is found by adding the coefficients. The coefficient referring to the pre-crisis period is given by the non-interacted variables.

Results from the estimation of model 1 are presented in Table 5.1, which shows that all independent variables have expected signs and are highly significant. This indicates that the model is best fit, which is also evident from the high R-square value (85%). The sign and significance of control variables are consistent with the previous studies. As expected, the coefficient on return on assets (ROA) and CR\*ROA variables are negative and significant at the level of 1% or better in both time periods. The negative coefficient on ROA and CR\*ROA in total debt regression is consistent with the predictions of the pecking order theory. This implies that firms rely on internal finance in both the pre-crisis (see for example, Aggarwal and Kyaw 2010; Daskalakis and Psillaki 2008; Gaud, Hoesli and Bender 2007; Voutsinas and Werner 2011) and during the crisis period, i.e., there is no difference across the two periods as for the pecking order model is concerned.

This finding is consistent with Heyman, Deloof and Ooghe (2008) who report negative relationship between profitability and debt for the small privately-held Belgian firms. The result also confirms the findings of Michaelas, Chittenden and Poutziouris (1999 a): by using UK data on SMEs they report negative relationship between profitability and debt. The negative relationship between debt and return on assets is also consistent with the previously published studies (see for example, Cassar and Holmes 2003; López-Gracia and Sogorb-Mira 2008; Psillaki and Daskalakis 2009; Sogorb-Mira 2005; Van der Wijst and Thurik 1993). All these studies have reported negative relationship between profitability and debt ratio.

The result, however, appears in contrast with Jordan, Lowe and Taylor (1998). By using UK data on small firms they did not find any significant relationship between firms' profitability and debt ratio. Similarly, the study by Nguyen and Ramachandran (2006) did not find significant impact of profitability on capital structure of SMEs in Vietnam. To sum up the above discussion, it seems that the majority of the above-mentioned studies have examined the relationship between debt and profitability in normal time periods. The results add to the findings of the above-mentioned studies by suggesting that profitable firms prefer to use less external debt both in the pre-crisis and during the crisis period.

The coefficient on the growth variable is positive in both the pre-crisis and the crisis period and is significant at the level of 1% or better. The positive coefficient on the growth variable in the total debt regression indicates that growing firms need more external finance. This may be due to the non-availability of sufficient internal funds for high growth firms to finance their growth, due to which they may need to borrow more debt. Michaelas, Chittenden and Poutziouris (1999 a) argue that rapidly growing small firms do not have sufficient internal resources to fund growth and therefore borrow more. The study further reports that “... *fast growing firms are likely to issue more debt*” (p. 121). The positive relationship between growth and leverage is also consistent with earlier published studies (see for example, Cassar and Holmes 2003; Chittenden, Hall and Hutchinson 1996; Michaelas, Chittenden and Poutziouris 1999 a; Nguyen and Ramachandran 2006; Sogorb-Mira 2005).

The positive coefficient on growth variable in total debt regression, however, appears in contrast with some of the existing studies. For example, Eriotis, Vasiliou and Ventoura-Neokosmidi (2007) report that high growth firms employ less debt in their capital structure. They find negative relationship between growth and leverage. Likewise, López-Gracia and Sogorb-Mira (2008) find that growth has negative impact on leverage. There are other studies which argue that growth is not a significant determinant of capital structure. For instance, the studies by Jordan, Lowe and Taylor (1998), Psillaki and Daskalakis (2009) and Krishnan and Moyer (1997) did not find evidence that growth is a significant determinant of firms' capital structure. The result of this study extends the previous literature by examining the relationship between growth and total leverage during the crisis period.

Having explained the relationship between control variables and total debt ratio, the study next focuses on main variable of interest, which is the crisis dummy. The study is interested in the sign and significance of the crisis dummy variable. The results of model 1 highlight that coefficient on the crisis dummy variable is negative and significant at the level of 1% or better. In terms of magnitude, the results reveal that private firms experienced a reduction of 5.9% in total debt ratio during the crisis period. It is important to highlight that coefficient on the crisis dummy indicates the change from the pre-crisis period to during the crisis period. The negative coefficient

on the crisis dummy variable implies that financial crisis has a negative impact on a firm's total debt ratio. In other words, the flow of credit to these firms was reduced during the crisis period. This suggests that supply of credit is an important determinant of firms' financing decisions. Since total debt encompasses all forms of debt (such as short-term debt, long-term debt and trade credit), which means that aggregate external financing activities of private firms contracted in response to the credit supply shocks.

This result parallels the findings reported by Lemmon and Roberts (2010) and Voutsinas and Werner (2011). Lemmon and Roberts (2010), for example, argue that aggregate external financing activities of below investment grade firms fall following negative shock to the supply of credit. However, both of these studies were carried out on public firms. In addition, they did not cover the recent financial crisis period (2007-2009). The first contribution of this study is to provide evidence from the perspective of the UK private firms during the recent financial crisis period. Its second contribution is that it extends the previous literature on firms' financing decision by suggesting that supply of capital is an important determinant of firms' capital structure. Overall, the results of model 1 show that, on balance, private firms experienced reduction in the flow of external debt following the recent credit drought in the financial market. Subsequent models will focus on the crisis period.

However, from the results of model 1, the impact on the components of the firm financing mix is not clear. In order to investigate this further, the study divided the total debt in to its components, such as long-term debt, short-term debt and trade credit, and ran separate regressions on each of these variables. The results of these regressions will help to better comprehend and identify the exact channel(s) through which supply shocks travel. In other words, to better understand which supply channel(s) is/are affected by the recent panic in the financial market, and comprehend and quantify substitution across the credit sources, components of capital structure were examined.

To achieve the aims of this research, the fixed effects regression model was run on long-term debt ratio. Results from the analysis of model 2 are presented in Table 5.1, which reveals that coefficient on ROA interacted with the crisis dummy variable is

negative and statistically significant at the level of 1% or better<sup>62</sup>. This confirms the predictions of the pecking order theory, which states that firms have particular financing hierarchy. In that hierarchy, internal finance comes before debt and debt before equity. In other words, firms prefer internal finance over debt and debt over equity. The negative relationship between ROA and long-term debt is in accordance with previously published studies, such as those of Van der Wijst and Thurik (1993) and Voutsinas and Werner (2011), who also find statistically negative relationship between ROA and long-term leverage ratio in their sample of firms.

The coefficient on the growth variable interacted with the crisis dummy is positive, but statistically insignificant. The positive coefficient of the growth variable interacted with crisis dummy variable is consistent with earlier studies. However, the coefficient on the growth variable is statistically not significant during the crisis period. This suggests that growth may not be a statistically significant determinant of a firm's long-term financing decision during the crisis period. The result seems to be consistent with previous published studies that have examined the determinants of firms' capital structure. Hall, Hutchinson and Michaelas (2000), for example, argue that growth is not a significant determinant of firms' long term financing decision.

Likewise, other studies such as Jordan, Lowe and Taylor (1998) and Daskalakis and Psillaki (2008) did not find any evidence that growth affects the capital structure of firms. All the above-mentioned studies have, however, examined the financing mix of firms during a normal time period. This study's result adds to this strand of literature by suggesting that growth is not a significant determinant of long-term debt financing decisions during the crisis period. To put it another way, private firms do not consider the growth opportunity an important factor in making their long-term financing decisions during the crisis period.

The study now focuses on the main variable of interest, that is the crisis dummy variable. The results highlight that sign on the coefficient of the crisis dummy is negative. This suggests that credit contractions have negatively affected the long-term

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<sup>62</sup> The coefficient on ROA is also negative and statistically significant at the level of 1% or better. This implies that pecking order theory hold in both time periods.

debt ratio of private firms. The negative coefficient on the crisis dummy variable in long-term debt regression is consistent with the findings in Lemmon and Roberts (2010), who found that supply contraction has negatively affected the long-term net debt issuance of below-investment-grade firms. However, the coefficient on the crisis dummy variable lacks significance, which suggests that the credit crisis had no significant impact on the long-term debt ratio. Hence, the results suggest that the long-term financing channel is not affected by the recent financial shocks.

In order to investigate the impact on short-term debt, the fixed effects regression model 3 and associated results are reported in Table 5.1. The short-term debt for private firms consists of bank overdraft, short-term group loan, director loans, hire purchase, leasing, and other short-term debt, etc. However, as reported in Bougheas, Mizen and Yalcin (2006), this is predominantly bank finance. The results of model 3 tell a similar story. The coefficient on ROA interacted with the crisis dummy variable is negative and significant at the level of 1% or better<sup>63</sup>. It indicates that, the more internal fund is available, the less firms use external debt during the crisis period, which is consistent with the predictions of the pecking order theory. This suggests that internal fund is substituted for short-term debt. The negative relationship between profitability and short-term debt is in accordance with Hall, Hutchinson and Michaelas (2000), who report negative relationship between profitability and short-term debt. A similar result is also reported in Van der Wijst and Thurik (1993) and Chittenden, Hall and Hutchinson (1996).

The coefficient on the growth variable interacted with the crisis dummy variable is positive and statistically significant. The positive coefficient on the growth variable in short-term debt regression confirmed the findings of Hall, Hutchinson and Michaelas (2000). They examine 3500 unquoted small and medium sized enterprises in the UK. Their results reveal positive relationship between growth and short-term debt. A similar result is also reported by Cassar and Holmes (2003). However, the result is not in line with Sogorb-Mira (2005), who finds negative relationship between short-term

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<sup>63</sup> Similarly, the coefficient on ROA is negative and significant at the level of 1% or better, which implies that the firms rely on internal finance in both the pre-crisis and the during crisis period, i.e. there is no difference across the two periods as for the pecking order model is concerned.

debt and growth opportunities for the Spanish SMEs. All the above-mentioned studies have examined the financing decisions of small firms in a normal time period. The result of this study extends the previous literature by suggesting that private firms consider the growth opportunity in making their short-term financing decisions during the crisis period.

Results from the analysis of model 3 show that coefficient on the crisis dummy variable in the short-term debt regression is negative and significant at the level of 1% or better. This implies that the short term debt reduced during the crisis period. Specifically, the credit crisis leads to a 2.5% decrease of short term debt. The R-square value is 75% which indicates the goodness of model fit. The negative coefficient and high significance suggests that the flow of short-term credit to private firms is squeezed as a result of the credit crisis. In other words, the financial crisis has impaired the short-term financing channel for private firms, as they face high information problem and are generally considered risky for the reasons discussed in Chapter 2. Therefore, lenders may have squeezed the availability of credit to these firms because it has been shown that banks only consider safer loan options during tight credit conditions (Lang and Nakamura 1995). This result is also in accordance with Gertler and Gilchrist (1993, 1994). They find that the flow of credit to small firms is squeezed following a tight monetary policy.

The reduction in short-term borrowings during the crisis period seems to be in line with the predictions of the existing published studies. For instance, it has been argued that small firms experienced a reduction in short-term borrowing during a tight monetary condition (see for example, Black and Rosen 2008; Bougheas, Mizzen and Yalcin 2006; Gertler and Gilchrist 1993, 1994; Oliner and Rudebusch 1995; Oliner and Rudebusch 1996, for details). The result seems to be in contrast with the findings in Lim (2003), whose results from Korea reveal that credit has been reallocated from large firms to small and profitable firms following the financial shocks.

Overall, the results of model 1 and 3 reported in Table 5.1 suggest that credit supply conditions play an important role in determining firms' leverage ratios. This seems to be in contrast with the results in Lemmon and Roberts (2010). They argue that supply

contraction has negligible impact on firms' leverage ratios. Similarly, the study by Lin and Paravisini (2010 a) did not find any significant relationship between firms' leverage and credit shortage in their sample of firms. This study's findings, however, are consistent with the results in a number of recent papers (see for example, Faulkender and Petersen 2006; Leary 2009; Rehman and Akbar 2011a; Rehman and Akbar 2011c; Rehman, Akbar and Ormrod 2011; Sufi 2009 a; Voutsinas and Werner 2011). All these studies provide evidence that support the view that supply of capital does affect the firms' financing decisions. In a nut shell, the results of this study, combined with the findings of the above-mentioned studies, suggest that accounting for both demand and supply side factors is critical in understanding the firms' financing decisions.

To conclude the above discussion, the results reported in Table 5.1 suggest that contractions in the supply of credit have adversely affected the total leverage ratios of UK private firms. The aggregate external credits to these firms reduced following negative shock to supply of credit. The results also highlight that the financial crisis has adversely affected the short-term credit channel of private firms, while it has no statistically significant affect on long-term debt ratio. The results show that this change in leverage ratios of private firms are caused by the supply side factor and are not driven by demand side factors. The use of the firm fixed effects and control variables helped us to disentangle the supply effect from the demand side factors.

The other question that this research addresses is to investigate whether private firms substitute to alternative sources of finance when supply of credit squeezes. The next section addresses this issue. First, the study examines the effect of financial crisis on the behaviour of trade credit and then examines its effect on the trade debtor. The aim is to better understand the exact nature of trade credit during the crisis period. In the following section, the study investigates the effect of the credit crisis on a broad set of alternative sources of finance (such as net debt issue, net equity issue, net trade credit and internal funds). The behaviour of dividend payout is also examined to see whether private firms adjust their dividend payout policy during the crisis period.

### 5.3 Trade Credit and Financial Crisis

The significance of alternative sources of finance increases when firms face restricted access to the capital market (see for example, Leary 2009; Lin and Paravisini 2010 a; Massa, Yasuda and Zhang 2009; Nilsen 2002; Petersen and Rajan 1997). One such alternative source of finance is trade credit. Literature suggests that trade credit is an important source of short-term finance for both small and large firms<sup>64</sup>. Its importance can be seen from the fact that it accounts for 62% of total liabilities of the UK firms (Bevan and Danbolt 2002). In addition, it is also reported that, in the UK, the majority of the total short-term credit extended and credit received took the form of trade credit (Kohler, Britton and Yates 2000).

The importance of trade credit as a source of short-term finance is well documented in the existing literature. However, the exact role of trade credit (accounts payable) and accounts receivable during the financial crisis is the subject of much debate. The lack of consensus and mixed evidence has brought the issue back to the attention of the academicians and researchers, and will be discussed in this study by examining the behaviour of trade credit, trade debtor and net trade credit of private firms during the recent financial crisis period. By conducting analysis on trade credit and trade debtor during the recent financial crisis period the researcher hopes to shed further light on these issues.

In order to investigate the behaviour of trade credit during the recent financial crisis period, the fixed effects regression model 4 is run on trade credit. The dependent variable in model 4 is trade credit, which is measured as trade credit scaled by total assets. The use of this measure is motivated by the fact that research suggests that “... *it is a better measure for studying the role of trade credit as a source of finance for firms' assets*” (Atanasova and Wilson 2003, p. 510). Since this study is interested in the financing motive of trade credit during the crisis period, this measure is the most appropriate. The control variables in this regression are the crisis dummy indicator, cash flow, sales growth variable and their interaction with the crisis dummy variable.

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<sup>64</sup> See for example Table (1) on p.8 in Oliner and Rudebusch (1995).

Results from the analysis of model 4 are reported in Table 5.2., which reveals that the majority of the control variables are statistically significant at the level of 1% or better. The significance of the control variables suggest that this model is best fit, which is also evident from the high R-Square value of 91%. The coefficient on cash flow interacted with the crisis dummy variable is negative and statistically significant at the level of 5%. This is consistent with the predictions of the pecking order theory. It implies that, the more firm generates internal fund, the less it needs external finance (trade credit). To put it another way, internal funds and trade credit are substitutes of each other during the crisis period. The negative relationship between cash flow and trade credit is in line with previously published studies (see for example, Atanasova and Wilson 2003; Atanasova and Wilson 2004; Love, Preve and Sarria-Allende 2007; Wilson, Le and Wetherhill 2004).

The results further highlight that coefficient on the growth variable interacted with the crisis dummy variable is positive and significant at the level of 1% or better. This suggests that growing firms need more external finance (trade credit) during a crisis period. This may be because growing firms usually do not have sufficient internal funds to finance their investment during the crisis period and, therefore, need to borrow more trade credit at this time. The positive relationship between growth and trade credit is consistent with previously published studies (see for example, Atanasova and Wilson 2003; Wilson, Le and Wetherhill 2004).

The coefficient on the crisis dummy variable in trade credit (accounts payable) regression is negative and significant at the level of 1% or better. Interestingly, the coefficient on the crisis dummy variable is not only negative but also highly significant, and reveals that supply of trade credit to private firms decreased during the crisis period. The general expectation is an increase in the supply of trade credit during the crisis period, but this study's result finds the opposite. The reduction in the flow of trade credit to private firms also shows the lack of substitution towards this short-term source of finance during the crisis period.

This finding is in contrast with Biais and Gollier (1997), Petersen and Rajan (1997), Nilsen (2002) and Atanasova and Wilson (2003, 2004). These authors argue that when

supply of credit squeezes, firms increase the use of trade credit. Nilsen (2002), for example, argues that, when supply of bank credit squeezes, small and large firms without bond rating increase the use of trade credit. This study's results regarding trade credit regression, however, suggest the opposite: that the supply of trade credit decreases when the financial crisis reduces the availability of credit; which supports the view that trade credit is a complement for bank credit rather than a substitute.

The results also suggest that, during the crisis period, trade credit flows in the same direction as bank credit. This finding is consistent with the previous literature (for example, Lemmon and Roberts 2010; Love and Zaidi 2010; Taketa and Udell 2007). Love and Zaidi (2010), for example, examined the behaviour of trade credit of small and medium sized enterprises during the 1998 financial crisis, but did not find evidence that trade credit can mitigate the effect of decline in bank credit. Likewise, other studies, such as Marotta (1997), did not find conclusive evidence for the Italian firms that trade credit acts as substitution for the bank lending.

The reduction in the flow of trade credit following the recent panic in the financial market implies that private firms experienced reduction in the flow of trade credit from their suppliers. The reduction of this source of short-term finance suggests that private firms cannot hedge themselves from the adverse effect of supply contractions by resorting to trade credit. In other words, trade credit does not compensate for the lower access to credit during the crisis period; this is again in line with the findings reported in Lemmon and Roberts (2010). These authors did not find evidence that below investment grade firms' substitute to trade credit to lessen the effect of supply contractions. Similarly, the findings of some other studies do not support the view that trade credit increases when the supply of bank credit decreases (see for example, Bernanke and Gertler 1995; Gertler and Gilchrist 1993). Oliner and Rudebusch (1996, p. 302) also found "... *no evidence that small firms increase their use of trade credit during period of tight money.....*".

In brief, the results of model 4 do not support the substitution role of trade credit during the crisis period but rather support the complementary view of trade credit. Moreover, as explained in the previous chapter, trade credit is included in the calculation of total

debt, therefore, the conclusion drawn from Table 5.1 and Table 5.2 is that financial crisis has impaired the short-term credit and trade credit channels of private firms. In other words, the credit crisis has negatively affected the short-term financing channels of the private firms. Hence, the results suggest that short-term financing channels of private firms are sensitive to variations in the supply of credit.

The results above show that private firms experienced reduction in the flow of trade credit during the crisis period. However, trade credit is a two way process, so it is necessary that the researcher should also examine the behaviour of accounts receivable, to reveal whether private firms increased (or decreased) the extension of trade credit to their customers during the financial crisis period. This will also help to better understand the two-way nature of trade credit during the financial crisis period.

To examine the behaviour of the trade debtor (accounts receivable) during the crisis period, the fixed effects regression model 5 is run on accounts receivable. The dependent variable in model 5 is trade debtor (accounts receivable) which is measured as accounts receivable scaled by total assets. The control variables in this model are the same as used in the trade credit regression. Results from the analysis of model 5 are presented in Table 5.2, which reveals that the majority of the control variables are significant, and shows that the model is best fit. This is also clear from the high R-square value of 93%. Interestingly, the coefficient on the cash flow variable interacted with the crisis dummy variable is negative. However, it lacks significance, which suggests that private firms may not consider cash flow when granting credit to their customers during the crisis period. The sign of the coefficient on growth variable interacted with the crisis dummy variable is positive and significant, which indicates that private firms extend more trade credit to their customers during the crisis period, when they have more growth opportunities.

The coefficient on the crisis dummy variable is negative and significant at the level of 1% or better. The negative coefficient on the crisis dummy variable suggests that extension of trade credit reduced during the crisis period. To state this differently, with the reduction of the credit supply, private firms adjusted their trade credit policy and reduced the flow of trade credit to their customers. If the results of model 5 are

compared with those of model 6 then it seems that accounts receivable of private firms decreased more than accounts payable during the crisis period. The result of accounts receivable is consistent with the Kohler, Britton and Yates (2000), who examine the trade credit behaviour of quoted firms in the UK. Their results reveal that trade credit extension reduced following the rise in interest rate. This study's result, however, appears at odd with those found in Wilson, Le and Wetherhill (2004), which argue that small and medium sized firms extend more trade credit during tight monetary conditions.

To summarise the above discussion, the empirical results reported in Table 5.1 and 5.2 suggest that financial crisis has adversely affected the total debt ratio of private firms. Examination of individual components of capital structure reveals that financial crisis has adversely affected the short-term debt and trade credit channels. In other words, it is the short-term financing channel that is impaired by credit drought, while the crisis has no statistical significant impact on long-term financing channel. In addition, the results reported in Table 5.2 do not support the substitution role of trade credit during the crisis period. It further highlights that private firms reduced the extension of trade credit to their customers during the crisis period.

The results of this study contribute to the existing literature on corporate finance, firstly, by suggesting that accounting for both demand and supply side factors is crucial in understanding firms' financing decisions. Secondly, the key contribution to corporate finance literature is the finding that it is the short-term financing channel (i.e., short-term debt and trade credit) that is sensitive to variations in the supply of credit. Finally, the results extend the previous literature on trade credit by suggesting that trade credit does not compensate for a reduction in the supply of credit from the financial institutions. In the next section, the study examines the effect of the credit supply shocks on the behaviour of alternative sources of finance.

## **5.4 The Use of Alternative Sources of Finance**

It is generally argued that when supply of credit squeezes, firms substitute alternative sources of finance such as internal finance, equity and trade credit to undo the supply effect. For instance, Leary (2009) argues that bank-dependent firms substituted alternative sources of finance when the supply of bank credit squeezed. To investigate whether private firms substitute alternative sources of finance to offset the reduction of debt in their capital structure, the fixed effects panel regression is run on net debt issued, net equity issued, net trade credit and internal finance. The fixed effects regression model is also run on dividend payout to examine whether private firms reduced dividend payout during the crisis period.

To achieve this study's objectives, the fixed effects panel regression model 6 is run on net debt issued. Results from the analysis of model 6 are presented in Table 5.3, which highlights that the majority of the independent variables are significant. The coefficient on the crisis dummy variable is negative and is significant at the level of 1%. This is evidence that net debt issuance activities of private firms are adversely affected by the recent credit crisis. In other words, credit retrenchment has negatively affected the net debt issuance of private firms. This result confirms this study's earlier findings, which suggest that contractions in credit supply have adversely affected the leverage ratios of private firms. In addition, this result further confirms that supply of capital is an important determinant of firms' financing decisions. Overall, the fixed effects results suggest that net debt issue of private firms was reduced during the crisis period.

Next, the study investigates whether private firms move to equity finance to minimize the effect of credit contractions. In order to investigate this proposition, the fixed effects regression model 7 is run on net equity issued. The results of model 7 are also reported in Table 5.3. The coefficient on the crisis dummy variable is positive and significant at the 1% level or better. The result shows that net equity issued by private firms increased (by 0.04%) following contractions in the supply of credit. This is consistent with the credit supply effect, that is, when there are exogenous shocks to the supply of credit, this reduces credit availability and firms therefore issue more equity to

offset the negative effect of credit contractions. It implies that private firms move to equity finance to minimize the adverse effect of the credit supply contractions.

According to the findings of some of the existing literature, the cost of equity issue is high for private firms because of information asymmetry and control considerations (Brav 2009; Michaelas, Chittenden and Poutziouris 1999 a). Therefore, it is less likely that these firms visit the external equity market. However, this study's results suggest that, when conditions in the financial market deteriorate, private firms even compromise on control considerations and issue equity to reduce the negative effect of credit supply contractions. This result seems to be inconsistent with the findings reported by Lemmon and Roberts (2010). Using data on investment grade firms, they find little substitution towards equity finance following negative shocks to the supply of credit. This study's results are, however, consistent with the findings of Leary (2009) and Lin and Paravisini (2010 a), which also document that firms increase the use of equity finance when the supply of credit is squeezed.

In addition to the above, the literature on equity issues has documented that issues of equity are sensitive to stock prices. It is also reported in the literature that equity issue decision depends on the stock prices, i.e., firms prefer to issue equity when the stock prices are high (see for example, Baker and Wurgler 2002; Dittmar and Thakor 2007; Mikkelsen and Partch 1986). The results of this current study add to this strand of literature, firstly by providing evidence from the perspective of private firms; and, secondly, by suggesting that when conditions in the credit market deteriorate and credit becomes harder to obtain, private firms issue more equity. The bottom line is that private firms minimize the effect of credit contractions by resorting to equity finance.

The study then examines the behaviour of net trade credit during the crisis period. Model 8 is estimated on net trade credit. The dependent variable in model 8 is net trade credit, which is measured as accounts receivable less accounts payable scaled by total assets. The control variables in this model are the same as those used in the trade credit and trade debtor regression models. Results from the estimation of model 8 are presented in Table 5.3. The regression results reveal that coefficient on the crisis dummy variable is negative and significant at the level of 1%; and that net trade credit

reduced during the crisis period. This means that private firms are not substituting net trade credit during the crisis period. This confirms the study's earlier findings that the flow of trade credit to private firms decreased following the recent disruptions in the financial market.

The overall conclusion drawn from the results of models 4 and 5 reported in Table 5.2, and model 8 reported in Table 5.3 is that private firms do not shift to trade credit to lessen the adverse effect of the financial crisis; hence, the results do not support the substitution role of trade credit during the crisis period. Further, the results of model 5 highlight that these firms also reduced the extension of credit to their customers during the crisis period. However, it is clear from the results of model 4 and 5 that reduction in accounts receivable is more than accounts payable which means that private firms reduced the extension of trade credit to customers more than trade credit received from their suppliers.

Next, the study examines the change in cash and cash equivalent to see whether private firms increased the use of internal finance or held cash during the crisis period. From the estimation of model 9 the fixed effects regression is run on change in cash and cash equivalent scaled by the start of the period cash and cash equivalent. Results from the analysis of model 9 are presented in Table 5.4. The results of regression show that coefficient on the crisis dummy is positive and statistically significant at the levels of 5%. The positive coefficient on the crisis dummy variable indicates that private firms held (4.39%) more cash during the crisis period. This is consistent with the precautionary saving motive. Since the financial crisis increased uncertainty about the availability of credit, in response to that, private firms held more cash during the crisis period to hedge themselves from the unexpected reduction of credit in the near future. This result is consistent with the existing studies. Baum et al. (2006), for example, argue that firms hold more liquid assets when macroeconomic uncertainty or idiosyncratic uncertainty increases. Similarly, it has also been reported that firms hold more cash for precautionary saving motive (see for example, Bates, Kahle and Stulz 2009). This result is also in line with the findings in Lin and Paravisini (2010 a). They report that public firms use more equity financing and hold cash in response to credit contractions, consistent with the precautionary saving motive.

This study's results, however, do not seem to be much in line with some of the recent findings in this area. In this regard, Leary (2009), for example, shows that firms without bond market access use all forms of alternative sources of finance (including internal finance) when supply of credit is squeezed. Similarly, the study by Lemmon and Roberts (2010) highlights little substitution towards internal finance in response to the credit supply shocks. This study's result adds to this strand of literature, first, by providing evidence from the perspective of private firms. Second, the results suggest that private firms hold more cash in response to the exogenous credit contractions.

Finally, the study also examines whether private firms adjust their dividend policy during the crisis period for maintaining their financial slack. The conventional wisdom is that, when external credit becomes difficult to obtain, firms usually scale back shareholders' distribution in order to keep their financial slack. To examine the dividend behaviour of the private firms, with the estimation of model 10, the fixed effects regression is run on dividend. Results from the estimation of model 10 are given in Table 5.4. The results reveal that the coefficient on the crisis dummy variable is positive and is weakly significant, which does not indicate that private firms have scaled back shareholder distributions during the crisis period.

In contrast with the researcher's expectation, the results of model 10 suggest that the financial crisis has not much affected the dividend payout<sup>65</sup> of private firms. Although it was expected that private firms would have scaled back shareholder distributions so that more money would be available for business operations, the result suggests the opposite, paralleling the findings in Lemmon and Roberts (2010). Their findings reveal that below investment grade firms were neither dipping into cash reserves nor reducing dividend to keep their financial slack in response to credit supply contractions. Also, the current study's result suggests that private firms are not

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<sup>65</sup> The possible reason may be that the effect of financial crisis on firms' behaviour usually appears with a lag of a year, as highlighted by Sarrenheim (1995). Since the financial crisis became more severe in the 3<sup>rd</sup> and 4<sup>th</sup> quarter of 2008, therefore, its effect on dividend behaviour may not be immediately appeared in the data. It is also important to highlight that there is a lot of missing data for this variables, as majority of firms did not report data about their dividend payout, therefore, the results could also be due to this problem.

adjusting dividend payouts to maintain their financial slack in response to the credit crisis.

To conclude the above discussion, the results suggest that contractions in the supply of credit have adversely affected the total debt ratio of private firms. Further, the results reveal that the credit crisis has adversely affected the flow of short-term debt and trade credit to these firms. In response, private firms hold cash and issue equity to hedge themselves from the adverse effect of credit contractions. The study, however, does not find evidence that these firms switch to net debt issue or net trade credit; nor does it find that these firms scale back shareholders' distributions to maintain their financial slack.

### **5.5 The Credit Crisis, Firms' Performance and Investment**

One of the objectives of this study is to examine the effect of the financial crisis on firms' performance and investment. To examine the effect of the credit crisis on the financial performance and investment behaviour of firms, the fixed effects regression model 11 is run on firm investment. In this model, dependent variable is investment, which is measured as change in firm fixed assets scaled by total assets. The results of model 11 are reported in Table 5.5, and reveal that coefficient on the crisis dummy variable is negative and significant at the level of 1%. The results show that investment as a fraction of total assets of the private firms declined (by 5.2%) as a consequence of the credit crisis. In other words, credit contractions have adversely affected the private firms' investment.

The results thus suggest that the inability of private firms to obtain external credit caused them to cut back their investment in tangible assets. This finding is in line with the previous published studies (see for example, Campello, Graham and Harvey 2010; Duchin, Ozbas and Sensoy 2010; Kashyap, Lamont and Stein 1994). Kashyap, Lamont and Stein (1994), for example, find that, during tight monetary conditions, firms which have limited access to the capital market experience reduction in investment more than firms which have access to the capital market. Other studies, such as Duchin, Ozbas and Sensoy (2010), examine the investment behaviour of the

US public listed firms, and find that it declined following the recent subprime crisis. Similarly, the study by Lemmon and Roberts (2010) reports that net investment of below investment grade firms decreased following contractions in the supply of credit caused by the collapse of Drexel Burnham Lambert Inc, and some regulatory changes.

Campello, Graham and Harvey (2010) survey 1050 CFOs in the US, Europe and Asia. Their findings highlight that firms have reduced their investment during the credit crisis 2008. In a related work, Almeida et al. (2009) report that firms whose large fraction of long-term debt matured during the crisis experienced reduction in investment. This is because of the difficulty firms' face in refinancing the mature portion of debt due to credit contractions. In other words, firms whose long-term debt matured right after the crisis respond by reducing investment relative to otherwise similar firms whose debt matured well beyond 2008.

The majority of the above-mentioned studies are, however, carried out on public listed firms using the US market data. The current study's result is generally consistent with the findings in these other studies, and thus add to this strand of literature by providing evidence from the perspective of UK private firms. Results from the estimation of the fixed effects model show that private firms in the UK cut back investment in tangible assets in response to an exogenous credit crisis.

Next, the study examines the effect of the credit crisis on private firms' financial performance by running the fixed effects regression on performance of firms (model 12). The dependent variable in model 12 is performance and is measured as return on assets. Results from the estimation of the fixed effects model are presented in Table 5.5, which show that all variables are significant at the level of 1% or better. The coefficient on the crisis dummy variable is negative and is statistically significant at the level of 1%. The coefficient for the crisis dummy variable is also economically significant. The negative coefficient reveals that private firms earned -9% during the crisis period. In other words, the recent financial crisis has adversely affected the financial performance of these firms.

This further implies that the inability of private firms to obtain external credit has adversely affected their performance. This result is again in line with the findings of previous literature (Chava and Purnanandam 2011; Jeon and Miller 2004). Chava and Purnanandam (2011), for example, examine the effect of deteriorating bank health on the performance of bank-dependent firms. The results reveal that, following shock to bank capital, the profitability of bank-dependent firms declined more than that of firms which have access to the capital market. The study also runs the fixed effects regression on return on equity. To save space, the study does not report the regression results; however, it can be noted that the results of the regression model are qualitatively similar.

To summarize, it can be argued that the results of model 11 and model 12 reported in Table 5.5 present similar scenarios. Both performance and investment of private firms declined during the credit crisis period, which suggests that their inability to obtain external credit and the lack of substitution towards alternative sources of finance during the crisis period adversely affected their performance and investment. This suggests some real costs of the financial crisis. Moreover, the relative lack of substitutions towards alternative sources of finance and decline in investment may suggest that capital raised through equity issue is largely used to finance the cash reserve of the private firms. On the basis of these findings the researcher may argue that the financial crisis has severe implications on the current and future performance of private firms. The bottom line of all of the above discussion is that the financial and investment decisions of private firms are vulnerable to variations in the supply of credit.

## **5.6 Robustness Checks**

In order to check the robustness of the empirical strategy of the study, sample firms were classified into two groups. Getting insight from the literature (see for example, Al-Najjar and Belghitar 2011; Duchin, Ozbas and Sensoy 2010; Love, Preve and Sarria-Allende 2007), the study used cash and cash equivalent as a measure of liquidity

and reclassified sample firms based on their average<sup>66</sup> pre-crisis liquidity level. In this regard, those firms whose average cash and cash equivalent as a fraction of total assets is less than or equal to the sample mean is considered as liquidity constraint. Similarly, those firms whose average cash and cash equivalent as a fraction of total assets is greater than the sample mean is termed as liquidity unconstraint.

Literature (for example, Campello et al. 2009; Duchin, Ozbas and Sensoy 2010; Love, Preve and Sarria-Allende 2007) suggests that firms which have greater ex-ante liquidity would be less exposed to the financial shocks. Gao and Yun (2009), for instance, provide evidence that the financial crisis of 2008 has a pronounced impact on performance of firms which have low pre-crisis liquidity than on firms which have high pre-crisis liquidity status. Consistent with the earlier studies, this research hypothesized that firms with high cash reserve prior to the crisis would be in a better position to cushion themselves from the negative effect of the credit supply shocks.

In order to test this prediction, the study runs a separate regression on each of these groups. The results of the fixed effects regression are reported in Table 5.6. They reveal that the credit crisis has a pronounced effect on the ex-ante liquidity constraint firms while it has no negative effect on unconstraint firms. In other words, the credit crisis has adversely affected the total debt ratio and performance of constraint firms, which is consistent with the credit supply effect.

The study also performed the Hausman (1978) model specification test to compare fixed effects and random effects models. One of the assumptions of the random effect model is that the individual effect is uncorrelated with the control variables. If this is the case, then both the fixed effects and random effects estimates should yield similar results. In other words, they should not be statistically different. The test on all main variables is performed; in order to preserve space the study does not report the statistics. In unreported analysis, the study finds that test results reject the null

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<sup>66</sup> Sample firms were also reclassified based on their median pre-crisis liquidity level. In this regard, those firms whose median cash and cash equivalent as a fraction of total assets is less than or equal to the sample median is considered as liquidity constraint. Similarly, those firms whose median cash and cash equivalent as a fraction of total assets is greater than the sample median is termed as liquidity unconstraint. To save the space, the study does not report the regression results. However, it can be noted that the results are qualitatively similar.

hypothesis. The results of Hausman's (1978) test support the use of the fixed effects model over and above the random effect model. On the basis of this result, the researcher argues that the fixed effects model is a more appropriate model for investigating this issue. To put it another way, it is the best model for this study.

Taking care of other econometric issues such as heteroscedasticity and serial correlations also needs consideration. These issues affect the efficiencies of the estimated coefficients; and can also bias the estimation results, if not properly addressed. The study addressed these issues by adjusting the standard errors that are robust to serial correlations (Arellano 1987; White 1980). All the reported t-statistics in the tables below are based on the robust standard errors. Hence, the results are not driven by any econometric issues such as heteroscedasticity or serial correlations.

Finally, by getting insight from the existing literature (see for example, Chava and Purnanandam 2011; Lin and Paravisini 2010 a) all firms which have direct exposure to the subprime crisis (such as real estate firms)<sup>67</sup> have been removed from the sample. The aim is to minimize or remove any remaining demand side factors affecting the results. The study runs all the regression again after removing the exposed firms. Results from the analysis of the fixed effects models are presented in Appendices 3, 4, 5, 6 and 7. The analysis reveals that the results are qualitatively similar to the original regression results, which means that they are not driven by demand side factors.

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<sup>67</sup> More specifically the researcher removed all those firms which have the following UK SIC codes 7011, 7012, 7020, 7031, 7032. A total of 153 firms were removed from the sample. For more details about the SIC codes and activities see, for example, Appendices 2 at the end of the thesis.

## 5.6 Summary

This chapter has investigated the effect of the recent credit crisis (2007-2009) on the financing mix, performance and investment policies of UK private firms by using the panel fixed effects regression models. This method has not only the advantage of accounting for both the observed and unobserved time invariant heterogeneity, but it also enable researchers to disentangle the post crisis effect from the pre-crisis effect (Bougheas, Mizen and Yalcin 2006; Gan 2007 a; Love, Preve and Sarria-Allende 2007; Mateut, Bougheas and Mizen 2006; Sufi 2009 a). In addition, the exogenous nature of the recent credit crisis, the use of fixed effects regression model, and firm level control variables helped to identify the credit supply effect on behaviour of private firms. A total of four different sets of regressions are estimated in this chapter, which uncovered the behaviour of private firms during the recent crisis period.

The results suggest that credit crisis has adversely affected the leverage ratios of private firms. The total debt ratio of these firms decreased during the crisis period. It highlights that total external financing activities of private firms contracted as a result of the recent credit crisis. Further, examination of each component of capital structure reveals that this effect is largely concentrated in the short-term financing channels, i.e., the financial crisis has impaired the short-term debt and trade credit channels. The effect on the long-term debt is statistically insignificant, which suggests that the credit crisis has no significant effect on the long-term financing channel.

The results further reveal that the recent credit crisis has negatively affected the flow of trade credit to private firms. The reduction of this source of short-term finance reveals the lack of substitution towards the trade credit. The results show that trade debtor (accounts receivable) also decreased during the crisis period. Nevertheless, the reduction in accounts receivable is more than accounts payable. The results also highlight that private firms' net trade credit reduced during the crisis period. This confirmed that private firms are not switching to trade credit to lessen the impact of credit contractions during the crisis period.

Regarding the role of alternative sources of finance during the crisis period, the regression results reveal that private firms increased the use of equity finance. In other words, private firms issued more equity to hedge themselves from the adverse effect of credit contractions. In addition, these firms hold cash in response to the exogenous credit contractions. The increase in cash holding is consistent with the precautionary saving motive. The study, however, does not find any evidence that private firms move to net debt issue or net trade credit, nor that these firms scaled back shareholder distributions.

Finally, the fixed effects reveal that the credit crisis has also adversely affected the performance and investment decisions of private firms. The results suggest that non-availability of credit and the relative lack of substitution towards alternative sources of finance had adversely affected both performance and investment of private firms. Moreover, the increase in cash reserve and decrease in investment suggests that funds raised through equity issue may have been used to finance the cash reserve. A number of robustness tests were also carried out that have further validated the results. Overall, the results suggest that financial and investment policies of private firms are vulnerable to variations in the supply of credit, which may have long-term implications on the survival of these firms.

The next chapter explains the effect of the credit contractions on leverage ratios, alternative sources of finance, performance and investment behaviour of the UK public listed firms. A total of four sets of regressions are estimated in the chapter, and the results of analysis are explained in light of the existing literature. The chapter also highlights the contributions of the study findings to the existing literature. Five different robustness tests are carried out at the end to check the strength of the empirical strategy and results of the study. A short comparison between the financial and investment behaviour of private and public firms is also discussed in the chapter. A brief summary is provided to conclude the chapter.

**Table 5.1 Effect of the Financial Crisis on Leverage Ratio**

Model 1 Total debt =  $\beta_0 + \beta_1 * ROA + \beta_2 * GT + \beta_3 * CR + \beta_4 * GT * CR + \beta_5 * ROA * CR + \mu_{it}$

Model 2 Long-term debt =  $\beta_0 + \beta_1 * ROA + \beta_2 * GT + \beta_3 * CR + \beta_4 * GT * CR + \beta_5 * ROA * CR + \mu_{it}$

Model 3 Short-term debt =  $\beta_0 + \beta_1 * ROA + \beta_2 * GT + \beta_3 * CR + \beta_4 * GT * CR + \beta_5 * ROA * CR + \mu_{it}$

Variable	Model 1 (Total Debt)	Model 2 (Long-term debt)	Model 3 (Short-term debt)
ROA	-0.312 (-12.02)***	-0.080 (-4.07)***	-0.174 (-11.01)***
GT	0.026 (4.19)***	0.011 (2.12)**	-0.003 (-0.82)
CR*ROA	-0.225 (-7.51)***	-0.112 (-5.22)***	-0.051 (-2.72)***
GT*CR	0.049 (5.04)***	0.004 (0.48)	0.020 (2.91)***
CR	-0.059 (-5.66)***	-0.006 (-0.79)	-0.025 (-3.47)***
C	0.526 (78.04)***	0.193 (33.78)***	0.172 (36.09)***
R-squared	0.853	0.853	0.750
N Obs	21559	21979	22039
F-statistic	24.171	24.628	12.695
Prob(F-statistic)	0.000	0.000	0.000

Notes: CR represent crisis dummy for the crisis period. Total debt is measured as total debt divided by total asset. Long-term debt is measured as long-term debt divided by total asset. Similarly, short-term debt is measured as short-term debt divided by total assets. Definitions of the rest of variables are given in Chapter 3. T-statistics are reported in parentheses; \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

**Table 5.2 Effect of the Financial Crisis on Trade Credit and Trade Debtor**

Model 4 Trade Credit =  $\beta_0 + \beta_1 * CF + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * CF * CR + \mu_{it}$

Model 5 Trade Debtors =  $\beta_0 + \beta_1 * CF + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * CF * CR + \mu_{it}$

Variable	Model 4 (Trade Credit)	Model 5 (Accounts Receivable)
CF	0.046 (4.08)***	-0.057 (-4.78)***
GT	0.009 (2.31)**	0.010 (2.23)**
CR*CF	-0.027 (-2.13)**	-0.018 (-1.25)
GT*CR	0.040 (6.51)***	0.058 (8.63)***
CR	-0.043 (-6.59)***	-0.069 (-9.41)***
C	0.172 (39.73)***	0.227 (43.76)***
R-squared	0.909	0.932
N Obs	10041	10053
F-statistic	32.071	43.417
Prob(F-statistic)	0.000	0.000

Notes: CR represent crisis dummy for the crisis period. Trade credit is measured as trade credit divided by total asset. Trade debtor (accounts receivable) is measured as trade debtor divided by total asset. T-statistics are reported in parentheses \*\*, \*, \* represent 1%, 5% and 10% level of significance respectively.

**Table 5.3 Financial Crisis and Alternative Sources of Finance**

Variable	Model 6 (Net Debt issue)	Model 7 (Net Equity Issue)	Model 8 (Net Trade Credit)
ROA	-1.201 (-9.94)***	-0.062 (-2.27)**	----
GT	0.253 (6.38)***	0.033 (3.44)***	0.002 (-0.59)
CF	----	----	-0.097 (-6.68)***
CF*CR	----	----	-0.004 (-0.25)
CR*ROA	0.269 (2.22)**	0.006 (-0.27)	----
GT*CR	0.168 (2.85)***	-0.027 (-1.83)*	0.014 (1.81)*
CR	-0.256 (-4.16)***	0.04 (3.21)***	-0.019 (-2.33)***
C	-0.026 (-0.61)	0.962 (128.01)***	-0.097 (-6.68)***
R-squared	0.22	0.321	0.883
N Obs	20476	14152	9990
F-statistic	1.111	1.519	24.159
Prob(F-statistic)	0.000	0.000	0.000

Notes: Dependent variable in model 6 is net debt issue which is measured as the change in the sum of short-term debt and long-term debt divided by the sum of the start period of short-term debt plus long-term debt. Similarly, dependent variable in model 7 is net equity issue and is measured as change in the issued capital divided by the start of the period issued capital. In model 8 the dependent variable is net trade credit which is measured as accounts receivable less accounts payable scaled by total assets. Definitions of the rest of variables are given in Chapter 3. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

**Table 5.4 Effect of the Financial Crisis on Cash Reserve and Dividend**

Variable	Model 9 (Cash Reserve)	Model 10 (Dividend)
ROA	----	3.225
GT	5.049 (3.16)***	(6.45)***
CF	22.587 (10.79)***	0.764 (4.07)***
CF*CR	5.021 (1.46)	----
CR*ROA	----	----
GT*CR	-4.524 (-2.77)***	-0.748 (-1.66)*
CR	4.390 (2.27)**	-0.489 (-1.86)*
C	-4.256 (-2.06)**	0.51 (1.84)*
R-squared	0.351	-0.671 (-3.38)***
N Obs	6764	0.351
F-statistic	1.291	6092
Prob(F-statistic)	0.000	1.121
		0.001

Notes: Dependent variable in model 9 is cash reserve which is measured as change in cash and cash equivalent scaled by start period of cash and cash equivalent. Likewise, dependent variable in model 10 is dividend and is measured as change in dividend scaled by start of the period dividend. T-statistics are reported in parentheses. \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

**Table 5.5 Effect of Financial Crisis on Investment and Performance**

Variable	Model 11 (Investment)	Model 12 (Performance)
GT	0.029 (4.54)***	0.057 (13.69)***
CF	0.019 (1.32)	---
TD	---	-0.183 (-19.83)***
TD*CR	---	0.028 (3.98)***
CF*CR	-0.039 (-2.29)**	---
GT*CR	0.041 (4.83)***	0.071 (11.67)***
CR	-0.052 (-5.49)***	-0.093 (-12.94)***
C	-0.010 (-1.46)	0.090 (13.79)***
R-squared	0.337	0.652
N Obs	10078	21559
F-statistic	1.619	7.836
Prob(F-statistic)	0.000	0.000

Notes: Dependent variable in model 11 is investment which is measured as change in fixed assets divided by total assets. Similarly, dependent variable in model 12 is performance which is measured as return on assets. TD is total debt and is measured as total debt divided by total assets. Definitions of the rest of variables are given in Chapter 3. T-statistics are reported in parentheses. \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

**Table 5.6 Effect of Financial Crisis on Liquidity Constraint and Unconstrained Firms**

Model 1 Total debt =  $\beta_0 + \beta_1 * ROA + \beta_2 * GT + \beta_3 * CR + \beta_4 * TD + \beta_5 * ROA * CR + \mu_{it}$

Model 2 Performance =  $\beta_0 + \beta_1 * TD + \beta_2 * GT + \beta_3 * CR + \beta_4 * TD * CR + \beta_5 * TD * CR + \mu_{it}$

Variable	Constraint Firms (Total debt)	Unconstrained Firms (Total debt)	Constraint Firms (ROA)	Unconstrained Firms (ROA)
ROA	-0.256 (-6.63)***	-0.359 (-7.85)***	---	---
GT	0.006 (0.90)	0.054 (3.46)***	0.036 (9.19)***	0.105 (13.18)***
TD	---	---	-0.094 (-8.47)***	-0.070 (-4.24)***
TD*CR	---	---	0.017 (2.22)**	-0.026 (-2.40)***
ROA*CR	-0.162 (-3.04)***	0.202 (3.91)***	---	---
GT*CR	0.022 (1.73)*	-0.030 (-1.68)*	0.038 (6.02)***	-0.058 (-5.41)***
CR	-0.036 (-2.54)**	0.033 (1.77)*	-0.050 (-6.44)***	0.079 (6.35)***
C	0.560 (68.23)***	0.422 (27.19)***	0.057 (7.70)***	-0.013 (-1.32)
R-squared	0.772	0.765	0.585	0.576
N Obs	14881	7650	14881	7650
F-statistic	15.132	14.887	6.292	6.213
Prob(F-statistic)	0.000	0.000	0.000	0.000

Notes: Definitions of variables are given in Chapter 3. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

## **Chapter 6**

### **The Effect of the Recent Financial Crisis on the Financial and Investment Policies of Public Firms**

#### **6.1 Introduction**

Chapter 5 investigated the financial and investment behaviour of UK private firms during the crisis period. In this chapter, the study focuses on UK public listed firms. The chapter explains the effect of the credit crisis on leverage ratio, trade credit (accounts payable), trade debtor (accounts receivable), the behaviour of alternative sources of finance (such as net debt issue, net equity issue, net trade credit and cash reserve), dividend, firms' performance and investment decisions of public listed firms. As in Chapter 5, a total of four different sets of regressions are estimated. The empirical results of these regression models are presented and discussed here.

The main purpose of this chapter is to investigate the financial mix, performance and investment decisions of UK public listed firms during the recent crisis period, and to test whether the effect of credit supply shocks on their financial and investment policies is different from those of private firms. It is also evident from the existing literature that only a limited number of known studies have focused on this issue (see for example, Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a; Tong and Wei 2008). Some of these studies have, however, focused on specific events (for example, Chava and Purnanandam 2011; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a). The focus of the majority of the above-mentioned studies is very narrow with respect to the components of firms' capital structure. As a result, it is not clear from the existing literature which component of the capital structure is more sensitive to credit supply contractions as compared to another. In addition, the above-mentioned studies have not used a comprehensive and up-to-date dataset.

Further, an examination of the findings of the existing published studies reveals that the majority do not reach a unanimous conclusion (see for example, Allen and Carletti 2008; Bakke 2009; Duchin, Ozbas and Sensoy 2010; Iyer et al. 2010; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a). In addition, the majority of them have used data on the US market. Although there are similarities between the US and the UK, there are also differences in accounting regulations, financial reporting requirements, insolvency code, tax system, and corporate governance (see for example, Akbar, Shah and Stark 2011; Beattie, Goodacre and Thomson 2006; Dahya and Travlos 2000; Franks, Nyborg and Torous 1996; Jairo 2004; Kaiser 1996; Rajan and Zingales 1995; Wald 1999) between these two countries, which further highlights the need for more research - as called for by, for example, Bakke (2009) and Lemmon and Roberts (2010). To the best of this author's knowledge, the capital structure, trade credit, performance and investment decisions of public firms during the recent crisis period has not been thoroughly investigated to-date on the UK market. By examining the behaviour of public firms during the crisis period, the author hopes to shed light on these issues.

The rest of the chapter is organized as follows. Section 6.2 provides results of the panel fixed effects regression, and discusses the effect of the credit contractions on leverage ratio of public firms. The empirical results of the trade credit regressions are discussed in Section 6.3. Section 6.4 explains the role of alternative sources of finance (such as net debt issue, net equity issue, net trade credit and internal funds) during the crisis period. Results of the analysis of dividend regression are also discussed in this section. Section 6.5 discusses the effect of the credit contractions on performance and investment of the UK public firms. Robustness tests are explained in Section 6.6. A brief comparison between the financial and investment decisions of private and public firms is given in Section 6.7. The final Section 6.8 concludes the main findings of regression estimation discussed in the results.

## **6.2 Effect of Financial Crisis on Leverage Ratio**

The empirical models discussed in Chapter 3 are estimated in this chapter from the perspective of public listed firms. It is important to highlight that this study uses a comprehensive empirical strategy which helps to identify the effect of the credit supply shocks on the financing mix, performance and investment decisions of firms; and this empirical strategy is briefly recapped here. It consists of three elements, namely identification of exogenous credit crisis, the firm fixed effects model, and firm level control variables. The recent credit crisis 2007-2009 provided such an event; its exogenous nature making it possible to identify the effect of the credit crisis on the financial and investment decisions of firms.

The second element of the empirical strategy is the use of firm fixed effects regression model. As the study is using panel data set, there is a potential concern of unobserved heterogeneity. However, the use of the fixed effects regression model accounts for this problem, because this model has the advantage that it accounts for both observable and unobservable firm characteristics and heterogeneity (Bougheas, Mizen and Yalcin 2006; Gan 2007 a; Mateut, Bougheas and Mizen 2006). Finally, the inclusion of firm level control variables in regression minimizes any demand side concern. In other words, to account for demand side factors, the study includes firm level variables, which are proxy for firm demand.

To examine the effect of the credit crisis on the financial and investment decisions of public firms, the fixed effects regression is first run on total debt ratio of public listed firms over the period 2004-2009. To understand better which components of total debt ratio are sensitive to variations in the supply of credit, the total debt ratio of firms is divided into its components and then separate regressions are run on each of these variables. The division of total debt into its components will help to identify the supply channel(s) which is vulnerable to the exogenous credit crisis and to better comprehend the substitution across the external credit sources.

The fixed effects regression model 1 is run on total debt ratio of firms; and results from the estimation of model 1 are presented in Table 6.1. The research approach to

interpret the results of regression models reported in Table 6.1 and in the subsequent tables is as follows. Cr' represents the crisis dummy for the crisis period (2007-2009). The impact on dependent variable during the crisis period is given by the sum of the coefficient associated with the given variable and variable interacted with the crisis dummy. The crisis dummy is interacted with the control variables to determine the change in response to the pre-crisis period and the net response during the crisis period is found by adding the coefficients. The coefficient referring to the pre-crisis period is given by the non-interacted variables.

The results of model 1 show that all independent variables demonstrate the expected signs. The control variables' signs are generally consistent with the existing studies. Some variables are, however, not statistically significant at conventional levels. It might be that the crisis has changed the role of some firm-specific factors. For instance, Deesomsak, Paudyal and Pescetto (2004) observe that the financial crisis of 1997 has modified the role of firm-specific factors. They find that the relationship between leverage and firm-specific variables varies between the pre and post financial crisis period. Similarly, the sign and significance of the control variables varies between the pre and crisis period.

As expected, the results of model 1 reveal that the coefficient on return on assets (ROA) variable is negative in both pre and crisis period. The coefficient on ROA is statistically significant at 1% level in the pre-crisis period. The negative coefficient and significant result of ROA is consistent with the prediction of the pecking order theory which says that firms prefer internal sources of fund over external sources of fund. In other words, the availability of internal fund reduces the probability of relying on external finance. This finding is consistent with the existing studies on capital structure that have analysed the determinants of firms' capital structure (see for example, Antoniou, Guney and Paudyal 2008; Friend and Lang 1988; Leary 2009; Noulas and Genimakis 2011; Ozkan 2001; Rajan and Zingales 1995; Titman and Wessels 1988).

The coefficient on ROA interacted with the crisis dummy variable is negative but statistically insignificant. Interestingly, ROA during the crisis period is not significant,

which may indicate that public firms do not consider performance in making their financing decisions during the crisis period. A similar result is also reported by Deesomsak, Paudyal and Pescetto (2004). In their cross-sectional analysis, the results find that sign and significance of profitability variable varies in leverage regression between the post and pre-crisis period in their sample of countries. There are other studies which did not find conclusive evidence that profitability is an important factor in firms' financing decisions (see for example, Fattouh, Scaramozzino and Harris 2005; Franks, Nyborg and Torous 1996; Krishnan and Moyer 1997). However, as explained before, the crisis may have altered the relationship between debt ratio and some firm-specific variables. Deesomsak, Paudyal and Pescetto (2004, p. 400) argue "... *that the crisis appears to have affected the process of capital structure decision, implying that major changes to the overall economic environment may significantly alter the determinants of firm's decisions*".

The estimation results of model 1 further highlight that coefficient on the growth variable is positive in both the pre and crisis period. It is, however, significant only in the crisis period. The positive coefficient on the growth variable is consistent with previously published studies (Chen 2004; Colombo 2001). It indicates that growing firms need more external finance during the crisis period. This might be because these firms do not have sufficient internal funds to finance their growth and, therefore, seek more external finance (Michaelas, Chittenden and Poutziouris 1999 a). The result, however, appears in contrast with the majority of previously published studies, which have reported the opposite (see for example, Antoniou, Guney and Paudyal 2008; Barclay and Smith 1995 ; Leary 2009; Ozkan 2001; Rajan and Zingales 1995). The lack of significance of growth variable in the pre-crisis period may indicate that growth does not play a significant role in the firms' financing decisions during normal time periods. A similar result is also reported in Titman and Wessels (1988) and Krishnan and Moyer (1997). These studies did not support the view that growth variable plays an important role in firms' financing decisions.

The lack of significance of growth variable may be due to poor proxy for the growth opportunity. In other words, sales growth may be an inappropriate measure to capture the growth opportunity. There is also lack of consensus in the existing literature on the

good measure of growth opportunity. Previous studies have used different measures to capture the effect of growth opportunities on leverage ratio. For example, many studies have used market to book value of assets as a proxy for growth opportunity (Bevan and Danbolt 2002; Leary 2009; Rajan and Zingales 1995). Other studies have used growth in sales as a proxy for growth opportunity (see for example, Atanasova and Wilson 2003; Cassar and Holmes 2003; Dessi and Robertson 2003; Manohar and Faircloth 2005).

However, according to Delmar, Davidsson and Gartner (2003), none of the proxies are free from the influence of other effects. Similarly, Dessi and Robertson (2003) observe that there is no good proxy that adequately captures the effect of firms' growth opportunity. The coefficient on the growth variable interacted with the crisis dummy variable is, however, positive and significant at the level of 1% or better. This implies that firms with more growth opportunities need more external finance during the crisis period. The positive coefficient on the growth variable is consistent with the previous literature (see for example, Chen 2004; Colombo 2001). Having explained the effect of the control variables on dependent variable, this study now focuses on the main variable of interest.

Results from the estimation of model 1 are reported in Table 6.1. The results of model 1 reveal that coefficient on the crisis dummy variable is negative and significant at the level of 5%. It is important to highlight that the coefficient on the crisis dummy indicates the change from the pre-crisis period to during the crisis period. The negative coefficient on the crisis dummy shows that financial crisis has a negative impact on firms' total debt ratio. More specifically, the credit crisis leads to a 1.3% decrease in total debt ratio. Since total debt encompasses all forms of debt (such as short-term debt, long-term debt and trade credit), this implies that aggregate external financing activities of public listed firms contracted in response to the exogenous credit crisis.

This finding is in line with the existing literature. Lemmon and Roberts (2010), for example, find that aggregate external financing activities of below investment grade firms contracted following a negative shock to the supply of credit. The result however, seems to be in contrast with the findings reported in Lin and Paravisini (2010

a) that credit contraction has no effect on firms' total debt ratio. Similarly, Iyer et al. (2010) find that the 2007-2009 financial crisis did not disturb the flow of credit to large firms in Portugal. Overall, the results of model 1 show that, on average, public firms experienced reduction in the flow of external debt following negative shocks to the supply of credit.

The results of model 1 confirm the predictions of the recent studies, which suggest that supply of capital is an important determinant of firms' financing decisions (see for example, Faulkender and Petersen 2006; Leary 2009; Lemmon and Roberts 2010; Rehman and Akbar 2011a; Voutsinas and Werner 2011). However, the results of model 1 do not reveal which component of total debt ratio is affected by the credit supply shock. To understand better the response of individual components of capital structure to the credit supply shocks, the study divided the total debt into its components, such as long-term debt, short-term debt and trade credit, and ran separate regression on each of these variables. The aim is to better comprehend the exact channels through which supply shock travels. In other words, to identify which channels are affected by the recent panic in the financial market. It also helps to understand and quantify the substitution across the credit sources. The study focuses on the crisis period in the subsequent models.

In model 2 the fixed effects regression model is run on long-term debt and the estimation results are reported in Table 6.1. The results of model 2 reveal that coefficient on ROA interacted with the crisis dummy is negative and significant at the level of 1%. This suggests that if firms have more internal finance they would be less likely to use external finance, consistent with the predictions of the pecking order theory. The negative relationship between ROA and long-term debt is consistent with Van der Wijst and Thurik (1993), who also find a negative relationship between long-term debt and leverage in their sample of firms.

Further, model 2 reveals that coefficient on growth variable interacted with the crisis dummy variable is positive and significant. The positive coefficient on the growth variable is consistent with the previous literature (see for example, Chen 2004; Colombo 2001). However, the result of this current study appears in contrast with

some of the existing studies (for example, Deesomsak, Paudyal and Pescetto 2004; Leary 2009), which report a negative relationship between growth and leverage ratio. Also Barclay and Smith (1995 ) observe that firms with few growth options have more long-term debt in their capital structure. The positive relationship that this study observes between growth and long-term debt suggest that growing firms use more long-term debt during the crisis period. To put it another way, it suggests that, the more growth opportunities firms have, the more they will use long-term debt.

The study now focuses on main variable of interest, that is, crisis dummy. The coefficient on the crisis dummy variable is negative, which signifies that the financial crisis has negatively affected the long-term debt ratio of public listed firms. However, it is statistically not significant; therefore, a robust conclusion could not be drawn. The lack of significance may suggest that the crisis has not affected the long-term financing channel of public firms. This result seems to be inconsistent with the findings reported in Lemmon and Roberts (2010), who find that supply contractions have negatively affected the long-term net debt issuance of the below-investment-grade firms. In a nutshell, the findings of model 2 suggest that the credit crisis has not much affected the long-term financing channels of public firms.

Next, the study focuses on short-term financing channel. The panel fixed effects regression model 3 is run on short-term debt, which is defined as debt which is repayable within one year, and consists of bank overdraft, note payable, the current portion of long-term debt<sup>68</sup>, etc. Results from the estimation of model 3 are presented in Table 6.1. Interestingly, none of the control variables interacted with the crisis dummy variable are significant at any conventional level. The coefficient on ROA interacted with the crisis dummy is negative but insignificant. Likewise the coefficient on the growth variable interacted with the crisis dummy is negative but lacks significance.

Literature suggests that, to analyse the components of total debt separately, makes the analysis very difficult (Kasseeah 2008). This might be because factors which affect the

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<sup>68</sup> For more information see Appendix 1.

long-term debt might not affect the amount of short-term debt (Bevan and Danbolt 2002; Titman and Wessels 1988). Bevan and Danbolt (2002), for example, highlight difficulties in measuring the gearing ratio, and conclude that determinants of leverage vary significantly between short-term and long-term debt. The lack of significance could also be attributed to the fact that crisis may modify the factors which affect firms' financing decisions (Deesomsak, Paudyal and Pescetto 2004).

The coefficient on the crisis dummy variable in the short-term debt regression is positive indicating that the flow of short-term credit to public listed firms increased. The result is, however, not statistically significant at the conventional level. The positive coefficient on the crisis dummy in short-term debt regression is consistent with the existing studies. For instance, Gertler and Gilchrist (1993) find that, following the tightening of monetary policy, supply of bank credit to small firms decreased while flow to large firms increased. Results of model 3 suggest that crisis has no statistical significant impact on the short-term financing channel. In other words, the flow of short-term credit to large firms is not significantly affected by the recent credit retrenchments.

To summarise, the results reported in Table 6.1 highlight that contractions in the supply of credit have negative impact on total debt ratio of the UK public listed firms. This suggests that aggregate external credits flow to these firms squeezed during the crisis period because total debt encompasses all forms of debt. The results further highlight that effect of the credit crisis on long-term debt and short-term debt is statistically not significant. This may suggest that panic in the financial market has not much disturbed the flow of short-term and long-term credit to these firms. The results confirm that change in the leverage ratio of the public firms is caused by the contractions in the supply of capital and is not driven by any demand side factors. The use of the firm fixed effects model and control variables helped to disentangle the supply effect from the endogenous demand side factors.

Next, the study investigates how public listed firms manage their financial policies during the crisis period; in other words, whether public firms substitute to alternative sources of finance when the supply of credit squeezed. To be consistent with the

previous chapter, the study first investigates the effect of the credit crisis on trade credit. The aim is to better understand the exact nature of trade credit during the crisis period. In the following section, the study investigates the effect of the financial crisis on a broader set of alternative sources of finance (such as net debt issue, net equity issue, internal finance and net trade credit). This section also explains the effect of the credit crisis on dividend payout policy of the public firms.

### **6.3 Trade Credit and Financial Crisis**

It is argued that, when a financial crisis squeezes the availability of credit, firms increase the use of alternative sources of finance. The significance of these alternative sources increases during the crisis period, when credit becomes harder to obtain from the financial market (Leary 2009; Lin and Paravisini 2010 a; Massa, Yasuda and Zhang 2009). Trade credit is one such alternative source of finance. It has also been shown that trade credit is a significant source of short-term finance (Berger and Udell 1998) for both small and large firms<sup>69</sup>. Other studies, such as Bevan and Danbolt (2002), argue that trade credit accounts for 62% of total liabilities of UK firms.

The use of trade credit as a source of short-term finance is, however, the subject of much debate in the existing literature (see for example Chapter 2, for more details). Its role as a potential substitute for bank credit is mostly examined from the perspective of small firms during periods of tight monetary policy. As explained in Chapter 2, when the findings of the existing published studies are reviewed, it seems that the majority of these studies do not point towards unanimous conclusion. This suggests a lack of consensus among researchers which, along with mixed and inconclusive evidence has brought the issue to the attention of academicians and researchers. By examining the behaviour of trade credit and trade debtor during the financial crisis period, it is hoped that this research will shed further light on these issues. In other words, the study examines the behaviour of trade credit (accounts payable) and trade debtor (accounts receivable) of UK public firms during the recent financial crisis period.

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<sup>69</sup> See for example Table (1 p. 8) in Oliner and Rudebusch (1995)

In model 4 the fixed effects regression is run on trade credit, to investigate its behaviour during the crisis period. Results from the estimation of model 4 are presented in Table 6.2. The dependent variable in the model is trade credit, which is measured as trade credit divided by total assets. Following previous literature (for example, Love, Preve and Sarria-Allende 2007), the control variables in this regression model are crisis dummy variable, cash flow scaled by total assets, sales growth and their interaction with the crisis dummy. Results from the analysis of model 4 show that the majority of the control variables are significant. The value of R-square is 82%, which shows that the model is best fit.

The results reveal that coefficient on the cash flow interacted with the crisis dummy variable is negative<sup>70</sup> and is significant at the level of 1%. The negative coefficient on the cash flow variable indicates that internally generated fund negatively affect the firm's demand for external credit (trade credit) during the crisis period. This is consistent with the pecking order theory, i.e., the more internally generated fund is available, the less a firm needs external finance (trade credit). This implies that internal fund is an important alternative to trade credit. This finding is consistent with previous studies (see for example, Atanasova and Wilson 2003; Atanasova and Wilson 2004; Love, Preve and Sarria-Allende 2007).

Similarly, the coefficient on the sales growth interacted with the crisis dummy variable is positive but insignificant. The positive coefficient on the growth variable in trade credit regression is consistent with the previous literature (Atanasova and Wilson 2003; Atanasova and Wilson 2004). The result, however, lacks significance, which indicates that sales growth does not affect the public firms' decision to take trade credit during the crisis period. It further highlights that coefficient on main variable of interest is negative and significant at the level of 1%. The negative coefficient of the crisis dummy in trade credit regression highlights that the flow of trade credit to public firms reduced during the crisis period. In other words, the financial crisis has adversely affected the flow of trade credit to public firms.

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<sup>70</sup> The coefficient on the cash flow is also negative, which supports the predictions of the pecking order theory. This means that there is no difference between two periods as for the pecking order theory is concerned.

This study's results parallel the findings reported in Kohler, Britton and Yates (2000), who examine the trade credit behaviour of UK quoted firms during a period of tight monetary policy. Their results reveal that quoted firms received less trade credit during the recession period. The results also confirm the findings reported in Lemmon and Roberts (2010). They do not find that below investment grade firms' substitute to trade credit to lessen the effect of the credit supply contractions. This current study's findings are also consistent with the previous literature (see for example, Bernanke and Gertler 1995; Gertler and Gilchrist 1993; Lemmon and Roberts 2010; Oliner and Rudebusch 1996).

The results, however, appear at odd with Wilson, Le and Wetherhill (2004) who find that large firms receive more trade credit from their suppliers following tight monetary conditions. The finding regarding trade credit also appears in contrast with Petersen and Rajan (1997), Biais and Gollier (1997), Nilsen (2002) and Atanasova and Wilson (2003, 2004). All these researchers reported that firms increase the use of trade credit when supply of the credit squeezed; however, the results of this current research extends the trade credit literature, first, by examining the behaviour of trade credit of public firms during the recent crisis period. Second, the results suggest that flow of trade credit to public firms' is sensitive to credit supply shocks.

Further, the results also reveal the lack of substitution towards this source of short-term finance. In other words, reduction of this source of short-term finance implies that public firms do not hedge themselves from the effect of credit supply contractions by resorting to trade credit. This may be due to the fact that large firms have several options to raise funds, for instance, large firms can obtain funds through equity, public debt and commercial paper (Gertler and Gilchrist 1994). In addition, trade credit is an expensive source of finance, if the early discount offered is not taken up (Elliehausen and Wolken 1993). In sum, financial crisis has negatively affected the flow of trade credit to public listed firms.

As total debt consists of all forms of credit such as short-term debt, long-term debt and trade credit, it therefore seems that total debt ratio is driven by reduction in the flow of trade credit. In other words, it is the trade credit that has driven total debt ratio into

negative during the crisis period because the financial crisis has no statistical significant effect on short-term and long-term debt ratio. Moreover, the reduction in the flow of trade credit does not support the substitution view of trade credit but rather it supports the complementary view of trade credit, i.e., when the supply of credit squeezes, supply of trade credit also squeezes, consistent with the findings in Taketa and Udell (2007), and Love and Zaidi (2010).

To conclude, the results of model 4 show that flow of trade credit to public listed firms reduced during the recent crisis period. However, as mentioned in the previous chapter, trade credit is a two-way process. Its two-way nature makes it necessary for researchers to also examine the behaviour of accounts receivable, which will reveal the exact role of trade debtor (accounts receivable) during the financial crisis period. It will also help to better understand the two-way nature of trade credit during the recent credit crisis period.

In order to investigate the behaviour of accounts receivable during the crisis period, in model 5 the fixed effects regression model is run on accounts receivable. In this model the dependent variable is accounts receivable (trade debtor) which is measured as accounts receivable scaled by total assets. The control variables used in this model are the same as used in the trade credit regression. Results from the estimation of model 5 are presented in Table 6.2. The value of R-Square is 70%, which indicates that the model is best fit. The results reveal that coefficient on the cash flow interacted with the crisis dummy variable is negative but statistically insignificant. This implies that cash flow is not a significant determinant of firms' trade credit decisions during the crisis period. The results further highlight that coefficient on the growth variable is negative and statistically significant. It implies that, the more growth opportunities firms have, the less they extend trade credit to their customers during the crisis period; this is also consistent with the findings in Wilson, Le and Wetherhill (2004).

The coefficient on the crisis dummy is positive and significant at the level of 5%. The positive coefficient on the crisis dummy variable shows that accounts receivable of public firms increased during the crisis period. To state this differently, with reduction of the credit supply, public firms increased the extension of trade credit to their

customers. This result appears to be consistent with Wilson, Le and Wetherhill (2004). They examine the role of trade credit in the UK during a period of tight monetary policy, and observe a positive relationship between accounts receivable and monetary policy measure. In other words, their results find that large firms offer more trade credit to their customers during tight monetary conditions.

As public firms have access to the capital market, therefore, they may extend more credit to their customers during the crisis period. It is because firms' accessibility to financial intermediaries' credit increases the probability that firms will offer more trade credit (Petersen and Rajan 1997). Moreover, Calomiris, Himmelberg and Wachtel (1995) show that financially sound high quality firms issue more commercial paper during an economic downturn to finance the accounts receivable of firms. In other words, they extend more trade credit during economic downturns to support the short-term financing needs of those firms which have no access to the public capital market. Thus, these firms serve as intermediaries during downturn. The results of this research regarding accounts receivable are generally consistent with the findings of the above-mentioned studies.

On balance, the results of model 4 and model 5 reported in Table 6.2 do not support the substitution role of trade credit during the crisis period. This implies that public firms are not dipping into this source of short-term finance to immune themselves from the negative effect of credit contractions. The results suggest that flow of trade credit to public firms is squeezed during the crisis period, supporting the complementary view of trade credit. Although the accounts payable (trade credit) of public firms decreased, the accounts receivable (trade debtor) of these firms increased during the crisis period. This highlights that public firms extend more trade credit to their customers during the credit crisis period. As noted in Section 4.5.2, that sales growth of the public firms decreased during the crisis period. Therefore, the other reason may be that public firms want to maintain or increase their sales figures during the crisis period so, as a result, they offer more credit to their customers. The result further highlights that public firms extend more trade credit but receive less during the crisis period.

To summarize the above discussion, the results reported in Table 6.1 and 6.2 suggest that credit drought has adversely affected the total debt ratio of public firms. It highlights that credit contraction has no statistical significant impact on short-term and long-term debt ratio. Further, the results reveal that it is the trade credit channel that is impaired by the financial crisis, i.e., the credit crisis has reduced the availability of trade credit to these firms during the crisis period and, hence, the result does not support the substitution role of trade credit during the time of the crisis period. The results in Table 6.2, however, reveal that public firms extend more trade credit to their customers during tight credit conditions.

The results contribute to the existing literature on corporate finance by providing evidence from the perspective of the UK public firms during the recent crisis period. The contribution to the literature is that the results suggest that short-term and long-term debt is not sensitive to credit contractions; rather it is the trade credit channel that is sensitive to variations in the supply of credit. Secondly, the results contribute to the existing literature on trade credit, first: by examining the behaviour of trade credit beyond the tight monetary policy. Second, by suggesting that credit crisis reduced the flow of trade credit to public firms and, hence, does not support the substitution role of trade credit during the recent crisis period. Next, the results reveal that public firms help out their customers by extending more trade credit to them during the crisis period.

The above discussion focused on one alternative source of short-term finance, i.e., trade credit during the crisis period. There are, however, other sources of alternative finance such as net debt, net equity, and internal funds. In the next section, the study examines the behaviour of a broader set of alternative sources of finance. Specifically, the study examines the effect of the financial crisis on net debt issue, net equity issue, net trade credit, internal finance and dividend. In the subsequent section, the study focuses on the effect of the financial crisis on the firms' performance and investment decisions.

## 6.4 The Use of Alternative Sources of Finance

No one can deny the significance of alternative sources of finance especially in times when availability of credit is harder to obtain. Substitution towards alternative sources of finance reduces the negative effect of credit contractions (Leary 2009; Lin and Paravisini 2010 a). Leary (2009) for example, argues that firms substitute to alternative sources of finance when supply of bank credit squeezes. To investigate whether public firms substitute to alternative sources of finance to offset the adverse effect of credit contractions, the fixed effects panel regression is run on net debt issued, net equity issued, net trade credit, internal finance and dividend.

The fixed effects panel regression model 6 is run on net debt issued and results from the analysis of model 6 are presented in Table 6.3. The control variables used in this model are the same as used in total debt regression. Results of the analysis reveal that coefficient on the crisis dummy variable is negative and is weakly significant. The negative coefficient on the crisis dummy variable implies that net debt issuance of the public firms is reduced during the credit contractions' period, although the result is statistically weak ( $p$ -value of 0.09). In other words, the financial crisis has adversely affected the debt issuance activities of public firms during the crisis period. It suggests that public firms are not substituting towards debt issue during the recent crisis period. This result further confirms that supply of capital does affect firms' financing decisions.

Next, the net equity issue of public firms is examined. Equity finance is generally considered as an important alternative source of finance when the supply of credit becomes scarce. To investigate the behaviour of equity issue during the crisis period, the fixed effects regression model 7 is run on net equity issued; and the estimation results are reported in Table 6.3. Interestingly, the results of model 7 reveal that coefficient on the crisis dummy variable is negative and significant at the level of 1% or better. This suggests that net equity issue of public firms is adversely affected by the credit contractions. The reduction of net equity issue implies that these firms repurchased back equity (by 2.15%) during the crisis period.

The reduction in equity issue highlights that public firms are not substituting to equity finance to lessen the effect of the exogenous shocks to the supply of credit. Further, the results suggest that these firms reduced the equity by repurchasing it. This result is in line with the existing studies. For instance, the study by Lemmon and Roberts (2010) finds limited evidence of substitution towards alternative sources of finance (such as short-term debt, equity, and trade credit). This result, however, appears in contrast with the findings of Leary (2009), Lin and Paravisini (2010 a) and Massa, Yasuda and Zhang (2009). These authors argue that firms substitute to equity finance when credit becomes difficult to obtain from the financial market.

It is generally argued that managers consider the stock prices, when making equity issue decisions (Graham and Harvey 2001). There is also a good deal of literature which has documented that equity issue is sensitive to stock prices, i.e., firms prefer to issue equity when stock prices are high (see for example, Asquith and Mullins 1986; Baker and Wurgler 2002; Dittmar and Thakor 2007; Jung, Kim and Stulz 1996; Mikkelson and Partch 1986). Moreover, firms repurchase stock when stock prices are generally low, for example, during the crises period. In addition, as shares are not repurchased as frequently as dividends, hence the firms may choose not to pay dividends but to repurchase shares during the crises period using their excess cash reserves. Repurchasing shares is similar to investing in their own stock at the cost of their equity capital without significantly affecting their cost of capital or capital structure. The other motivation for share buy-backs may be to achieve an optimum capital structure (see for example, Dixon et al. 2008, for details). This study's result adds to this strand of literature by suggesting that public firms' equity issue (or repurchase) decision is also sensitive to variations in the supply of external credit.

The fixed effects regression model 8 is run on net trade credit, in order to investigate its behaviour. In this model, dependent variable is net trade credit which is measured as accounts receivable minus accounts payable divided by total assets. The control variables used in this model are the same as those used in the trade credit and trade debtors' regression models. Results from the estimation of model 8 are reported in Table 6.3. The results reveal that coefficient on the crisis dummy variable is negative and significant at the level of 5%. The negative coefficient on the crisis dummy

implies that net trade credit reduced during the crisis period. This is evidence that public firms do not substitute to trade credit. It further confirms this study's earlier findings that public firms experienced reduction in the flow of trade credit during the crisis period.

The overall conclusion drawn from models 4 and 5 reported in Table 6.2 and model 8 presented in Table 6.3 is that public firms experienced reduction in the flow of trade credit during the crisis period. In other words, the results reported in the above tables do not support the substitution view of trade credit, but rather support the complementary view of trade credit. The results further highlight that accounts receivable of these firms increased during the crisis period, suggesting that these firms extended more trade credit to their customers during periods of credit crisis.

Next, the study examines whether public firms dip into cash reserve when availability of credit becomes scarce. In order to investigate this further, the fixed effects regression model 9 is run on cash reserve. The dependent variable is cash reserve, which is measured as change in cash and cash equivalent scaled by start of the period cash and cash equivalent. Results from the estimation of model 9 are reported in Table 6.4; and reveal that sign on the crisis dummy variable is negative and significant at the level of 1% or better. The results show that public firms burn (0.90%) more cash during the crisis period. The reduction of cash reserve indicates that public listed firms used more internal funds to finance their operations and also to immune themselves from the adverse effect of credit supply contractions.

This result is consistent with the previous published studies (see for example, Campello, Graham and Harvey 2010; Leary 2009). Leary (2009), for example, argues that firms use all forms of alternative financing (including internal finance), when they face restricted access to credit. Likewise, other studies such as Campello, Graham and Harvey (2010) conducted a survey of chief financial officials and concluded that firms burn more cash during the crisis period. However, this result appears in contrast with the findings in Lemmon and Roberts (2010). They find lack of substitution towards alternative sources of finance (including internal funds) following negative shocks to the supply of credit. The results of the current research add to this strand of literature

by suggesting that public firms use more internal funds during the crisis period, to minimize the adverse effect of credit shortage. In addition, as shown above, the equity issue of these firms declined during the crisis period, which suggests that cash reserve might have been used to finance the equity repurchases.

Finally, the study also examines whether public firms adjusted their dividend payout policy during the recent crisis period to maintain their financial slack. It is generally argued that, when external credit becomes difficult to obtain, firms scale back shareholder dividend, to keep their financial slack. To investigate this further, the fixed effects regression model 10 is run on change in dividend. In this model, the dependent variable is change in dividend divided by start of the period dividend. The control variables are same as used in other models. The estimation results of model 10 are presented in Table 6.4.

Results from the estimation of model 10 reveal that coefficient on the crisis dummy is negative and significant at the level of 5%. The negative coefficient on the crisis dummy variable indicates that public firms have reduced dividend payout. In other words, these firms scaled back shareholder dividends (by 0.25%) during the crisis period and that the spare cash may have been used to repurchase shares. The reduction in dividend payout highlights that public firms adjusted their dividend policies during the crisis period to maintain their financial slack. This finding is in line with the results of Campello, Graham and Harvey (2010), who also report that firms have deeper cuts on dividend distributions during the recent crisis period. The result, however, is inconsistent with the findings in Lemmon and Roberts (2010), which reveal that below investment grade firms do not dip into cash reserve nor reduce dividend to keep their financial slack in response to the credit supply contractions. The result of the current research adds to the findings of the above-mentioned studies by suggesting that dividend payout of public firms are sensitive to the credit market conditions.

To conclude all the above discussion, the results reveal that financial crisis has adversely affected the total debt ratio of public listed firms. The effect of the credit crisis on short-term and long-term debt is statistically not significant. Further, it reveals that it is the trade credit channel that is impaired by the recent credit crisis. As

a result, public firms increased the use of internal finance in order to hedge themselves from the adverse effect of credit contractions. In other words, these firms burn more cash during the crisis period. These firms also adjusted their dividend payout in response to the exogenous credit contractions in order to preserve their financial slack. Moreover, the decrease in cash reserve and equity issue suggests that cash reserve may have been used to finance the equity repurchases. The study, however, does not find any evidence that public firms substitute to net debt issue, equity finance and net trade credit. These firms, however, extend more trade credit to their customer during the crisis period.

## **6.5 Effect of the Financial Crisis on Firms' Performance and Investment**

One of the objectives of this study is to examine the behaviour of firms' investment and performance during the crisis period. To achieve these objectives, the fixed effects regression model 11 is run on firms' investment. Dependent variable in this model is investment, which is measured as change in firms' fixed assets scaled by total assets. Results from the estimation of model 11 are presented in Table 6.5, and reveal that sign of the control variables are consistent with the existing literature (see for example, Duchin, Ozbas and Sensoy 2010). The coefficient on the cash flow interacted with crisis dummy variable is positive and significant at the level of 5%. This suggests that the higher the firms generate internal funds during the crisis period, the more they invest in tangible assets.

The coefficient on the growth variable interacted with crisis dummy is positive but statistically insignificant. The lack of significance suggests that growth opportunities do not affect firms' decision to invest during the crisis period. The results further reveal that coefficient on the main variable is negative and statistically significant at the level of 1% or better. The negative coefficient indicates that investment as a fraction of total assets declined (by 1.9%) as a consequence of reduction in the availability of credit. This implies that non-availability of external credit has negatively affected the investment of public listed firms.

The results highlight that investment of public firms declined as a consequence of credit drought, which suggests that investment decisions of these firms are sensitive to the availability of external credit. This finding is consistent with the existing studies<sup>71</sup> (see for example, Campello, Graham and Harvey 2010; Duchin, Ozbas and Sensoy 2010; Gan 2007 a; Gan 2007 b; Rungsomboon 2005; Saarenheimo 1995). Duchin, Ozbas and Sensoy (2010), for example, examine investment behaviour of US public listed firms during the recent financial crisis period, and find that it declined following the subprime crisis. Their results further reveal that decline in investment is greater in firms which have low pre-crisis cash reserves. Other studies, such as Lemmon and Roberts (2010), also report that net investment of the below investment grade firms declined following contractions in the supply of credit caused by the collapse of Drexel Burnham Lambert Inc, and some regulatory changes.

Similarly, Campello, Graham and Harvey (2010) survey 1050 CFOs in the US, Europe and Asia. Their findings reveal that firms reduced investment during the credit crisis 2008. In a related work, Almeida et al. (2009) report that firms whose large fraction of long-term debt matured during the crisis experienced reduction in investment. This is because of the difficulty firms' face in refinancing the matured portion of debt due to credit contractions. In other words, firms whose long-term debt matured right after the crisis respond by reducing investment relative to otherwise similar firms whose debt matures well beyond 2008. The results of the current research contribute to this strand of literature, first, by providing evidence from the perspective of the UK public firms using the most up-to-date dataset; and secondly, by suggesting that investment decisions of public firms are vulnerable to availability of external credit during the crisis period.

Finally, the effect of credit contractions on performance of public listed firms is examined. In model 12 the fixed effects regression model is run on performance. The dependent variable in this model is performance and is measured as return on assets. The control variables in this model are crisis dummy, sales growth, total debt and their

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<sup>71</sup> The study by Kashyap, Lamont and Stein (1994) find that inventory investment of firms declined following tight monetary policy. A similar result is also reported by Gertler and Gilchrist (1993, 1994) and Bernanke, Gertler and Gilchrist (1996).

interaction with the crisis dummy indicator. Results from the estimation of model 12 are given in Table 6.5. The results reveal that coefficient on the crisis dummy variable is negative and statistically significant at the level of 5%, which indicates that performance of these firms is adversely affected by the credit crisis. The coefficient for the crisis dummy variable is also economically significant.

The negative coefficient reveals that performance of these firms declined (by 2.9%) during the recent crisis period. This implies that the inability of firms to obtain external credit has adversely affected their performance. These results are again consistent with the findings of previous literature (for example, Chava and Purnanandam 2011; Jeon and Miller 2004). Chava and Purnanandam (2011), for example, examine the effect of deteriorating bank health on bank-dependent firms' performance. Their results reveal that profitability of bank-dependent firms declined following shocks to bank capital. Similarly, the study by Tong and Wei (2008) also observes that subprime crisis has adversely affected the stock prices of firms.

In order to check the robustness of this finding, the study also runs the fixed effects regression on return on equity<sup>72</sup>. The dependent variable here is return on equity. In order to save space, the study does not report the statistics. The unreported results reveal that this result is qualitatively similar to the study's earlier findings. In other words, the return on equity also decline during the credit contractions period.

The estimation results of model 11 and model 12 reported in Table 6.5 show that public listed firms experienced decline in performance and investment in fixed assets. In other words, the non-availability of external credit has adversely affected both the firms' investment and performance. These findings are again consistent with those of recent published studies (see for example, Campello, Graham and Harvey 2010; Duchin, Ozbas and Sensoy 2010; Gao and Yun 2009; Tong and Wei 2008). All these studies reported similar results. The bottom line is that panic in the financial market has imposed significant cost on the public listed firms. This suggests some real costs of the financial crisis.

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<sup>72</sup> In addition, the study also runs the fixed effects regression model (12) on Tobin's Q. It can however, be noted that the results of the regression model are qualitatively similar to the study's earlier findings.

The results contribute to the existing literature on firms' performance and investment, first, by providing evidence from the perspective of the UK public firms during the recent crisis period. The second contribution is the use of a comprehensive and up-to-date dataset. The results also supplement the findings of studies using the US market data. Although there are significant institutional differences between the two countries, this study's results are generally consistent with the findings of studies based on the US market data. The findings of this study can also be generalized to other settings with similar legal and institutional jurisdictions.

## **6.6 Robustness Checks**

The study conducts a number of alternative tests to check the robustness of the empirical strategy. To be consistent with the previous chapter, the study classified its sample firms into two groups based on their average pre-crisis liquidity position. The study used cash and cash equivalent as a measure of liquidity and reclassified sample firms based on their average pre-crisis liquidity level<sup>73</sup>. The study put all those firms whose cash and cash equivalent as a fraction of total assets is less than or equal to sample mean into one group and called it liquidity constraint. Similarly, firms whose average cash and cash equivalent as a fraction of total assets is greater than the sample mean are termed liquidity unconstraint.

The study predicts that the effect of the financial crisis would be more pronounced on liquidity constraint firms than on unconstraint firms, as obtaining external credit would be more difficult for the former during the crisis period. In order to test this prediction, the fixed effects regression model is run on both groups of firms separately and the regression results are reported in Table 6.6. They reveal that the financial crisis has adversely affected the total debt ratio and performance of constraint firms<sup>74</sup> while its

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<sup>73</sup> Sample firms were also reclassified based on their median pre-crisis liquidity level. The unreported results reveal that effect of financial crisis on total debt ratio of both types of firms is statistically insignificant. However, the financial crisis has adversely affected the performance of constraint firms while its effect on unconstraint firms is statistically not significant.

<sup>74</sup> Only the total debt and performance of these firms was examined. In other words, regression was run only on total debt and performance of constrained and unconstrained firms. This is because the main aims of these regressions are to check the robustness of the results and empirical strategy and not to examine the behaviour of constraint and unconstraint firms', which is beyond the scope of this research.

effect on unconstraint firms is statistically not significant. This implies that the credit crisis has a pronounced effect on the liquidity constraint firms. In other words, ex-ante liquidity constraint firms are more affected than unconstraint ones. This is consistent with the existing literature and also with the credit supply effect.

The second robustness test is the Hausman specification test. As the study used the fixed effects regression model, in order to formally test whether this model is the appropriate one for this study, Hausman (1978) specification test was performed to compare the fixed effects model with the random effects model. One of the assumptions of the random effect model is that, the individual effect would be uncorrelated with the control variables. If this is the case, then both the fixed effects and random effect estimates should yield similar results. In other words, they should not be statistically different.

In order to test this, the study performed the Hausman model specification test. However, to save space, the statistics are not reported here. In unreported analysis, the study finds that test results reject the null hypothesis. In other words, test results suggest that the fixed effects model is better than the random effects model. Hence, the Hausman test also supports the use of the fixed effects over and above the random effects model. On the basis of this result, this study argues that the use of the fixed effects model is more appropriate for investigating this issue. In other words, it is the best model in this case. This confirms that this empirical strategy is the most appropriate strategy for investigating this issue.

The study also addressed the other econometric issues such as heteroscedasticity and serial correlations, both of which affect the efficiencies of estimated coefficients. If not properly addressed, these issues can also bias the estimation results. The study addressed them by adjusting the standard errors that are robust to serial correlations (Arellano 1987; White 1980). All the reported t-statistics in the tables below are based on the robust standard errors. Hence, the results are free from the influence of these problems.

The final robustness test is, to run the regression model after removing the real estate firms. This test is motivated by getting insight from the existing literature (see for example, Chava and Purnanandam 2011; Lin and Paravisini 2010 a). Following previous studies (see for example, Chava and Purnanandam 2011; Lin and Paravisini 2010 a), the study removed all firms which have direct exposure to subprime crisis (such as the real estate firms)<sup>75</sup>. The aim is to minimize or remove any demand side factors affecting the results. The study runs all the regression again after removing the exposed firms. The results of the estimation are presented in appendices 8, 9, 10, 11 and 12. Results from the estimation reveal that the majority of the regression results are qualitatively similar to the original regression results. This means that the results are not driven by demand side factors.

## **6.7 A Comparison between the Financial and Investment Policies of Private and Public Firms During the Crisis Period**

The financial and investment decisions of private firms during the crisis period are discussed in detail in the previous chapter and for the public listed firms' decisions are discussed in this chapter. A comparison of the financial and investment decisions of these two types of firms is in order. The results highlight that the financial crisis has adversely affected the total debt ratio of private firms. Since total debt comprises all forms of debt, this means that aggregate external credit to these firms is squeezed as a result of the credit drought. Examination of each component of total debt reveals that it is the short-term financing channel (i.e., short-term debt and trade credit) that is sensitive to variations in the supply of credit, while the credit crisis has no statistically significant effect on the long-term financing channel. Since private firms face high information and agency problems, as a result, adverse selection and moral hazard problems are high in these firms. Such problems may further worsen during the crisis period, which make these firms more vulnerable and risky. Because of these problems,

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<sup>75</sup> More specifically the following firms were removed: Real Estate Investment and Service Real Estate Trust from the sample. In total, 36 firms were removed from the sample.

lenders may have squeezed the flow of short-term credit to these firms, because banks make safer loans during the crisis period (Lang and Nakamura 1995).

The total debt ratio of UK public firms is also adversely affected by the recent credit crisis. However, examination of the components of total debt ratio reveals that credit shortage has no statistical significant impact on both short-term and long-term debt but rather it is the trade credit channel that is impaired by the recent panic in the financial market. As explained before, public firms are not very opaque, as reporting and publishing financial information is obligatory for them. In addition, they have several options to raise funds, for instance, they can access public debt and commercial paper market. Therefore, these firms are generally considered as safer than private firms; which is why the flow of credit to public firms was not greatly disturbed during the crisis period because lenders prefer to lend to safer firms at such times. These findings are consistent with those of the existing published studies (see for example, Bernanke, Gertler and Gilchrist 1996; Black and Rosen 2008; Bougheas, Mizen and Yalcin 2006; Gertler and Gilchrist 1993, 1994; Iyer et al. 2010; Oliner and Rudebusch 1995; Oliner and Rudebusch 1996).

Both private and public firms had a similar response to the credit crisis with regard to net debt issued and net trade credit. In other words, the net debt issued and net trade credits of both firms are negatively affected by the credit crisis. This means that neither type of firm is substituting to net debt issue and net trade credit, to hedge themselves from the negative effect of credit retrenchments. Further, examination of trade credit behaviour of the private firms' sample reveals that both their accounts payable and accounts receivable decreased during the crisis period. However, the decrease in accounts receivable is more than that for accounts payable. The accounts payable of public firms also decreased during the crisis period; but their accounts receivable increased. The increase in accounts receivable is, however, more than the decrease in accounts payable, which suggests that public firms extend more trade credit to their customers during the crisis period.

There are, however, striking differences in the responses of internal fund, net equity issued and dividend payout behaviour of both private and public firms to the credit

crisis. For example, private firms issue equity in response to the credit shortage and hold cash for precautionary saving purposes during the crisis period. In addition, their dividend payout policy is not greatly disturbed in the crisis period. However, public firms use more internal funds and repurchase back the equity. These firms also adjusted their dividend payout policy during the crisis period. In other words, public firms reduced the dividend payout during the recent crisis period, in order to preserve their financial slack.

There are many similarities in the performance and investment behaviour of both the private and public firms during the crisis period. For instance, the credit retrenchments have adversely affected the performance and investment of both types of firm. The non-availability of credit from the financial market and the relative lack of substitution towards alternative sources of finance have negatively affected the performance and investment of private firms. Further, in the private firms' sample, the relative lack of substitutions towards alternative sources of finance and decline in investment may suggest that capital raised through equity issue is largely used to finance the cash holdings of these firms. Similarly, for the above-mentioned reasons, the performance and investment behaviour of the public firms are sensitive to the credit supply shocks. In addition, the use of internal funds, reduction in dividend payout and investment in tangible assets suggests that internal funds may have been used to finance the equity repurchases.

## **6.8 Summary**

This chapter has examined the financing mix, performance and investment decisions of the UK public listed firms during the crisis period. A total of four different sets of regressions are estimated to unearth the effect of the credit crisis on leverage ratio, the behaviour of trade credit and trade debtor, alternative sources of finance, performance and investment behaviour of public firms. The estimation results of these regression models are presented in tables and discussed in detail in the chapter. A brief summary and contributions of the empirical results are also discussed at the end of the respective sections of this chapter.

The results suggest that total debt ratio of the UK public firms declined during the crisis period. It indicates that external financing activities of the public firms are adversely affected by the recent credit crisis. Further examination of each component of total debt suggests that the effect of the credit crisis is largely concentrated on the trade credit channel. In other words, it is the trade credit channel that is impaired by the credit crisis. The effect of the credit crisis on long-term debt and short-term debt is statistically not significant at conventional level, which suggests that credit crisis has not affected the flow of long-term and short-term debt to these firms.

The results show that financial crisis has adversely affected the flow of trade credit to public listed firms. This indicates that public firms are not substituting to trade credit to offset the reduction of credit. The results further reveal that accounts receivable of these firms increased during the crisis period. However, the increase in accounts receivable is more than reduction in accounts payable. This highlights that public firms help out their customers by extending more trade credit to them during the crisis period. The results also highlight that net trade credit of these firms declined during the crisis period, which supports the complementary view of trade credit during the crisis period.

To minimize the effect of the credit crisis, public firms rely more on internal funds. In other words, they use more internal funds during the crisis period. These firms also adjusted their dividend payout in response to the exogenous credit contractions. Putting it differently, public firms reduced the dividend payout to shareholders in order to maintain their financial slack during the crisis period. The study however, does not find that public firms substitute to equity issue but rather the results suggest that these firms purchase back the equity share during the crisis period. In addition, the decrease in cash reserve, payout and decline in investment suggests that internal funds and reduction in dividend payout may have been used to finance the purchase of equity.

Finally, the fixed effects regressions reveal that the recent credit crisis has also adversely affected the financial performance and investment of these firms. The results suggest that the inability of public firms to obtain external credit from the credit market and the relative lack of substitution towards alternative sources of finance has

negatively affected their financial performance and investment in tangible assets. A number of alternative tests were also carried out to check the robustness of the study's empirical strategy. The robustness tests have further validated the study's empirical strategy and regression results. Overall, the results suggest that financial and investment policies of the public firms are sensitive to variations in the supply of credit.

The next chapter is the final chapter of this thesis. It summarises the results documented throughout the whole thesis; and briefly recaps the main motivation underlying the study, the research objectives, the research methodology and data used in the study. The summaries of all the chapters are also briefly discussed. The chapter also highlights the contributions of the study findings to the literature regarding the effect of exogenous credit supply shocks on firms' behaviour. Further, it describes certain limitation of the study. Finally, a brief discussion of issues generated in this research, which could be investigated in the future, is given.

**Table 6.1 Effect of the Financial Crisis on Leverage Ratio**

Model 1 Total debt =  $\beta_0 + \beta_1 * ROA + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * ROA * CR + \mu_{it}$   
 Model 2 Long-term debt =  $\beta_0 + \beta_1 * ROA + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * ROA * CR + \mu_{it}$   
 Model 3 Short-term debt =  $\beta_0 + \beta_1 * ROA + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * ROA * CR + \mu_{it}$

Variable	Model 1 (Total Debt)	Model 2 (Long-term debt)	Model 3 (Short-term debt)
ROA	-0.126 (-3.99)***	-0.002 (-0.26)	-0.038 (-3.58)***
GT	0.0002 (0.14)	-0.002 (-2.01)**	0.002 (1.04)
CR*ROA	-0.002 (-0.05)	-0.024 (-2.63)***	-0.001 (-0.05)
GT*CR	0.009 (2.77)***	0.004 (2.63)***	-0.001 (-0.20)
CR	-0.013 (-2.32)**	-0.001 (-0.31)	0.004 (0.958)
C	0.288 (80.72)***	0.111 (75.93)***	0.055 (21.61)***
R-squared	0.731	0.820	0.594
N Obs	7546	5602	7492
F-statistic	9.014	11.59	4.85
Prob(F-statistic)	0.000	0.000	0.000

Notes: CR represent crisis dummy for the crisis period. Total debt is measured as total debt divided by total asset. Long-term debt is measured as long-term debt divided by total asset. Likewise, short-term debt is measured as short-term debt divided by total assets. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

**Table 6.2 Effect of the Financial Crisis on Trade Credit and Trade Debtor**

Model 4 Trade Credit =  $\beta_0 + \beta_1 * CF + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * CF * CR + \mu_{it}$

Model 5 Trade Debtor =  $\beta_0 + \beta_1 * CF + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * CF * CR + \mu_{it}$

Variable	Model 4 (Trade Credit)	Model 5 (Accounts Receivable)
CF	-0.023 (-2.41)***	-0.030 (-0.45)
GT	0.001 (0.84)	-0.033 (-2.40)***
CR*CF	-0.027 (-2.84)***	-0.104 (-0.875)
GT*CR	0.002 (1.21)	-0.047 (-2.39)***
CR	-0.007 (-3.17)***	0.050 (1.88)**
C	0.114 (87.83)***	0.237 (11.90)***
R-squared	0.815	0.703
N Obs	7441	6996
F-statistic	14.61	7.917
Prob(F-statistic)	0.000	0.000

Notes: CR represent crisis dummy for the crisis period. Trade credit is measured as trade credit divided by total asset. Trade debtor (accounts receivable) is measured as trade debtor (accounts receivable) divided by total asset. T-statistics are reported in parentheses, \*\*, \*, \* represent 1%, 5% and 10% level of significance respectively.

**Table 6.3 Financial Crisis and Alternative Sources of Finance**

Model 6 Net Debt Issue =  $\beta_0 + \beta_1 * ROA + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * ROA * CR + \mu_{it}$

Model 7 Net Equity Issue =  $\beta_0 + \beta_1 * ROA + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * ROA * CR + \mu_{it}$

Model 8 Net Trade Credit =  $\beta_0 + \beta_1 * CF + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * CF * CR + \mu_{it}$

Variable	Model 6 (Net Debt issue)	Model 7 (Net Equity Issue)	Model 8 (Net Trade Credit)
ROA	0.019 (0.04)	-0.806 (-0.88)	---
GT	-0.012 (-0.17)	-1.054 (-2.06)**	0.001 (2.18)**
CF			-0.020 (-1.56)
CF*CR	---	---	-0.008 (-0.54)
ROA*CR	-0.076 (-0.10)	1.783 (2.90)***	---
GT*CR	0.500 (1.99)**	0.886 (2.37)***	0.001 (0.49)
CR	-0.505 (-1.67)*	-2.154 (-3.50)***	-0.007 (-2.58)***
C	-0.026 (-0.61)	2.544 (3.01)***	0.080 (59.73)***
R-squared	0.274	0.357	0.801
N Obs	5953	5156	7440
F-statistic	1.085	1.326	13.371
Prob(F-statistic)	0.024	0.000	0.000

Notes: Dependent variable in model 6 is net debt issue which is measured as the change in the sum of short-term debt and long-term debt divided by the sum of the start period of short-term debt plus long-term debt. Similarly, the dependent variable in model 7 is net equity issue and is measured as change in issued capital divided by the start of the period issued capital. In model 8, the dependent variable is net trade credit which is measured as accounts receivable less accounts payable scaled by total assets. Definitions of the rest of variables are given in Chapter 3. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

**Table 6.4 Effect of the Financial Crisis on Cash Reserve and Dividend**

Model 9 Cash Reserve =  $\beta_0 + \beta_1 * CF + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * CF * CR + \mu_{it}$

Model 10 Dividend =  $\beta_0 + \beta_1 * ROA + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * ROA * CR + \mu_{it}$

Variable	Model 9 (Cash Reserve)	Model 10 (Dividend)
ROA	---	1.382 (11.59)***
GT	0.168 (1.81)*	0.401 (5.65)***
CF	1.911 (2.34)***	---
CF*CR	2.323 (2.28)**	---
ROA*CR	---	0.589 (4.029)***
GT*CR	-0.166 (-1.22)	0.036 (0.35)
CR	-0.902 (-3.98)***	-0.252 (-2.305)**
C	1.796 (13.35)**	-0.399 (-5.328)***
R-squared	0.318	0.529
N Obs	7113	2271
F-statistic	1.452	2.503
Prob(F-statistic)	0.000	0.000

Notes: Dependent variable in model 9 is cash reserve which is measured as change in cash and cash equivalent scaled by start period of cash and cash equivalent. Similarly, dependent variable in model 10 is dividend and is measured as change in dividend scaled by start of the period dividend. Definitions of the rest of variables are given in Chapter 3. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

**Table 6.5 Effect of Financial Crisis on Investment and Performance**

Model 11 Investment =  $\beta_0 + \beta_1 * CF + \beta_2 * GT + \beta_3 * CR + \beta_4 * TD + \beta_5 * CR * CR + \beta_6 * CF * CR + \mu_{it}$

Model 12 Performance =  $\beta_0 + \beta_1 * TD + \beta_2 * GT + \beta_3 * CR + \beta_4 * TD * CR + \beta_5 * TD * CR + \mu_{it}$

Variable	Model 11 (Investment)	Model 12 (Performance)
GT	0.012 (3.70)***	0.015 (3.92)***
CF	0.011 (0.83)	---
TD	---	-0.422 (-14.62)***
TD*CR	---	0.007 (1.237)
CF*CR	0.035 (2.20)**	---
GT*CR	0.007 (1.58)	0.040 (1.734)*
CR	-0.019 (-3.03)***	-0.029 (-1.97)**
C	-0.010 (-1.46)	0.074 (6.92)***
R-squared	0.396	0.724
N Obs	7511	5611
F-statistic	2.174	6.757
Prob(F-statistic)	0.000	0.000

Notes: Dependent variable in model 11 is investment which is measured as change in fixed assets divided by total assets. Likewise, dependent variable in model 12 is performance which is measured as return on assets. TD is total debt and measured as total debt divided by total assets. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

**Table 6.6 Effect of Financial Crisis on Liquidity Constraint and Unconstrained Firms**

Model 1 Total debt =  $\beta_0 + \beta_1 * ROA + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * ROA * CR + \mu_t$

Model 12 Performance =  $\beta_0 + \beta_1 * TD + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * TD * CR + \mu_t$

Variable	Constraint Firms (Total debt)	Unconstrained Firms (Total debt)	Constraint Firms (ROA)	Unconstrained Firms (ROA)
ROA	-0.109 (-2.407)***	-0.088 (-2.55)***	---	---
GT	0.002 (1.428)	0.003 (1.10)	0.008 (2.73)***	0.020 (3.03)***
TD			-0.192 (-2.94)***	-0.312 (-4.98)***
TD*CR	---	---	0.012 (0.21)	0.127 (1.29)
ROA*CR	0.003 (0.087)	0.010 (0.32)	---	---
GT*CR	0.012 (1.344)	0.004 (0.93)	0.031 (2.58)***	0.000 (0.01)
CR	-0.019 (-1.650)*	0.003 (0.38)	-0.053 (-2.46)***	-0.013 (-0.55)
C	0.340 (92.072)***	0.162 (20.67)***	0.057 (2.56)***	-0.148 (-8.73)***
R-squared	0.648	0.565	0.592	0.578
N Obs	1116	2808	1116	2808
F-statistic	6.644	4.649	5.233	4.917
Prob(F-statistic)	0.000	0.000	0.000	0.000

Notes: Definitions of variables are given in Chapter 3. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

## **Chapter 7**

### **Conclusion**

#### **7.1 Summary of Main Findings**

The main purpose of this study is to investigate the effect of the recent credit crisis on the financial and investment decisions of both the private and public firms in the UK. The underlying motivations for pursuing the study are the lack of research on the financial and investment decisions of firms in general and during the crisis period in particular. A relatively limited number of studies have examined the effect of the credit supply shocks on firms' financing mix, performance and investment behaviour of public firms using specific individual events (see for example, Chava and Purnanandam 2011; Leary 2009; Lemmon and Roberts 2010; Lin and Paravisini 2010 a; Massa and Zhang 2010, for details).

In the context of the recent financial crisis, few studies have focused on these issues (Allen and Carletti 2008; Becker and Ivashina 2010; Campello, Graham and Harvey 2010; Duchin, Ozbas and Sensoy 2010; Tong and Wei 2008). In addition, an examination of the findings of the existing literature shows that the majority of these studies provide mixed and inconclusive evidence (see for example, Allen and Carletti 2008; Bakke 2009; Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Iyer et al. 2010; Leary 2009; Lemmon and Roberts 2010). Further, the focus of the majority of the existing studies is very narrow with respect to the components of capital structure. As a result, it is not clear from the existing literature which component of the capital structure is more sensitive to credit supply contractions than others.

Similarly, little attention has been paid to the effect of the recent credit crisis on the financial and investment decisions of private firms. Given the significant role of private firms in economic growth, innovation and employment growth (Acs and Audretsch 1990; Kotey and Meredith 1997; Neck and Dockner 1987), the financial theories and empirical research seems to have largely ignored this sector of the economy (Ang 1991; Michaelas, Chittenden and Poutziouris 1999 a; Zingales 2000)

which is a serious omission. To the best of the author's knowledge, to-date no study has examined the financial mix, trade credit, dividend, performance and investment decisions of UK private firms during the recent credit crisis period. The lack of research on the private firms is also one of the main motivations of this study.

In addition, the majority of the above-mentioned studies have used US market data. Although there are many similarities between the US and the UK there are also some important institutional differences between them. Rajan and Zingales' (1995) examination of the determinants of capital structure of G-7 countries reveals that firms in the UK are less leveraged than firms in the US. Rajan and Zingales (1995, p. 1440) wonder as "*why firms in countries such as the United Kingdom and the United States with similar capital markets and financial institutions have such different levels of debt*". Other studies, such as Bevan and Danbolt (2002), highlight that trade credit and equivalent is a significant component of firms' financing in the UK. Their results suggest that researchers must consider it when investigating the firms' financing decisions. Moreover, differences between accounting regulations and financial reporting requirements, corporate governance, tax codes and insolvency procedure (Akbar, Shah and Stark 2011; Beattie, Goodacre and Thomson 2006; Dahya and Travlos 2000; Franks, Nyborg and Torous 1996; Franks and Torous 1992; Kaiser 1996) between the US and the UK further justified the need for this research.

In attempting to provide further insights into these issues, the present analysis has focused on the effect of the credit crisis on the financial, performance and investment decisions of both private and public firms. More specifically, the study examined whether shock to supply of credit affected the leverage ratio of firms and determined which components of capital structure are affected by the credit supply contractions. Further, it investigated the behaviour of trade credit and trade debtor during the crisis period. The study also examined the behaviour of alternative sources of finance (such as net debt issue, net equity issue, net trade credit and internal fund). In other words, how firms manage their finances during the crisis period. The dividend payout behaviour of firms during the crisis period was also examined. Finally, the study examined the effect of credit supply shocks on the performance and investment decisions of firms.

To achieve these objectives, the study used a comprehensive empirical strategy which consisted of three elements, namely: the exogenous credit crisis, the firm fixed effects regression model, and the firm level control variables; which helped to identify the effect of the exogenous credit crisis on firms' behaviour. Data for the analysis are extracted from two different databases, that is, for the private firms' sample, data was extracted from the FAME database over the period 2004-2009 and for the public firms' sample, the data was collected from the Datastream database for the years 2004-2009. The final sample of private firms consisted of 4973 firms and the public firms' sample consisted of 2039 firms.

The findings of this study add to a growing body of evidence on the effect of credit supply shocks on firms' behaviour. In the empirical Chapter 5, the study investigated the effect of the credit crisis on the financial and investment policies of the UK private firms. It was expected that the investigation would also provide insights into the financial and investment policies of private firms and would shed some light on how private firms manage their finances during the crisis period. A total of four sets of regression models were estimated for this purpose and their results were discussed.

The results revealed that financial crisis has adversely affected the total leverage ratio of the UK private firms. The total debt ratio of these firms declined during the crisis period, which indicates that their total external financing activities reduced. Further investigation of each component of capital structure revealed that credit contraction has negatively affected the short-term debt and trade credit channel of private firms, while the crisis has had no statistically significant effect on the long-term financing channel. In other words, it is the short-term financing channel that is impaired by the recent credit crisis which is consistent with the previous literature (see for example, Black and Rosen 2008; Bougheas, Mizen and Yalcin 2006; Gertler and Gilchrist 1993, 1994; Oliner and Rudebusch 1995; Oliner and Rudebusch 1996, for details)

The results further revealed that the flow of trade credit to private firms squeezed during the credit crisis period, which highlights that trade credit does not compensate for the lower access to credit during the crisis period. This is consistent with the existing literature (see for example, Bernanke and Gertler 1995; Gertler and Gilchrist

1993; Love and Zaidi 2010; Marotta 1997; Oliner and Rudebusch 1996; Taketa and Udell 2007). Investigation of accounts receivable of private firms revealed that these firms reduced the supply of credit to their customer during the crisis period, which is consistent with Kohler, Britton and Yates (2000), who argue that trade credit extension reduced following the rise in interest rate. The result, however, appears in contrast with Wilson, Le and Wetherhill (2004) who argue that small and medium sized firms extend more trade credit during tight monetary conditions. In terms of magnitude, accounts receivable decreased more than accounts payable, which means that private firms reduced the extension of trade credit to customers more than trade credit received from their suppliers. The results showed that net trade credit also declined during the crisis period. This confirms the study's earlier findings that flow of trade credit to these firms was squeezed. The crux of the above discussion is that the results do not support the substitution role of trade credit during the crisis period rather they support the complementary view of trade credit.

Regarding the behaviour of alternative sources of finance, the results highlighted that private firms issue more private equity, which is consistent with the credit supply effect. These firms also hold more cash in response to the exogenous credit contractions, which is consistent with previous studies' findings (Faulkender 2002; Opler et al. 1999; Ozkan and Ozkan 2004). However, the result appears in contrast with Leary (2009), who argues that firms without bond market access use all forms of alternative sources of finance (including internal finance) when supply of credit is squeezed. The results, however, do not provide evidence that private firms substitute to net debt issue or net trade credit, nor do they reveal any evidence that these firms scaled back shareholder distributions to build up their financial slacks during the crisis period. On balance, the empirical results suggested that private firms issue more equity in response to the credit crisis and build up cash stock for precautionary saving motive during the crisis period.

In addition, the results revealed that financial crisis has also negatively affected both the performance and investment of private firms. Private firms experienced deterioration in performance and investment in fixed assets during the recent crisis period. The results suggested that the inability of private firms to obtain external credit

and the relative lack of substitution towards alternative sources of finance has adversely affected both the performance and investment of these firms, which may have severe implications on their current and future performance. The decline in investment suggests some real cost of the financial crisis. Moreover, decline in investment and the lack of substitution towards alternative sources of finance suggest that funds raised through equity issue are largely used to build up the cash stock. A number of alternative tests were also carried out and explained in Chapter 5, which has confirmed the empirical strategy and robustness of the results of this study.

The study also investigated the effect of the recent financial crisis on the financial and investment policies of the UK public firms. The fixed effects results revealed that total debt ratio of public firms decreased during the recent crisis period, which highlights that the credit crisis has adversely affected the flow of credit to these firms. This is consistent with the findings reported in Lemmon and Roberts (2010). The result, however, appears in contrast with the findings reported in Lin and Paravisini (2010 a) and Iyer et al. (2010). Iyer et al. (2010) for example, find that the recent financial crisis did not disturb the flow of credit to large firms in Portugal. Further investigation uncovered the fact that the effect of the credit contractions on short-term debt and long-term debt was statistically insignificant. The results suggest that credit shortage has not disturbed the short-term and long-term financing channels. Investigation of trade credit behaviour reveals that the flow of trade credit to these firms squeezed during the crisis period, which is consistent with previous studies (Lemmon and Roberts 2010; Oliner and Rudebusch 1996). Hence, this shows that it is the trade credit channel that is impaired by the recent financial crisis.

Investigation of the accounts receivable was necessary to better understand the two-way nature of trade credit. The fixed effects results reveal that accounts receivable of public firms increased during the crisis period. This signifies that public firms increased the extension of trade credit to their customers during the recent crisis period. In other words, public firms helped out their customers by extending more trade credit to them during the crisis period. This is consistent with Wilson, Le and Wetherhill (2004), who argue that large firms offer more trade credit to their customers during tight monetary conditions. In terms of magnitude, the results suggest that extension of

trade credit is more than contractions in the accounts payable. This confirms that public firms extend more trade credit to their customers during hard times. The results further revealed that net trade credit also reduced during the crisis period. It is clear that the flow of trade credit to public firms reduced and, hence, it also indicates that trade credit does not serve as a substitute for bank credit during the crisis period.

In addition, the empirical results showed that public firms rely more on internal funds during the crisis period, which is consistent with the findings of Campello, Graham and Harvey (2010), who argue that firms burn more cash during the crisis period. However, the result appears to be in contrast to Lemmon and Roberts (2010) who find lack of substitution towards alternative sources of finance (*including internal finance*). The result further revealed that public firms also adjusted their dividend payout policies during the recent crisis period. In other words, these firms scaled back shareholder distributions during the crisis period in order to build up their financial slack, which is in line with the results of Campello, Graham and Harvey (2010), who find that firms have deeper cut on dividend payout during the recent crisis period.

The result is inconsistent with the findings reported in Lemmon and Roberts (2010), who reveal that below investment grade firms are not dipping into cash reserves nor reducing dividend to keep their financial slack in response to the credit supply contractions. The fixed effects results further highlighted the lack of substitution towards net debt issue, net trade credit and net equity issue; suggesting that net equity issued by these firms reduced during the crisis period. This highlights that these firms purchased back their share during the crisis period. The overall results suggest that reduction in internal cash reserve and dividend payout might have been used to finance the purchase of the equity back.

The results further revealed that performance of public firms declined during the crisis period, which is consistent with the previous literature (Chava and Purnanandam 2011; Jeon and Miller 2004). Likewise, investment in fixed assets also declined in response to the exogenous credit contractions, which is again consistent with existing studies (Campello, Graham and Harvey 2010; Chava and Purnanandam 2011; Duchin, Ozbas and Sensoy 2010; Gan 2007 a; Gan 2007 b; Jeon and Miller 2004; Rungsomboon

2005; Saarenheimo 1995). The inability of these firms to raise funds during the credit contraction period adversely affected their financial performance and investment in tangible assets. The reduction in investment suggests some real cost of the financial crisis. Overall, the results suggest that equity repurchase has been financed through decline in cash reserve, dividend payout and investment in tangible assets. The empirical strategy and results explained were further verified by conducting a number of robustness checks.

## **7.2 Contributions and Implications of this Study**

This study provides further insights into the financial and investment decisions of both private and public firms during the crisis period; and its findings contribute to various strand of literature. First, the study contributes to the burgeoning literature which has called into question the demand-driven approach to corporate finance (see for example, Becker 2007; Duchin, Ozbas and Sensoy 2010; Faulkender and Petersen 2006; Gan 2007 a; Ivashina and Scharfstein 2010; Leary 2009; Lemmon and Roberts 2010; Rehman and Akbar 2011a; Rehman and Akbar 2011c; Rehman, Akbar and Ormrod 2011; Rehman and Rehman 2011; Voutsinas and Werner 2011). The results of the study contribute to the literature on firms' financing decisions by providing evidence which suggests that accounting for both demand and supply side factors are significant in better understanding the firms' financing decisions.

Second, the study contributes to the burgeoning literature on the financial and investment decisions of firms during the crisis period by providing evidence from the perspective of UK private firms. The key contribution to the literature is that the results provide evidence which suggests that shift in the supply of credit can have significant consequences for the financial, performance and investment policies of UK private firms. In other words, both the financial and investment policies of the private firms are sensitive to the exogenous credit contractions. The study findings would also be helpful to future researchers in this area. In addition, the results also suggest that policy makers should take into account the association between the credit supply shocks and investment (or financial decisions) of firms at the time of designing the monetary and fiscal policies during the crisis period.

Third, the findings of this study contribute to the literature on the role of trade credit during the crisis period. The first contribution of this study is that it suggests that trade credit is an important source of short term finance for the UK firms and therefore, should be added as an external finance option. The second contribution of this study to the trade credit literature is that it investigated the role of trade credit, trade debtor and net trade credit beyond the monetary policy regime. In other words, the study examines the behaviour of trade credit during the recent financial crisis period. The study also contributes to the existing literature by examining the behaviour of trade credit of both the private and public firms simultaneously during the recent crisis period using a comprehensive data set. Finally, the study results extend the trade credit literature by providing evidence that suggests that trade credit does not compensate for the lower access to credit during the crisis period, which has clear policy implications.

*Similarly, the study contributes to the limited amount of literature regarding the effect of credit supply shocks on the financial and investment policies of public firms. The results of this study make two contributions to this strand of literature; firstly, by providing evidence on the financing mix, performance and investment decisions of the UK public listed firms during the crisis period. Secondly, these results extend the previous literature by providing evidence which suggests that short-term and long-term financing channels of the public firms are not sensitive to the credit supply conditions. However, the investment decisions of public firms are sensitive to variations in the supply of credit. As researchers and economic policy makers are generally interested in the real side implications of credit supply shocks, therefore, these findings have clear implications for the ongoing financial crisis as well as future policy designs by monetary and banking authorities.*

The study also provides more insight into the role of alternative sources of finance during the crisis period. The contribution of this study to the corporate finance literature is that it investigated the role of cash reserve, net debt issue, net equity issue, and net trade credit during the recent financial crisis period. One of the most important contributions of this study is to show how private and public firms were affected during the recent crisis period and how they responded to the credit supply shocks, which is also relevant for the economic policy-making. Hence, findings of this study provide a

good ground to better understand the financing and investment decisions of the private and public firms during the crisis period. In addition, the findings of this study can also be generalized onto other settings with similar legal and regulatory environments.

The final contribution of the study's findings is to the methodology issues related to the identification problem of the credit supply shocks. Identification of the credit supply effect is a really challenging task when investigating the effect of the credit supply shock on firms' behaviour. The contribution of this study is the use of an inclusive panel dataset, comprehensive empirical strategy which helped to overcome this problem. Furthermore, a number of alternative tests were carried out which have further validated the empirical strategy. Hence, this study extends the literature on the research methodology by providing a comprehensive strategy which will help to understand better the identification problems which are usually associated with credit supply shocks.

### **7.3 Limitations of the Study**

No work in this world can achieve absolute perfection in any regard. There will always be some limitations in almost every piece of work conducted by human beings. Similarly, this study has some limitations, the first of which is the use of annual data. Due to the non-availability of quarterly data from the available databases, this study only uses annual data in the analyses. This is because of the unavailability of data on leverage ratio, net equity issues, trade credit, trade debtor, internal funds and dividend on a quarterly basis (especially for the private firms' sample). The use of quarterly data would, however, add new insights into the research findings and contributions. This notion is supported by the findings of Duchin, Ozbas and Sensoy (2010) and Chava and Purnanandam (2011). In particular, quarterly data on the financing mix, performance and investment of firms would add more value to the outcome of this research.

The second limitation could be the duration of the study. At the time of the data collection process, data were only available only up to the year 2009. Although the study covered the pre-crisis and crisis period, it would be more informative and

convincing if more recent years were included in the dataset. In other words, it would be more fruitful if data on the post-crisis period could also have been included. However, given the limited time period available and the release of data with a lag by databases, it was not possible to examine the behaviour of firms during the post crisis period.

The third limitation could be the sample selection bias. As explained in Chapter 4, missing observations was a serious problem in the private firms' sample. To avoid this problem, the study took *insight from the existing literature and required that firms must have non-missing value for the key variables of the study*. This may introduced survivorship bias in private firms' sample. As the firms included in the sample are all active firms. However, despite all these limitations, this study still makes some useful contributions to the limited literature in this area of research.

#### **7.4 Scope of Future Research**

This study investigated the financial and investment decisions of both private and public firms during the crisis period. Nevertheless, it encourages further research in this area. It would be useful to extend the duration of the study and examine the post-crisis financial and investment decisions of both the private and public firms. Similarly, the use of quarterly data and extension of the duration of study would be really convincing and fruitful areas for further research. In particular, investigating the financial and investment decisions of firms during the post crisis period and comparing it with the pre-crisis and crisis period could be an interesting area for future research.

Future research should also consider the role of relationship lending during the crisis period. It is often argued that relationships with banks could help in mitigating the negative impact of credit supply shocks on firms' behaviour. In this regard, existing evidence suggests that establishing a relationship with lenders enhances the availability of financing during the crisis period (Petersen and Rajan 1994). In addition, it is also been argued in the literature that a longer relationship with the lender helps firms pay lower interest rates and pledge little or no collateral for loans (Boot and Thakor 1994). Therefore, investigating the role of relationship lending during the crisis period could

also provide more valuable insights and a better understanding of the financing and investment decisions of firms from the perspective of manager and investors.

Investigation of the financing mix and investment decisions of the sub-sectors of the UK economy could also be another topic for future research. The splitting of the sample into manufactures and non-manufactures or in other different ways would be very useful. The splitting of the sample into sub-samples would also bring more interesting and innovative findings. It would also help to better understand which sector of the economy is more affected by disruptions in the financial market. In other words, which sector of the economy is sensitive to variations in the supply of credit. Hence, investigation of the effect of the credit crisis on sub-sectors of the economy would be an interesting topic for future research.

In addition, the use of qualitative methodology (such as questionnaire and interview) could also be adopted for research in this area. It would be really useful to use questionnaire (and interview) in examining the financing and investment decisions of firms during the crisis period. Such an approach could provide more valuable insights and a better understanding of firms' financing and investment decisions from the perspective of the managers and investors. Also, the combination of both qualitative and quantitative approaches could supplement each other in the search for how the firms manage their financial and investment decisions during the crisis period. However, due to limited time and resources this research was not able to cover these areas and they are therefore left to future research.

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## Appendices

**Appendix 1 Datastream Variable Codes, Variable Names and Descriptions**

S.No	Codes	Variable Names	Descriptions
1	WC02999	Total Assets	TOTAL ASSETS represent the sum of total current assets, long term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets.
2	WC02501	Property, Plant and Equipment-net	PROPERTY, PLANT AND EQUIPMENT (NET) represents Gross Property, Plant and Equipment less accumulated reserves for depreciation, depletion and amortization. It includes but is not restricted to: Land, Buildings – Net, Machinery- Net, Equipment – Net, Construction work in progress, Minerals – Net, Oil – Net, Autos and trucks – Net, Timberland and timber rights – Net, Leasehold improvements – Net, Rented equipment – Net, Furniture and fixture – Net, Property, Plant and Equipment leased under capitalized lease obligations – Net, Book plates – Net, Non-current film costs and inventory, Broadcasting rights and licenses, Franchise rights and licenses, Long term power purchase contracts, Publishing rights and licenses, Funds held for construction, Long term power purchase contracts, Software products.

		<p>It excludes: Tools and dies amortized over less than two years, Excess carrying value over cost of property, Copyrights, trademarks, and goodwill, Property not used in operations or used in operations to be discontinued, Property held for sale for companies other than Real Estate companies (treated as investment and advances).</p>
<p>3</p>	<p>WCO1001</p> <p>Net Sales or Revenues</p>	<p>NET SALES OR REVENUES represent gross sales and other operating revenue less discounts, returns and allowances.</p> <p>It includes but is not restricted to: Franchise sales when corresponding costs are available and included in expenses, Consulting fees, Service income, Royalty income when included in revenues by the company, Contracts-in-progress income, Licensing and franchise fees, Income derived from equipment lease or rental when considered part of operating revenue, Commissions earned (not gross billings) for advertising companies, Income from leased departments</p> <p>It excludes: Non-operating income, Interest income, Interest capitalized, Equity in earnings of unconsolidated subsidiaries, Rental income, Dividend income, Foreign exchange adjustment, Gain on debt retired, Sale of land or natural resources, Sale of plant and equipment, Sale of investment, Sales from discontinued operations, Security transactions, Income on reserve fund securities when shown</p>

			separately, Operating differential subsidies for shipping companies, Net mutual aid assistance for airlines companies, General and Service Taxes, Value-Added taxes, Excise taxes, Windfall Profit Taxes.
4	03051	Short-term debt and Current portion of Long term debt	<p><b>SHORT TERM DEBT &amp; CURRENT PORTION OF LONG TERM DEBT</b> represents that portion of debt payable within one year including current portion of long term debt and sinking fund requirements of preferred stock or debentures.</p> <p>It includes but is not restricted to: Current portion of long-term debt (18232), Notes payable, arising from short-term borrowings, Current maturities of participation and entertainment obligations, Contracts payable for broadcast rights, Current portion of advances and production payments, Current portion of long term debt that must be paid back during the next twelve months and included in long term debt, Bank Overdrafts, Advances from subsidiaries/associated companies, if the term of the loan is not known it is assumed to be long term debt, Current portion of preferred stock of a subsidiary, Treasury tax and loan demand notes, Short sales of U.S. government securities</p> <p>Eurodollar borrowings, if not reported separately and the amount cannot be separated.</p>

5	03251 Long term debt	<p>LONG TERM DEBT represents all interest bearing financial obligations, excluding amounts due within one year. It is shown net of premium or discount.</p> <p>It includes but is not restricted to: Mortgages, Bonds, Debentures, Convertible debt, Sinking fund debentures, Long term bank overdrafts, Long term notes, Long term bills, Medium term loans, Long term royalties, Long term contracts, Industrial revenue bonds, Notes payable, due within one year and to be refunded by long term debt when carried as non-current liability, Long term prepaid contracts, Advances and production payments, Talent and broadcasting rights, Capitalized lease obligations, Revolving credit, Long term advances from subsidiaries/associated companies, Compulsory convertible debt (South Africa), Eurodollar borrowing, Long term liability in connection with ESOP, Federal Home Loan advances</p> <p>It excludes: Current portion of long term debt, Pensions, Deferred taxes, Minority interest</p>
6	03040 Account Payable	<p>ACCOUNTS PAYABLE represents the claims of trade creditors for unpaid goods or services, which are due within the normal operating cycle of the company. Data for this field is generally not available prior to 1989.</p>

			<p>It includes but is not restricted to: Due to factor, Bills of Exchange.</p>
7	03255	Total Debt	<p>TOTAL DEBT represents all interest bearing and capitalized lease obligations. It is the sum of long and short-term debt.</p>
8	02051	Receivables (net)	<p>RECEIVABLES (NET) represent the amounts due to the company resulting from the sale of goods and services on credit to customers (after applicable reserves). These assets should reasonably be expected to be collected within a year or within the normal operating cycle of a business.</p> <p>It includes but is not restricted to: Trade accounts (18297), Installment sales account receivables and notes, Trade notes and receivables, Charge account, Due from factor, Equity in accounts receivable sold to financial subsidiaries, Due from finance subsidiary, Unbilled shipments received by customers, Unbilled lease revenue, Accrued Interest, Receivables of discontinued operations, Current portion of net investment in sales-type leases, Deferred billings on contracts, Earned and unbilled costs of contracts to be billed within one year, Due from unconsolidated subsidiaries, affiliates or associated companies, Current portion of long-term receivables (includes mortgage and notes receivable), U.S. government contract billing, Income tax recoverable or refund, Unbilled sources, Receivable from sale</p>

		<p>of assets, Litigation claims receivable, Due from officers and employees (within one year), Dividend receivable, Stock subscription receivables, Salary &amp; Pension Funds, Banker's trade acceptances for non-financial institutions or corporations, Costs recoverable through rate adjustments, Bills of Exchange, Provision for bad debt (18298).</p> <p>It excludes: For non-U.S. corporations, long term receivables are excluded from current assets even though included in net receivables, Due to factor.</p>
9	03480	<p>COMMON STOCK represents the par or stated value of the issued common shares of the company. It includes the value of all multiple shares. Along with capital surplus it is the equity capital received from parties outside the company. It excludes excess involuntary liquidation value of preferred stock over stated value when common stock value and capital surplus are reported combined. Data for this field is generally not available prior to 1989.</p>
10	02002	<p>CASH AND SHORT TERM INVESTMENTS represents the sum of cash and short-term investments.</p> <p>It includes but is not restricted to: Cash on hand, Undeposited checks, Cash in banks, Checks in transit, Cashier's checks, Credit card sales, Drafts, Cash in escrow, Restricted cash, Money orders</p>

		<p>Letters of credit, Demand deposits (non-interest bearing), Mortgage bond proceeds held in escrow</p> <p>Bullion, bullion in transit, Short-term obligations of the U.S. Government, Stocks, bonds, or other marketable securities listed as, Short-Term Investments, Time Certificates of Deposit, Time deposits</p> <p>Eurodollar bank time deposits, U.S. Government treasury bills, Corporate Securities - stocks, bonds</p> <p>Municipal securities, Commercial Paper, Money market mutual fund shares, Post Office checking/GIRO accounts (non-U.S. corporations only), Post Office savings accounts (non-U.S. corporations only), Post Office time deposits (non-U.S. corporations only), Central Bank Deposits</p> <p>Temporary Investments,</p> <p>It excludes: Commercial Paper issued by unconsolidated subsidiaries to Parent company (included in receivables), Amount due from sale of debentures (included in receivables), Checks written by the company but not yet deposited and charged to the company's bank account, Promissory Notes.</p>
11	18192	<p>DIVIDENDS PROVIDED FOR OR PAID - COMMON represents the total value of the common dividends declared for the year. For most countries outside of the U.S. and Canada it includes the</p> <p>Dividend provided for or paid-</p>

		Common	interim paid, if any, plus the proposed final dividend declared after the year end. If not reported separately, it is the dividend charged to retained earnings. Data for this field is generally not available prior to 1992.
12	18191	Earnings Before Interest and Taxes (EBIT)	EARNINGS BEFORE INTEREST AND TAXES (EBIT) represents the earnings of a company before interest expense and income taxes. It is calculated by taking the pre-tax income and adding back interest expense on debt and subtracting interest capitalized.

## Appendix 2 Selected Industry Classification Code-UK SIC (2003)

Source: FAME database

S.No	Code	Activity
1	4011	Production of electricity
2	40110	Production of electricity
3	4012	Transmission of electricity
4	40120	Transmission of electricity
5	4013	Distribution and trade in electricity
6	40130	Distribution and trade in electricity
7	402	Manufacture of gas; distribution of gaseous fuels through mains
8	4021	Manufacture of gas
9	4100	Collection, purification and distribution of water
10	41000	Collection, purification and distribution of water
11	65	Financial intermediation, except insurance and pension funding
12	651	Monetary intermediation
13	6511	Central banking

14	65110	Central banking
15	6512	Other monetary intermediation
16	65121	Banks
17	6521	Financial leasing
18	65210	Financial leasing
19	6522	Other credit granting
20	65222	Factoring
21	65223	Activities of mortgage finance companies
22	65233	Security dealing on own account
23	6601	Life Insurance
24	6602	Pension funding
25	6603	Non-life insurance
26	671	Activities auxiliary to financial intermediation, except insurance and pension funding
27	6711	Administration of financial markets
28	6712	Security broking and fund management
29	6713	Activities auxiliary to financial intermediation not elsewhere classified

30	6720	Activities auxiliary to insurance and pension funding
31	70	Real estate activities
32	701	Real estate activities with own property
33	7011	Development and selling of real estate
34	70110	Development and selling of real estate
35	7012	Buying and selling of own real estate
36	70120	Buying and selling of own real estate
37	702	Letting of own property
38	7020	Letting of own property
39	7031	Real estate agencies
40	7032	Management of real estate on a free or contract basis
41	9001	Collection and treatment of sewage
42	9002	Collection and treatment of other waste
43	9003	Sanitation, remediation and similar activities
44	9112	Activities of professional organisation
45	9133	Activities of other membership organisations not elsewhere classified

46	9211	Motion picture and video production
47	9220	Radio and television activities
48	9231	Artistic and literary creation and interpretation
49	9232	Operation of arts facilities
50	9233	Fair and amusement park activities
51	9234	Other entertainment activities not elsewhere classified
52	9253	Botanical and Zoological gardens and nature reserves activities
53	9261	Operation of sports arenas stadiums
54	9262	Other sporting activities
55	9271	Gambling and betting activities
56	9272	Other recreational activities not elsewhere classified
57	9301	Washing and dry cleaning of textile and fur products
58	9302	Hairdressing and other beauty treatment
59	9303	Funeral and related activities
60	9304	Physical well-being activities
61	9305	Other service activities not elsewhere classified
62	9500	Private households with employed persons

### Appendix 3 Effect of the Financial Crisis on Leverage Ratio of Private Firms

$$\text{Model 1 Total debt} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

$$\text{Model 2 Long-term debt} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

$$\text{Model 3 Short-term debt} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

Variable	Model 1 (Total Debt)	Model 2 (Long-term debt)	Model 3 (Short-term debt)
ROA	-0.198 (-6.27)***	-0.047 (-2.22)**	-0.113 (-6.65)***
GT	0.005 (0.85)	0.003 (0.58)	-0.005 (-1.32)
CR*ROA	-0.184 (-4.87)***	-0.105 (-4.39)***	-0.055 (-2.86)***
GT*CR	0.031 (2.80)***	0.001 (0.15)	0.011 (1.71)*
CR	-0.042 (-3.46)***	-0.003 (-0.36)	-0.014 (-2.06)***
C	0.533 (71.68)***	0.193 (33.14)***	0.168 (35.87)***
R-squared	0.768	0.805	0.700
N Obs	22499	22499	22116
F-statistic	14.878	18.632	10.297
Prob(F-statistic)	0.000	0.000	0.000

Notes: CR represent crisis dummy for the crisis period. Total debt is measured as total debt divided by total asset. Long-term debt is measured as long term debt divided by total asset. Similarly, short-term debt is measured as short-term debt divided by total assets. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

#### Appendix 4 Effect of the Financial Crisis on Trade Credit and Trade Debtor of Private Firms

Model 4 Trade Credit =  $\beta_0 + \beta_1 * CF + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * CF * CR + \mu_{it}$

Model 5 Trade Debtor =  $\beta_0 + \beta_1 * CF + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * CF * CR + \mu_{it}$

Variable	Model 4 (Trade Credit)	Model 5 (Accounts Receivable)
CF	0.004 (3.70)***	-0.065 (-4.58)***
GT	0.004 (0.99)	0.0131 (2.65)**
CR*CF	-0.040 (-2.56)***	-0.014 (-0.87)
GT*CR	0.029 (3.85)***	0.037 (5.06)***
CR	-0.031 (-3.76)***	-0.047 (-6.10)***
C	0.176 (34.09)***	0.233 (44.54)***
R-squared	0.842	0.923
N Obs	10163	10163
F-statistic	17.755	40.032
Prob(F-statistic)	0.000	0.000

Notes: CR represent crisis dummy for the crisis period. Trade credit (accounts payable) is measured as trade credit divided by total asset. Trade debtor (accounts receivable) is measured as trade debtor divided by total asset. T-statistics are reported in parentheses, \*\*, \*\*\*, \* represent 1%, 5% and 10% level of significance respectively.

### Appendix 5 Financial Crisis and Alternative Sources of Finance

$$\text{Model 6 Net Debt Issue} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

$$\text{Model 7 Net Equity Issue} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

$$\text{Model 8 Net Trade Credit} = \beta_0 + \beta_1 * \text{CF} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{CF} * \text{CR} + \mu_{it}$$

Variable	Model 6 (Net Debt issue)	Model 7 (Net Equity Issue)	Model 8 (Net Trade Credit)
ROA	-0.697 (7.37)***	-0.054 (-3.22)***	----
GT	0.130 (3.60)***	0.021 (3.69)***	0.013 (2.65)***
CF			-0.065 (-4.58)***
CF*CR	---	---	-0.014 (-0.87)
CR*ROA	0.091 (0.93)	0.018 (1.08)	----
GT*CR	0.125 (2.74)***	-0.016 (-2.17)**	0.037 (5.06)***
CR	-0.197 (-4.10)***	0.027 (3.43)***	-0.047 (-6.10)***
C	0.072 (1.86)*	-0.023 (-3.73)***	0.023 (44.54)***
R-squared	0.253	0.282	0.923
N Obs	181011	15701	10163
F-statistic	1.228	1.429	40.321
Prob(F-statistic)	0.000	0.000	0.000

Notes: Dependent variable in model 6 is net debt issue which is measured as the change in the sum of short-term debt and long-term debt divided by the sum of the start period of short-term debt plus long-term debt. Similarly, the dependent variable in model 7 is net equity issue and is measured as change in issued capital divided by the start of the period issued capital. In model 8, the dependent variable is net trade credit which is measured as accounts receivable less accounts payable scaled by total assets. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

### Appendix 6 Effect of Financial Crisis on Cash Reserve and Dividend

$$\text{Model 9 Cash Reserve} = \beta_0 + \beta_1 * \text{CF} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{CF} * \text{CR} + \mu_{it}$$

$$\text{Model 10 Dividend} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

Variable	Model 9	Model 10
	(Cash Reserve)	(Dividend)
ROA	---	2.230
GT	2.940 (2.84)***	(6.11)***
CF	20.191 (9.30)***	0.645 (3.83)***
CF*CR	4.390 (1.01)	---
CR*ROA	---	---
GT*CR	-4.903 (-3.59)***	-0.525 (-1.37)
CR	5.105 (3.27)***	-0.631 (-2.86)***
C	-1.777 (-1.23)	0.634 (2.72)***
R-squared	0.338	-0.442 (-2.45)***
N Obs	7271	0.347
F-statistic	1.324	6583
Prob(F-statistic)	0.000	1.227
		0.000

Notes: Dependent variable in model 9 is cash reserve which is measured as change in cash and cash equivalent scaled by start period of cash and cash equivalent. Similarly, dependent variable in model 10 is dividend and is measured as change in dividend scaled by start of the period dividend. Definitions of the rest of variables are given in Chapter 3. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

### Appendix 7 Effect of Financial Crisis on Investment and Performance of Private Firms

$$\text{Model 11 Investment} = \beta_0 + \beta_1 * \text{CF} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{CF} * \text{CR} + \mu_{it}$$

$$\text{Model 12 Performance} = \beta_0 + \beta_1 * \text{Td} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{Td} * \text{CR} + \mu_{it}$$

Variable	Model 11		Model 12	
	(Investment)	(Performance)	(Investment)	(Performance)
GT	0.035 (4.52)***		0.042 (10.68)***	
CF	0.024 (1.62)		---	
Td	---		-0.009 (-9.84)***	
Td*CR	---		0.021 (3.33)***	
CF*CR	-0.034 (-1.99)**		---	
GT*CR	0.035 (4.52)***		0.049 (8.16)***	
CR	-0.046 (-5.27)***		-0.064 (-9.14)***	
C	0.002 (0.38)		0.057 (8.72)***	
R-squared	0.314		0.575	
N Obs	10160		22499	
F-statistic	1.520		6.096	
Prob(F-statistic)	0.000		0.000	

Notes: Dependent variable in model 11 is investment which is measured as change in fixed assets divided by total assets. Likewise, dependent variable in model 12 is performance measured as return on assets. TD is total debt and measured as total debt divided by total assets. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

### Appendix 8 Effect of the Financial Crisis on Leverage Ratio of Public Firms

$$\text{Model 1 Total debt} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

$$\text{Model 2 Long-term debt} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

$$\text{Model 3 Short-term debt} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

Variable	Model 1 (Total Debt)	Model 2 (Long-term debt)	Model 3 (Short-term debt)
ROA	-0.097 (-3.53)***	-0.019 (1.899)**	-0.030 (-3.24)***
GT	0.002 (1.70)*	0.001 (0.88)	0.001 (0.86)
CR*ROA	0.006 (0.26)	-0.004 (-0.41)	0.006 (0.58)***
GT*CR	0.007 (2.05)**	0.002 (1.42)	-0.001 (-0.16)
CR	-0.008 (-1.42)	0.000 (0.04)	0.003 (0.81)
C	0.275 (80.22)***	0.102 (45.49)***	0.055 (30.68)***
R-squared	0.652	0.713	0.528
N Obs	7926	7923	7867
F-statistic	6.632	8.761	3.933
Prob(F-statistic)	0.000	0.000	0.000

Notes: CR represent crisis dummy for the crisis period. Total debt is measured as total debt divided by total asset. Long-term debt is measured as long term debt divided by total asset. Similarly, short-term debt is measured as short-term debt divided by total assets. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

### Appendix 9 Effect of the Financial Crisis on Trade Credit and Trade Debtor of Public Firms

$$\text{Model 4 Trade Credit} = \beta_0 + \beta_1 * CF + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * CF * CR + \mu_{it}$$

$$\text{Model 5 Trade Debtor} = \beta_0 + \beta_1 * CF + \beta_2 * GT + \beta_3 * CR + \beta_2 * GT * CR + \beta_2 * CF * CR + \mu_{it}$$

Variable	Model 4 (Trade Credit)	Model 5 (Accounts Receivable)
CF	-0.006	-0.038
GT	(-0.66)	(-0.44)
	-5.64	-0.012
CR*CF	(-0.06)	(-2.50)***
	-0.034	-0.222
GT*CR	(-3.07)***	(1.79)*
	0.001	-0.029
CR	(0.83)	(-1.94)**
	-0.007	-0.047
C	(-2.78)***	(2.25)**
	0.112	0.203
	(79.42)***	(24.17)***
R-squared	0.752	0.569
N Obs	7726	7181
F-statistic	10.528	4.560
Prob(F-statistic)	0.000	0.000

Notes: CR represent crisis dummy for the crisis period. Trade credit is measured as trade credit divided by total asset. Trade debtor is measured as trade debtor divided by total asset. T-statistics are reported in parentheses. \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

### Appendix 10 Financial Crisis and Alternative Sources of Finance

$$\text{Model 6 Net Debt Issue} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

$$\text{Model 7 Net Equity Issue} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

$$\text{Model 8 Net Trade Credit} = \beta_0 + \beta_1 * \text{CF} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{CF} * \text{CR} + \mu_{it}$$

Variable	Model 6 (Net Debt issue)	Model 7 (Net Equity Issue)	Model 8 (Net Trade Credit)
ROA	0.328 (1.05)	-0.661 (-0.83)	---
GT	0.088 (0.68)	-0.780 (-2.32)**	0.001 (1.09)
CF			-0.134 (-2.21)**
CF*CR	---	---	0.023 (0.56)
CR*ROA	-0.117 (-0.39)	1.524 (2.36)***	---
GT*CR	0.714 (2.45)***	0.745 (2.53)***	0.012 (1.55)
CR	-1.198 (-3.24)***	-1.980 (-3.62)***	-0.024 (1.73)*
C	1.163 (12.63)***	2.245 (3.69)***	0.064 (18.27)***
R-squared	0.342	0.356	0.499
N Obs	4722	5770	7725
F-statistic	1.254	1.473	3.458
Prob(F-statistic)	0.000	0.000	0.000

Notes: Dependent variable in model 6 is net debt issue which is measured as the change in the sum of short-term debt and long-term debt divided by the sum of the start period of short-term debt plus long-term debt. Similarly, the dependent variable in model 7 is net equity issue and is measured as change in issued capital divided by the start of the period issued capital. In model 8, the dependent variable is net trade credit which is measured as accounts receivable less accounts payable scaled by total assets. Definitions of the rest of variables are given in Chapter 3. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

### Appendix 11 Effect of Financial Crisis on Cash Reserve and Dividend

$$\text{Model 9 Cash Reserve} = \beta_0 + \beta_1 * \text{CF} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{CF} * \text{CR} + \mu_{it}$$

$$\text{Model 10 Dividend} = \beta_0 + \beta_1 * \text{ROA} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{ROA} * \text{CR} + \mu_{it}$$

Variable	Model 9 (Cash Reserve)	Model 10 (Dividend)
ROA	----	0.773
GT	0.125 (1.42)	(3.77)***
CF	1.083 (1.21)	0.282 (3.36)***
CF*CR	2.803 (2.99)***	----
ROA*CR	----	0.521 (1.76)*
GT*CR	-0.004 (-0.02)	0.052 (0.47)
CR	-1.193 (-4.72)***	-0.263 (-2.04)**
C	2.046 (14.56)***	-0.227 (-2.19)**
R-squared	0.288	0.419
N Obs	7614	3376
F-statistic	1.382	2.126
Prob(F-statistic)	0.000	0.000

Notes: Dependent variable in model 9 is cash reserve which is measured as change in cash and cash equivalent scaled by start period of cash and cash equivalent. Similarly, dependent variable in model 10 is dividend and is measured as change in dividend scaled by start of the period dividend. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.

### Appendix 12 Effect of Financial Crisis on Investment and Performance of Public Firms

$$\text{Model 11 Investment} = \beta_0 + \beta_1 * \text{CF} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{CF} * \text{CR} + \mu_{it}$$

$$\text{Model 12 Performance} = \beta_0 + \beta_1 * \text{TD} + \beta_2 * \text{GT} + \beta_3 * \text{CR} + \beta_2 * \text{GT} * \text{CR} + \beta_2 * \text{TD} * \text{CR} + \mu_{it}$$

Variable	Model 11 (Investment)	Model 12 (Performance)
GT	0.013 (4.38)***	0.013 (3.94)**
CF	0.004 (0.30)	---
TD	---	-0.241 (-5.14)***
TD*CR	---	0.031 (0.70)
CF*CR	0.026 (1.74)*	---
GT*CR	0.003 (0.83)	0.013 (1.536)
CR	-0.016 (-2.60)***	-0.031 (-1.82)*
C	0.022 (4.95)***	-0.012 (0.85)
R-squared	0.368	0.617
N Obs	7738	7926
F-statistic	2.018	5.690
Prob(F-statistic)	0.000	0.000

Notes: Dependent variable in model 11 is investment which is measured as change in fixed assets divided by total assets. Likewise, dependent variable in model 12 is performance which is measured as return on assets. TD is total debt and measured as total debt divided by total assets. T-statistics are reported in parentheses, \*\*\*, \*\*, \* represent 1%, 5% and 10% level of significance respectively.