The Ministry of education of Azerbaijan Republic

The Determinants of Capital Structure and the Impact of Financial Crisis: Evidence from UK Panel Data

Samira Babayeva

UNEC SABAH

Acknowledgements

First and foremost, I would like to show my gratitude to my supervisor, Orkhan Sultanov, who was always willing to provide me with suggestions regarding my dissertation and who guided me the whole dissertation period. I also really grateful to my parents, who always supported and encouraged me for the period of studying at the Azerbaijan State Economic University.

Finally, I would like to thank all my friends who helped and gave suggestions, supported me throughout the academic year.

Abstract

This paper examinations the connection between capital structure and organization's capital structure working in the United Kingdom for the time of 2000 to 2013 utilizing pooled OLS panel estimation models. Moreover, it analyses the effect of crisis on capital structure. The final full sample for this study is panel data of 820 firms and in total of 2014 firm-year observations. Employing two measurements of gearing measured at book and market values. Both are found to increase with factors as size and asset tangibility of the organizations. And decrease with development opportunities and liquidity factors. Analyzing the impact of crisis, it was found that, on the whole, the total gearing of UK firms increased during the crisis years 2007-2008, despite the measures of gearing applied.

Table of Contents

List of Tables:

List of Figures:

Section 1. Introduction

Main responsibilities of the financial managers is to choose how to combat firm's capital structure decisions. Specifically, firms must decide how to fund their business tasks. Capital structure is particularly important issue for the firms, because bad financing decisions might damage the operations of the firm, whereas good financing decisions could lead to the prosperity of the firm.

Since pioneering research by Modigliani and Miller, then it became one of the most researched issues in the corporate finance. Theoretical and other studies were conducted. These examinations explored the capital structure decision from different directions; however, choosing capital structure still has no definite, clear answer. Modigliani and Miller's (1958) recommendations expressed that assuming the capital markets are efficient, that is, there are no distortionary taxes, exchange expenses and bankruptcy costs, and parties have equal symmetric information, the capital structure choice becomes irrelevant, therefore, debt and equity can be substitutes for each other.

Some theories as theory by Litzenberger , caught much of the attention. And also Myers and Majluf (1984) and other theories have tremendous impact in economy. Moreover, additionally to the theories, many of the researches were dedicated to find out the possible factors that could clarify capital structure choices. For instance, Harris and Raviv(1991) summarize that the gearing of the firm increases due to firm size and tangible assets, while profitability, probability of bankruptcy, and the uniqueness of the firms' products decreases the firm gearing. Rajan and Zingales (1995) in their paper studied four possible determinants as size, growth, profitability and tangibility in G-7 nations (the US, the United Kingdom, France, Italy, Germany and Japan). They found that these factors are relatively similar across countries, however, there exist some exceptions. For instance, size is positively related to the gearing in Germany, while in other countries it is negatively correlated. Titman and Wessels (1988) consider in their paper additionally aforementioned four factors as development

opportunities, productivity , size of the firm, asset tangibility and the other factors. Bowen, Daley, and Huber (1982) also studied the relationship of the gearing and industry classifications.

While the numerous papers researched capital structure determinants in the United States. This studies including Bradley Jarrell in1984 and Malitz in1985.There are also papers that studied the factors in other countries. Booth, Aivazian, Demirguc- Kunt, and Maksimovic (2001) dedicated their paper to think about developing nations. Chen (2004) researched on capital structure determinants of Chinese-listed organizations. Deesomsak, Paudyal and Pescetto (2004) studied about the Asia Pacific Region (Singapore, Thailand, Malaysia and Australia). The paper of Kayo and Kimura (2011) studied the hierarchical determinants, specifically, related to time, firm-level, across industries and countries, over 40 countries. They found that firm and time-level determinants are the most relevant in explaining the level of gearing hold by firms. Jong, Kabir, and Nguyen (2008) also conducted research analyzing the firm and nation specific factors in 42 nations. They concluded that the nation-specific factors have an indirect impact on the choices of firms regarding the level of gearing. Capital structure determinants were studied specifically in United Kingdom. It was studied by Bennett and Donnelly (1993), Kashefi (2011) and others.

Bevan and Danbolt (2002) utilize four factors. Including this elements: growth, profitability, tangibility and size, and study the same years as them. Moreover, they decompose the gearing to long and short-term debts. In their other work, Bevan and Danbolt (2004) studied as before capital structure of organizations in the United Kingdom. But this time utilizing the panel data estimations. In these studies they used pooled OLS. And also they employed fixed effects models. The purpose of the work by Bennett and Donnelly (1993) was to research capital structure's cross-sectional variation in non-financial UK firms. They used elements like asset tangibility, profitability, growth, size, as well as non-debt tax shields. Kashefi (2011) researched capital structure determinants over firms' sizes (small, medium, and large). Moreover,

he tested whether the tradeoff and pecking order theories could explain the variation in capital structure across firms' sizes. Ooi (1999) gave confirmation on capital structure determinants based on UK property firms. The aim of this paper is to investigate determinants in the UK covering the period starting from 2000 to 2013. The paper will follow Rajan and Zingales (1995), Bennett and Donnelly (1993), Bevan and Danbolt (2002 and 2004), as well as Ozkan (2001) works employing commonly used five factors. Including these elements size of the firm, profitability, asset tangibility, liquidity and the growth factor. The paper attempts to provide extra proof on capital structure determinants in the UK market and answer following research questions:

1. Can chosen possible factors clarify the variety in the capital structure . It is for UK market?
2. Can the discussed theoretical models clarify capital structure choice?
3. Did the capital structure of organizations alter during the crisis years?

Attempting to answer those research questions, it is expected that the paper will contribute in two ways. Firstly, the paper hopefully will add usefulness to the existing prior researches studying capital structure in the UK as not so many papers specifically investigated this country solely. Secondly, it is expected that paper will make contribution to know 2008 crisis affected capital structure of organizations. .One of the papers that studied the influence of crisis is by Fosberg (2014). He studied the U.S. market and he showed that as a consequence of crisis market debt ratios of sample firms increased, on average, by 5.5% in the year 2008.

In order to examine the relationship among gearing and possible determinants, fixed effects models are employed. And also pooled OLS are used. The data is collected for the UK firms operating in eight sectors (Consumer discretionary, Information technology, Energy, Health care, Consumer staples, Materials, Industrials and Telecommunication Services) for the period 2000-2013. The final full sample contains 820 firms and in total of 2014 firm-year observations. To identify the impact of crisis

in UK the years 2007 and 2008 are regarded as crisis period and taken as a crisis dummy.

The paper is organized in the following ways. Literature review which summarizes all previous related research papers and explores the possible determinants is presented in Section 2. Section 3 describes methodology applied in this study like gathering and describing sample data, model specifications and preliminary analysis describing the sample. Section 4 represents empirical consequences of the study, discussion of findings, and robustness checks. Following it, concluding marks and implications from the study, recommendations and limitations are provided in the last section.

Section 2. Literature Review

Capital structure is the blend of debt and equity. And firm uses it to fund business actions and investment decisions. Modigliani and Miller's pioneering work (1958) laid the groundwork to many fundamental papers that discussed the capital structure hypothesis. They assume that capital markets are efficient, inside and outside parties have equal symmetric information. On top of that, it is assumed that there are not any costs like distortionary tax costs, transaction cost. They proposed that in those kinds of circumstances that were aforementioned capital structure choice becomes irrelevant, thus, internal and external funds could be perfectly substituted by each other, meaning that the firm would be indifferent in choosing the ways of financing like issuing more equity or rather debt. Modigliani and Miller's proposition became a framework for the development of other theories.

This section aims to review fundamental papers that discussed the capital structure hypothesis and empirical evidences on possible factors. Theories are discussed. The determinants as size of firm, asset tangibility and liquidity which are commonly used in many research papers and employed in this study are provided next along with

hypotheses that are tested in this study. Further, evidence on crisis is discussed. Finally, the table of summary of hypotheses is provided in the concluding part of this section.

2.1 Theories of Capital Structure

2.1.1. Trade-Off Theory

Unlike dividends, paid interests on debt decrease the amount of firm's taxable income, that is, the firm issuing the debt will benefit from the tax shields. The more debt the firm holds, the more it gains from the tax shields. However, the probability of going bankrupt becomes higher when organizations issue more debt. Therefore, financial managers making decisions on optimal capital structure choices seek a trade-off between future tax reductions and financial distress. Trade-off theory discussed in the paper of Kraus and Litzenberger. They claims that capital structure is trade-off between bankruptcy costs and tax benefits. Therefore, firms will look for optimal capital structure.

2.1.2. Agency Costs Theory

Jensen and Meckling initiated the research based on agency costs, that is, costs due to conflicts of interest among parties acting as agents and principals. In their paper, they recognize two types of conflicts. First conflicts between shareholders and managers of the firm. And the other one is the conflicts among shareholders and debtholders of the firms. Conflicts among managers and shareholders may arise because managers take actions that would benefit his or her, rather than maximizing the wealth of the shareholders and the value of organization. As an suitable example, managers keeping less than 100% of the residual claim can make less effort to use the firm resources in the best way for the firm, in spite of that they can be tempted to use resources for their own benefit like increasing own perquisites, empire building and others (Harris and Raviv). The conflict among managers and shareholders could be mitigated by giving

managers larger fraction of the firm's equity and increasing the debt financing of business operations. Thus, as Harris and Raviv refer to Jensen (1986), increasing the debt requires to pay cash out regularly and it would decrease the amount of free cash flow available. As a result, debt would act as a discipline for the managers and they would be less engaged in actions that are for their own benefits.

Conflicts between shareholders and the debt holders arise when debt contracts between these two parties give equity holders an incentive to invest in the projects at the expense of the debt holders. Jensen and Meckling refer to it as 'asset substitution effect . If the investment goes wrong, the consequences will be borne by the debt holders. That is why, equity holders will be induced to invest in risky projects that yield higher returns. Therefore, to constrain the equity holders from those actions, debt holders put some restrictions on borrowing the debt like requiring collateral for debt in order to secure their position. It may result in increase of costs of debt which leads firms to issue less debt.

2.1.3. Pecking Order Theory

It was studied by Myers and Majluf in 1984.They suggests that when managers facing choice, they will prefer to finance future investments .They should do it utilizing internal sources of funds over external, and then, in case of need in external funds firstly issue debt, and lastly only issue the equity. Theory propose that profitable firms generally will fund their business operations. They use internal sources of fund, retained earnings. It means that relatively profitable organizations will have less debt than less profitable firms. The firms that do not have enough retained earnings to finance future investments, first of all, will resort to safest security, debt, and then only to equity.

Pecking order theory, it is assumed, insiders possess more information about the firm's operations rather than outsiders. Therefore, when the firms would like to issue equity,

the market underprices it, thinking that managers of firms decide to issue equity only when it is deemed to be overpriced (Myers and Majluf).

2.2 The Determinants

Numerous papers talked about different determinants that could clarify variety in organization's capital structure. Different possible factors were studied and discussed. There are still no definite and exact determinants that could clarify capital structure choice. Kayo and Kimura study hierarchical determinants in 2011. These are firm-level, industry-level, country-level determinants, twelve in total, across 40 countries. They conclude that firm-level determinants and time can be regarded as the most relevant factors and country level determinants as the least in explaining the variation in gearing. Specifically, they take development opportunities, productivity, size as firm-level determinant. Study in developing countries was conducted by Booth et al. in 2001. They did research based on ten developing nations (Brazil, Korea, Thailand, India, Pakistan, Malaysia, Turkey, Mexico Jordan and Zimbabwe). They found that profitable firms will hold less debt. Finally, they think that capital structure in developing nations is effected by similar significant factors as in developed nations.

Rajan and Zingales using four determinants in 1995. Including size, tangibility, productivity and development opportunities. They researched capital structure in G-7 nations. They found that in general gearing measures are similar across countries than it was expected. Positive correlation between size of the firm and its gearing was found across all countries, except Germany. As they use size as a proxy for probability of default, they explain the difference as the tendency for firms in Germany to be easily liquidated. Profitability is negatively correlated with gearing in all countries, with the exception of the UK. They argue that the possible reason for that could be the equity is prevailing external source of financing in the UK. Thus, UK firms may rely on mostly equity financing rather than debt financing. Whereas market-to-book ratio

as a proxy is negatively correlated across all countries. But tangibility is positively correlated.

Bevan and Danbolt (2002) following work of Rajan and Zingales (1995) and conducting the cross sectional analysis, found very similar results as them. They studied determinants specifically in the UK . They found asset tangibility , size of organization are positively correlated with debt. In their later work, Bevan and Danbolt studied the same dataset of non-financial firms for the years of 1991-1997 in the UK. Unlike their previous work where the cross-sectional analysis was conducted. The panel estimation models were employed. However, they argue that pooled OLS may cause potential bias on account of inability to control firm effects. Firm size, development opportunities and profitability are commonly discussed and utilized factors in many studies .Therefore, aforementioned factors are selected to be employed in this paper.

2.2.1 Size

Size of the firm is one of the suggested determinants of capital structure in numerous papers. Under the different theories it is expected to have different signs. Trade-off hypothesis predicts a positive relation between firm size and its gearing. Bigger firms are more diversified. Therefore, there is less probability for them to go bankrupt (Titman and Wessels). Thus, as proposed by the theory, there is a small chance of facing budgetary problems for larger firms, and therefore, it is expected for larger firms to rely more on debt . Moreover, lenders regard large firms as reliable and important corporate, they usually lend to larger firms at favourable rates.

Bennett and Donnelly (1993) predict a positive relationship, assuming that larger companies would issue more debt than the smaller organizations. They found significantly positive connection between them, thus, proving, that smaller companies would hold less debt , rely on short-term debt like bank loans, as a result supporting

trade-off theory. Rajan and Zingales (1995) found mainly positive connection across G-7 countries. They found that the size is significantly positively correlated with gearing when it is measured in book values. However, they conclude that they don't have clear answer for the question why the gearing is correlated with size of the firm. Furthermore, Bevan and Danbolt studied the UK market in 2002 and they have the same results as of Rajan and Zingales. Size is positively correlated, but it is only significant when gearing measured at its book values. Relatively larger firms tend to be more transparent, outside parties as lenders and investors can obtain information that is related to the firm, rather than smaller firms, therefore, it would be easier for larger firms to issue equity, while for smaller firms it would be costly (Titman and Wessels)

Titman and Wessels (1988) found significant negative connection between gearing and the firm size. In their study they predicted a positive relationship, however, they found that gearing and size of organization is negatively correlated and smaller firms are more tend to issue short-term debt, the main reason is that possibly high transaction costs when issuing equity or long-term debt. Therefore, a positive connection between the size of the firm and gearing would support the tradeoff theory, while the negative correlation would support pecking order hypothesis.

In view of majority of empirical evidences in favour of positive relationship, in this study, it is expected and hypothesized that gearing and size of the firm is positively correlated.

2.2.2 Growth

As it was mentioned earlier, agency problems among shareholders and debt holders arise when shareholders are willing investing in risky projects at the expense of debt holders. When the investments will succeed the shareholders reap most of the gains, but if it fails the debt holders will borne most of the losses (Miglo, 2014). According

to Titman and Wessels , these kinds of conflicts arise in growing industries which are flexible in their prospective investments preferences. To mitigate the conflicts among shareholders and debt holders, debt holders put restrictions which results for shareholders in increase of cost of debts. Thus, under agency costs hypothesis, the negative correlation is normal between development opportunities and gearing of the firm.

Development opportunities of the organization are regarded as the intangible assets which add value to the organization as research, development expenditures. However, they cannot be used as collateral, therefore, in times of financial distress they fall in value.

Rajan and Zingales discovered that growth opportunities are negatively related with gearing of organization. In study of Kashefi (2011), the development opportunities of the firm and its level of gearing are also strongly negatively correlated with each other. In Titman and Wessels study the growth opportunities and firm gearing is negatively correlated when measured at their market values. Bevan and Danbolt discovered similar results as them, when gearing is measured at its market values, it is negatively correlated. But for some of the other book value measures, it is positively correlated.

However, pecking order hypothesis suggests a positive connection between development opportunities and gearing of the firm. When firms will be in need of funds, they will resort either to internal sources or external sources of financing. If they will decide to issue equity, the theory assumes that managers of the firms have insider information. It means that managers would like to issue new shares only when they are deemed to be overpriced. The investors suspecting this possibility will require the discounts on new shares. As a result, the firms will be reluctant to issue equity because of low prices for new shares, therefore, they would rather rely on internal funds and in case of shortage in internal funds, they will rely on debt when considering putting up in profitable investments.

In view of majority of empirical findings, it is expected that development opportunities and gearing of the firm to be negatively related to each other.

2.2.3 Tangibility

Asset structure of the firm is regarded as one of the important factors when issuing the debt. Because, generally tangible assets are utilized as collateral for debt, they are used to secure debt holders claim in a case of failure of the firm to satisfy its commitments towards debt holders.

Agency costs theory states that conflict between debt holders and shareholders arises when shareholders invest optimally, when they put money in risky projects which in case of failure will harm the debt holders' position. It was said by Jensen and Meckling. Therefore, to mitigate those kinds of conflicts tangible assets of the firm could be used to secure the debt holders and restrict shareholders to invest for their own benefits (Titman and Wessels). Moreover, Bennett and Donnelly (1993) referring to Scott recommend that agency costs associated with issuing secured debt is smaller than of unsecured debt. Thus, agency costs theory anticipates the positive connection between gearing of the firm and tangibility.

Besides, the positive connection between gearing and asset tangibility is expected under the trade-off hypothesis. As Miglo (2014) points out that firms experiencing financial distress will bear a smaller loss of its tangible assets rather than those firms which asset structure mainly consists of intangible assets. Hence, it is expected that firms holding more tangible assets will be more levered.

Bennett and Donnelly (1993), in their study, found a significantly positive relationship, thus confirming Scott's (1977) hypothesis about secured debt and Myers' (1977) about capital-intensity of assets-in-place. Also Myers argues that capital intensive organizations issue more debt.

In G-7 nations gearing and tangibility positively related. And it was studied by Rajan and Zingales . They said, organizations with more tangible assets across G-7 nations will have more gearing. In addition, they conclude that tangible assets could utilized to mitigate agency problems.

Bevan and Danbolt discovered controversial consequences. They found both significant negative and positive relationship for tangibility and gearing.

Under pecking order hypothesis, negative correlation is forecasted for tangibility and gearing of the firm. The theory proposes that organizations that have less collateral assets will suffer from higher information costs (Dang, 2013). Therefore, they would rather issue debt than equity. Booth. E discovered a negative connection in their study based on the ten developing nations. Chakraborty (2013) also found a negative connection between the firm gearing and its tangibility. Thus, agency costs theory predict a positive correlations trade-off hypothesis, tangibility and gearing to be negatively related for pecking order theory. Taking into consideration aforementioned theories and empirical results, the positive correlations are expected.

2.2.4 Profitability

Pecking order theory recommends that organizations usually fund business activities utilizing inward sources like retained earnings at first . Then look for external sources giving preference for the debt initially and then only to the equity. Therefore, relatively profitable organizations will utilize inward sources of funding, thus leading to the negative connection for gearing, profitability of the firms (Miglo, 2014).

Many papers found a connection between productivity and gearing of organization. Also Rajan and Zingales claimed that the gearing and productivity are negatively related, but it is significant when measured at their market values. And also Bevan and Danbolt find negative relationship . Then Booth et al also discovered results showing

negative correlation between productivity of organization and its level of gearing despite the ways how that level of gearing is defined. They confirm pecking order theory, and argue that generally firms are reluctant to resort to external sources of financing due to high associated costs.

Profitability and gearing is expected to be positively related, under trade-off theory. Theory recommended that profitable organizations issuing more debt could benefit from significant amount of tax shields. Therefore, it is considered that relatively profitable firms will choose to issue more debt. The main reason is that, the benefits from taxable income to shield.

2.2.5 Liquidity

There is no definite evidence about how liquidity impacts it. Ozkan (2001) discusses two possible impacts of liquidity on gearing of the firm. Firms which have high liquidity ratios may like holding more debt, because capacity to fulfil short-term obligations towards lenders. Thus, it is anticipated to be positively connect with gearing of organization.

However, those firms with high liquidity ratios may decide to use liquid assets to fund future investments. Hence, it leads negative correlation between gearing and liquidity. In his study, Ozkan (2001) discovered negative coefficients for liquidity factor.

Pecking order recommends that organizations choose internal sources of funding rather than external. Therefore, theory predicts that if firm has sufficient liquid assets to fund its future investments, there will not be any need to firm to resort to external sources of financing (Niu, 2008). Thus, in accordance with pecking order it is expected to liquidity negatively correlated with gearing of organization. Next, the

possible reasons of financial crisis and how it may effect UK organizations' capital structure is discussed.

2.3 Financial crisis

Much literature to date agree that the starting point of crisis was US, after that it started to spread to other areas in the world causing an economy-wide recession (Berg, 2011). Financial crisis led to the detrimental consequences as the collapse of many financial institutions, decline in stock markets and slowdown of the economies over the world (Dallago, 2013).

According to Szyszka (2010), the root of the financial crisis refers back to period before crisis itself. He argues that before the crisis, the US economy was prospering and developing faster than the entire economies of many countries taken together. This led to the growing demand in household products including the housing. To satisfy demand the US was forced to import products outside of the country which resulted in trade imbalance and deficit. Consequently, the US government was forced to issue a large amount of Treasury bills in order to embrace the deficit which resulted in liquidity repletion. This repletion led to the asset bubbles and abundant gearing (Blundell-Wignall et al, 2009).

The problem worsened further because of poor regulatory framework and offered low interest rates by the US government which resulted in people's holding more debt (Szyszka, 2010). US government regulations supported the people that are deemed to be risky, that is, people without permanent job, with no stable income, could borrow loans with lower rates. Therefore, banks started to issue more subprime loans to those kinds of borrowers.

However, in August of 2007 the interest rates were increased by Federal Reserve System (Goodhart, 2008). The increase in interest rates put borrowers in difficult position, because it became troublesome to them to pay back the interests and loans to

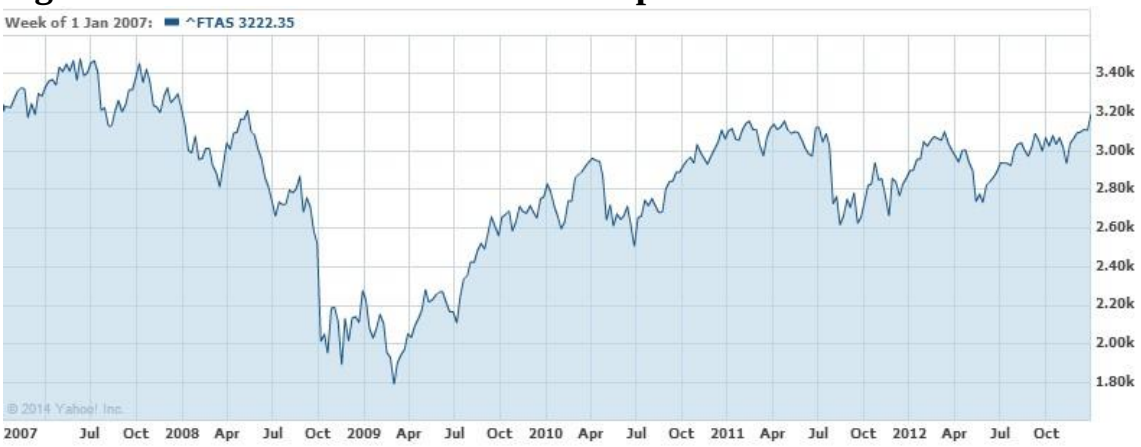
the banks. Banks used their houses as collateral because of their powerlessness to pay back, it resulted in the drop of prices of houses. Consequently it led to the housing bust.

The lack of transparency between the parties, and improper fulfilment of obligations by rating agencies were also the one of the causes that led to crisis. After giving away the loans to the subprime borrowers, financial institutions created Mortgage Backed Securities which consist of pool of subprime mortgages and sold it to investors. The subprime mortgages and MBS were the new to the financial markets (Calomiris, 2008). Therefore, it was difficult to give them a proper rating. In addition, rating agencies did not want to give their business to their competitors , that is why they tended to give high ratings even though the financial institutions had high risk of going default (Calomiris, 2008). Furthermore, financial institutions suffered from the liquidity dry-ups. Banks faced problems in truly identifying the financial institutions that were suffering from temporary shortage of liquidity or were on the verge of collapse. One of the possible reasons for that could be the competition among financial institutions, that is, institutions did not want to lend to competitors in need, because of interest to see their failure (Berg, 2011). Started in the U.S., the financial crisis proliferated quickly to other countries. Spain and France were affected by housing bubble. The prices for houses increased dramatically like three times for Spain during the periods 1985-1991 and 1996-2008 and in France by 120% during the eight years from 2000 to 2008 (Dallago, 2013). Moreover, the portfolios of European banks that hold the US subprime mortgage packages appeared to be in difficult position (Dallago, 2013).

The crisis did not bypass the United Kingdom. Financial crisis resulted in dramatic price drops of financial assets. According to Banks, Crawford, Crossley, and Emmerson (2012), the FTSE all share Index went down by almost one-thirds (Figure 1). The house prices dropped significantly. Consequently, all of these caused the

slowdown of the economy, failures of financial institutions and declines in the wealth of the households.

Figure 1. FTSE All-Share Index for the period 2007-2013

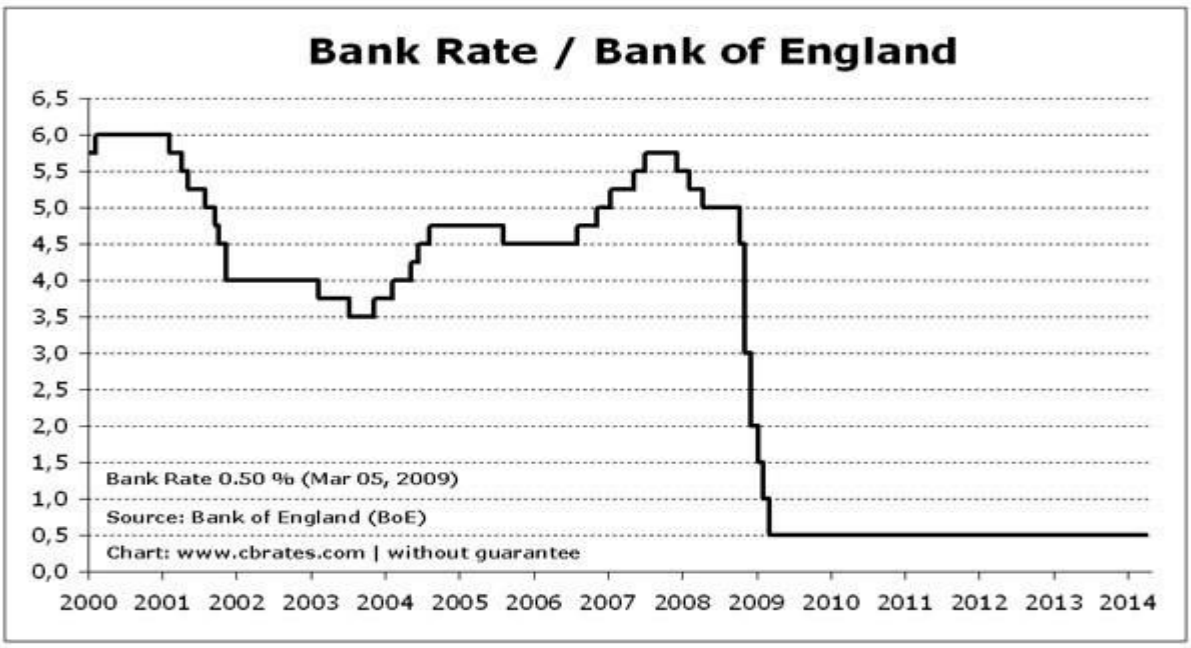


Data source: UK and Ireland Yahoo Finance, https://uk.finance.yahoo.com/

One of the measures that were taken by governments and central banks worldwide in order to cope with consequences of crisis was to decrease interest rates (Berg, 2011). Cut in interest rates was supposed to restore the financial stability of the economy. Central banks allowed borrowers to borrow the loans at longer maturities than before. Also the group of parties who can take loans were increased in range (Berg, 2011). Figure 3 depicts the bank rates for Bank of England for the period 2000-2014[1]. It is clearly seen that interest rates started to decrease from the year 2007.

Thus, in this study, it is expected that decrease in interest rates induces organizations borrowing more and leads to the increase in the level of gearing across UK organizations during the crisis.

Figure 2. Bank rates for the period 2000-2014



source: Bank of England Chart: www.cbrates.com

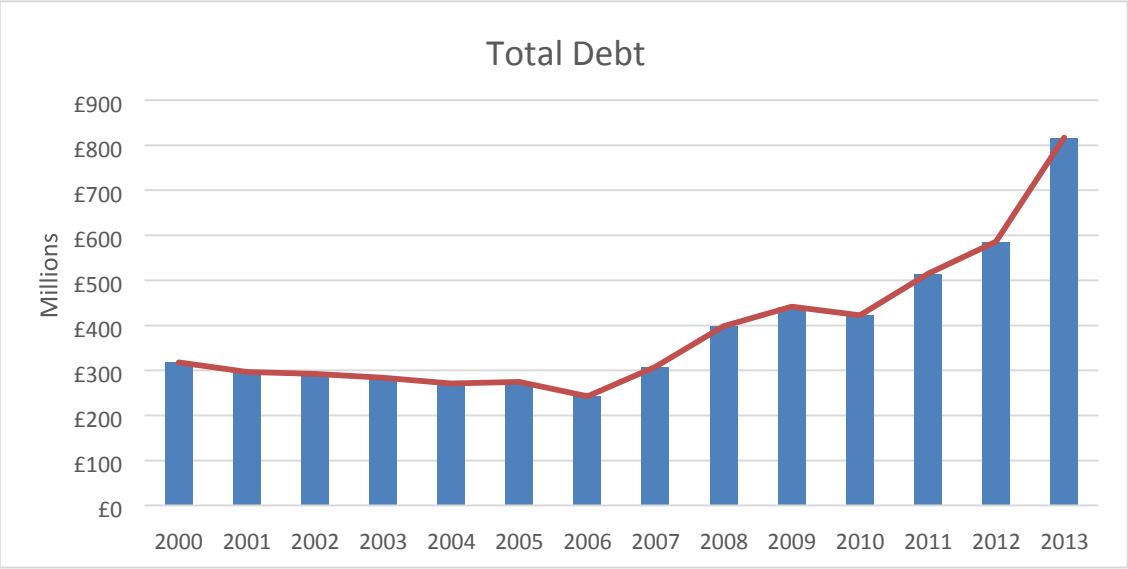
[1]

Table 1 for bank rates in Bank of England is presented in the Appendix.

Figure 3 illustrates the total debt issued in the UK market for 2000–2013 across eight sectors (Consumer discretionary, Information technology, Energy, Consumer staples Health care, Materials, Industrials and Telecommunication Services). It is clearly seen that from the year 2007 the amount of total debt issued started to increase.

Fosberg (2014), who studied the crisis's effects on capital structure of the U.S. firms, provides evidence that in the US the market debt ratios increased in year 2008 on average by 5.5% due to financial crisis. Book debt ratios also were influenced and increased, but they were affected to smaller extent than that of market debt ratios. With this in mind, it can be expected capital structure of UK organizations operating in eight sectors will increase after the year 2007.

Figure 3. Total Debt issued in the United Kingdom (across eight sectors)



Data source: Thomson One Banker

Thus, taking into consideration bank interest rate falls and increase in debt issuance in the UK, it can be hypothesized that during crisis the gearing of the firms is expected to increase. All in all, there is no definite empirical evidence about how one particular factor affects like, for instance, with the increase of one factor the organization capital structure also increases, or increase in another factor definitely decreases the gearing of the firm. Different theories predict different signs of coefficients based on the supporting arguments.

It is expected to financial crisis significantly influence the estimations of the capital structure. As it is displayed in Figure 2, starting from the year 2007, the issuance of total debt in the UK started to increase. Therefore, it is hypothesized that the UK firms' capital structure will increase. This connection between gearing and factors , also impact of crisis on gearing of the firms are discussed in the next sections.

Table 1. The Summary of Hypotheses

Variables	Hypothesis
Size	H_1: *Positive correlation is expected between gearing and size of organization.*

Growth	H_2:	*Negative correlation is expected between development opportunities ,gearing of organization*
Tangibility	H_3:	*Positive connection is expected between tangibility & gearing of the firm.*
Profitability	H_4:	*Negative connection is expected between profitability & gearing of organization.*
Liquidity	H_5:	*Negative connection is expected between liquidity & gearing of organization.*

Crisis period H_6: *Due to financial crisis, the gearing of firms is expected to increase.*

Section 3. Data and Methodology

This section introduces the sample construction and the methodology adopted in order to find out the determinants that could clarify capital structure decisions of the organizations. It also includes preliminary analysis presenting descriptive statistics. It is statistic dependent and independent variables.

3.1 Data

The data for the further research is collected from the secondary source Thomson One Banker, which provides a wide scope of financial data on international public firms, private equity, international stock indices and others. This study is based on the United Kingdom. Thus, the financial data on variables were extracted in total of 1334 publicly recorded UK organizations operating in eight sectors (Consumer discretionary, Information technology, Consumer staples Energy, Health care, Materials, Industrials and Telecommunication Services). Firms from the financials and utilities sector were not included because of different asset structure than firms in non-financial sectors (Rajan and Zingales; Ozkan, 2001). The time period is selected starting from 2000 to the 2013 in purpose of analyzing recent data and incorporating impact of crisis.

The observations that have missing values are dropped, assuming that those missing values are random. Antoniou et al. refer to Arellano and Bond (1991) argue that to observations to have robust results, they should have at least five consecutive annual observations. Therefore, the observations which have data for less than five consecutive years were excluded (Ozkan, 2001). Outliers were identified and because they may distort the results, following Bevan and Danbolt all variables with the exception of size and tangibility were winsorized at 1%. The coefficients of size before and after winsorizing are similar. Therefore, with a view to keep the integrity of the data, size was not winsorized and remained as it was (see Appendix, Table 2). The observations which were more than 1 in the tangibility were dropped, because tangible assets are the composition of total assets itself. Therefore, it cannot be more than total assets.

As a result, the final sample for further regression consists of unbalanced panel data of 820 UK firms and in total of 8014 firm-year observations.

3.2 Model and Methodology

The panel data is used in order to run the regression to examine the correlation among level of gearing and its determinants. The utilization of panel data gives more effective estimates. Baltagi said that the panel data provides efficient results than time-series, also it is more effective rather than cross-sectional analyses. There are several studies that apply the panel data. For example by Ozkan, Kashefi (2011) , Booth et al and others.

The OLS techniques can be applied using panel data. However, it does not always provide efficient results. Bevan and Danbolt argue that pure pooled OLS estimation results might be biased because of incompetence to have control over firm-particular and time-invariant heterogeneity. It may arise because of presence of some factors which cannot be measured or observed, but they influence the variables.

It is possible to mitigate the heterogeneity problem utilizing panel data techniques. Including fixed and random models. Firstly, fixed effects considered those firm-particular factors that influences the determinants and removes their effects giving one to assess the net effect of variables. Random models is used when it is believed that the variation in the entities are random and that it is not correlated with the independent variables. The panel data estimation models help to mitigate the problem of multicollinearity which can be issue in time-series regression. Fixed model is chosen to be employed for further regression. Because, the tests that determine the model that is suitable for further regression determined fixed model as suitable model. The results of the test are provided in detail in the next section. For this study both fixed effects will be employed. Booth et al. refer to Hsiao (1986) argues fixed model due to measurement error may also produce biased estimations. Because each of the models has its own limitations, using only one of them will not give efficient results.

3.2.1 Model specification

Referring to several papers (Bevan and Danbolt, 2004) the following regression model ‘s goal was to test the hypotheses (H_1-H_5) developed in the previous section (Table 1):

$$(1)\ GEAR_{i,t} = \alpha_{it} + \beta_1 SIZE_{i,t-1} + \beta_2 GROWTH_{i,t-1} + \beta_3 TANG_{i,t-1} + \beta_4 PROF_{i,t-1} +$$

$$\beta 5\ LIQi,t\text{-}1 + \varepsilon it$$

where,

- $GEAR_{i,t}$ is the measure of gearing of the firm *i* at time *t.*
  In this study two measures of the gearing included: 1) book value , 2) market value.
- $SIZE_{i,t-1}$ is the size of the firm *i* at time *t-1.*
  The proxy for the size of the firm is taken as natural logarithm of sales.
- $GROWTH_{i,t-1}$ is development opportunities of the firm *i* at time *t-1.*
  Many papers take different proxies for organization growth opportunities of the firm.

- $TANG_{i,t-1}$ is the tangibility of the given firm *i* at time *t-1*.
  As used in several papers, the proxy for the firm's tangibility is measure of fixed assets to total.
- $PROF_{i,t-1}$ is the profitability of firm *i* at time *t-1*.
  The proxy for profitability is operating profit (EBIT) to total assets.
- $LIQ_{i,t-1}$ is the liquidity of the given firm *i* at time *t-1* measured as total current assets which divided by total liabilities
- ε_{it} is the error term
- *i* is the firms involved in regression. $i = 1, 2, \ldots N$
- *t* is the given time period. $t = 2000, \ldots, 2013$

Furthermore, time dummies are included in further regressions using (LSDV) model which is one of the approaches of fixed model. Time dummy is included so as to check alter of firm's capital structure. Setting year 2001 as a base year, it is tested how the level of gearing across firms differs each year compared with the year 2001. Because all the variables lagged one year, including the year 2000 will lead to the collinearity between year 2000 and 2001. Thus, the base year is 2001.

3.2.1.1 Regression model with crisis dummy

In order to find whether the financial crisis solely effect on capital structure and test the following hypothesis

the crisis dummy is included to the preceding regression model:

$$(2)\ GEARi,t = \alpha it + \beta 1\ SIZEi,t\text{-}1 + \beta 2\ GROWTHi,t\text{-}1 + \beta 3\ TANGi,t\text{-}1 + \beta 4PROFi,t\text{-}1 + \beta 5\ LIQi,t\text{-}1 + CrisisDummy + \varepsilon_{it}$$

Crisis dummy includes two years (2007 and 2008). As it was mentioned in the section 2 in financial crisis part, Goodhart (2008) argues that in 2007 interest rates for loans

increased, consequently which led to the housing bust. Therefore, the 2007 is regarded as the start of financial crisis. Also, interaction variables are employed. Each of them shows the additional impact of crisis on each of the determinants (SIZE, GROWTH, PROF, TANG, and LIQ).

(3) $GEARi,t = \alpha it + \beta 1\ SIZEi,t\text{-}1 + \beta 2\ GROWTHi,t\text{-}1 + \beta 3\ TANGi,t\text{-}1 + \beta 4 PROFi,t\text{-}1 + \beta 5\ LIQi,t\text{-}1 +$

$CrisisDummy + CrisisDummy\ X\ SIZEi,t\text{-}1 + CrisisDummy\ X\ GROWTHi,t\text{-}1 + CrisisDummy\ X\ TANG_{i,t-1} + CrisisDummy\ X\ PROF_{i,t-1} + CrisisDummy\ X\ LIQ_{i,t-1} + \varepsilon_{it}$

Table 2. Description of variables

The table shows the measures that will be used as proxies for variables and their predicted signs. TD is total debt. TA is total assets. FA stands for fixed assets. And CA and CL are current assets ,liabilities, respectively.

Variable	Proxy	Predicted sign
Gearing	Gearing (BV) = TD / TA	
	Gearing (MV) = TD/ (TA – BVE + MVE)	
Size	Log (Sales)	"+" ve
Growth	Market-to-Book ratio (MTB)	"–" ve
Tangibility	FA/TA	"+" ve
Profitability	EBIT/TA	"–" ve
Liquidity	CA/CL	"–" ve
Crisis Dummy	CD = 1 if year = 2007, 2008; otherwise CD = 0	"+" ve

3.3 Preliminary analysis

The preliminary analysis of full sample is presented before proceeding to the regression results, which includes the full descriptive statistics of variables.

3.3.1 Descriptive Statistics

Table 3 exhibits descriptive statistics for panel of 820 companies operating in the United Kingdom over the time period 2000–2013. The full sample consists of 8014 firm-year observations.

The values for all variables but size and tangibility presented in the table are after the winsorizing at 1%. As it can be seen from the table, the two measures of gearing differ from each other. The gearing of firms measured at book value is 0.1546. The minimum is zero, the maximum gearing at its book values is 0.7942, indicating that gearing across firms differs significantly. The average level of the gearing across firms is 0.1212, the minimum is negative value close to zero (-0.00002), whereas the maximum of level of gearing across firms is around 0.5991.

Even after winsorizing the standard deviation for growth opportunities is still largest (3.9461), indicating that the dispersion of growth opportunities across firms is large enough and it differs across firms. The second largest standard deviation among variables is for size (2.6171), and it can be seen that there is substantial difference between minimum , maximum, 6.7685 and 27.0055, respectively, indicating that sample contains firms with different sizes. There are no dramatic differences between means and medians of all variables which mean that they are close to normal distributions.

Table 3. Descriptive Statistics of Sample

The sample consists of 820 UK firms of all sectors, except financial and utilities sectors. The table shows mean, median, minimum, maximum, and standard deviation of variables for 8014 firm-year observations for the period of 2000 to 2013. Development is market-to-book ratio.

Variable	Obs.	Mean	Median	Std.Dev.	Min	Max
Gearing (BV)	8014	.1546	.112	.1667	0	.7942
Gearing (MV)	8014	.1212	.0773	.1377	-.00002	.5991
Size	8014	18.0974	18.1491	2.6715	6.7685	27.0055
Growth	8014	2.4431	1.6413	3.9461	-13.1925	22.7521
Tangibility	8014	.2291	.1506	.2276	0	.9707
Profitability	8014	.0095	.0649	.2314	-1.1817	.3593
Liquidity	8014	2.1124	1.4407	2.2935	.2698	15.595

3.3.2 Multicollinearity

Before proceeding to the regression, the data sample must be detected to the issues that may lead to unreliable results. Multicollinearity is one of the issues that may result in unreliable estimation coefficients. It arises when there might be a strong negative or positive correlation among independent variables (Wooldridge, 2009). The presence of this kind of strong relationship among explanatory variables may make it difficult to identify the pure impact of those independent variables . To check for multicollinearity among dependent independent variables, the pairwise correlation and (VIF) tests are conducted.

Table 4 presents the pairwise correlation matrix. As it can be seen, the illustrative variables are not highly associated, showing that there are no issues leading to multicollinearity problem. Two measurements measured at book and market values are highly correlated (0.8359). However, it does not cause the multicollinearity problem, as both of them dependent variables and are not included together at the same time in one regression.

Table 4. Pairwise correlation matrix

The table presents pairwise correlation between variables.

	Gearing (BV)	Gearing (MV)	Size	Growth	Tangibility	Profitability	Liquidity
Gearing (BV)	1.0000						
Gearing (MV)	0.8359	1.0000					
Size	0.2709	0.2608	1.0000				
Growth	-0.1026	-0.1792	-0.0154	1.0000			
Tangibility	0.2380	0.2820	0.2093	-0.0763	1.0000		
Profitability	0.0538	0.0959	0.5437	-0.0042	0.1627	1.0000	
Liquidity	-0.3147	-0.2915	-0.4114	0.0632	-0.1350	-0.2275	1.0000

Another test conducted in order to detect the multicollinearity among variables is VIF test. If the mean VIF score will be more than 10, it means that there presents multicollinearity (Wooldridge, 2009). The obtained results show the mean VIF of 1.27 (see Appendix, Table 3). Thus, the test also proves that the multicollinearity among explanatory variables is not an issue.

Section 4. Empirical Results

This section presents the regression results for determining the connection amongst capital structure and determinants. Firstly, the results are provided for full sample with a view to test capital structure over UK firms for 2000-2013. Secondly, the regression results which show how the capital structure alters over time are presented. Next, results that incorporated the crisis dummy are given in order to analyze the influence of the crisis on UK organization's capital structure during the time frame of crisis. The robustness checks are discussed in the last part.

4.1 Model fit

To choose utilizing panel data the estimation model that is appropriate to run the regression for capital structure determinants. In order to determine the model that fits the panel data better and conducted between fixed and random models Hausman test is used. Conducting the test we get X^2 of 73.99 and p-value of 0.0000 . It implies that the fixed effects model is preferred to random effects model and significant at 0.01 significance level. Hence, the further regression results are based on the fixed effects model. Pooled OLS model's results is also presented in order to compare the estimation results of both models and test relationship between gearing and its determinants remains the same after controlling for firm-specific factors

The fixed effects model has less explanatory power than pooled OLS, adjusted R^2 for pooled OLS is 0.170 for both of the measurements of gearing, while for fixed effects are 0.0381 and 0.0303, for book value gearing and market value gearing respectively (Table 6). Bevan and Danbolt

(2004) referring to Barclay, Smith and Watts (1995) explain this difference as the failure of pooled OLS to capture the firm effects when the sample includes firms more than one times. Dougherty (2012) also argues that OLS estimates may be inflated by unobserved heterogeneity. Therefore, it may lead to the overstatement of variables' significance (t-statistics) in the pooled OLS regressions and because of that to the increase of R^2. Whereas fixed effects model captures, control those firm-specific effects which may result in less t-statistics and R^2.

4.2 Capital structure , determinants

Table 6 shows the regression results for two measurements of gearing, gearing measured at book value and the other one measured at market value. And it is utilizing fixed effects , pooled OLS models. The results are robust to heteroskedasticity. The signs of all the variables are in accordance with the predictions. As it can be seen from

the table, overall, the total gearing of the firm, notwithstanding which measure of gearing is applied, increases with the size and its tangibility, while the development opportunities, productivity, liquidity of the firm decrease the total gearing of the firm. In order to find the importance of each explanatory variable in explaining the gearing, they are discussed next in details.

Table 5. Capital structure determinants: full sample regression results for fixed effects and pooled OLS models

The table shows regression results for fixed effects using the following model: And also it indicates results for pooled OLS.

$GEARi,t = \alpha it + \beta 1\ SIZEi,t\text{-}1 + \beta 2\ GROWTHi,t\text{-}1 + \beta 3\ TANGi,t\text{-}1 + \beta 4\ PROFi,t\text{-}1 + \beta 5\ LIQi,t\text{-}1 + \varepsilon it.$

t-statistics are robust to heteroskedasticity and provided in parentheses below the coefficients. *, **, *** represents the significance levels for coefficients at 0.10, 0.05 and 0.01 respectively.

		Fixed effects		Pooled OLS	
Variable	Predicted sign	(1) Gearing (BV)	(2) Gearing (MV)	(1) Gearing (BV)	(2) Gearing (MV)
$SIZE_{t-1}$	" + "	0.0124**	0.0163***	0.0142***	0.00873***
		(3.07)	(5.28)	(16.27)	(12.27)
$GROWTH_{t-1}$	" – "	-0.00112	-0.00135*	-0.0009	-0.00389***
		(-1.62)	(-3.59)	(-1.20)	(-9.66)
$TANG_{t-1}$	" + "	0.0445	0.0291	0.139***	0.138***
		(1.32)	(1.06)	(15.75)	(16.45)
$PROF_{t-1}$	" – "	-0.0491*	-0.0249*	-0.131***	-0.0494***
		(-2.23)	(-2.21)	(-9.11)	(-6.82)
LIQ_{t-1}	" – "	-0.0082**	-0.0033**	-0.0163***	-0.0115***
		(-5.04)	(-3.20)	(-19.07)	(-17.94)
Constant		-0.0575	-0.169***	-0.0946***	-0.0323*
		(-0.76)	(-2.90)	(-5.55)	(-2.35)
N		6932	6932	6932	6932
R^2		0.0388	0.0310	0.171	0.170
adj. R^2		0.0381	0.0303	0.170	0.170
F		10.84	14.92	327.3	324.0

4.2.1 Size

As it was expected the size of the firm has a significant positive power in explaining the level of firm gearing, implying the larger the firm, the larger its debt ratio. The results confirm trade-off theory, it suggests that larger organizations are relatively

more diversified and they less prone to face financial distress. Moreover, findings confirm that relatively large firms have an easier access to debt markets, they face less transaction costs rather than smaller firms. Therefore, larger firms are willing to have more debt in capital structure rather littler firms.

In fixed effects model, the coefficient of size when gearing measured at book value implies that when size of organization raises by 1%, the total gearing of the firm will raise by 1.24%. Whereas in market value gearing, the increase in size of ēthe firm by 1% results in increase of total gearing by 1.63%.

Pooled OLS results are slightly lower than fixed model results, still significant at 0.01 significance level. Thus, under pooled OLS, 1% increase in size increases the gearing of the firm by 1.425% and 0.873%, when measured at book and market value respectively. The impact of size on market value gearing is twice smaller in magnitude (1.63% for fixed effects and 0.873% for pooled OLS, respectively) under the pooled OLS. Overall, findings are in accordance with the hypothesis (H_1), and support the predictions of trade-off theory

4.2.2 Growth opportunities

The results indicate negative connection between the firm gearing and its development opportunities. Under trade off hypothesis, development chances of the firm are regarded as intangible assets that increase value to the firm in the future (e.g., advertising expenses, research ,development expenses and so on), but when faced with financial distress, it is expected to them decrease in value. Therefore, organizations with growth opportunities are expected to hold less debt.

Agency costs hypothesis recommends that in the growing industries the conflicts between equity holders and debt holders happen more frequently. Debt holders in order to cope with those issues put restrictions on borrowing capacity of firms, which leads to less debt. Thus, acquired outcomes of negative connection between the

gearing of the firm and development opportunities support the trade-off hypotheses, implying that organizations with more future development opportunities will hold less debt and also it supports agency cost hypotheses. The estimated coefficients under fixed effect model are significant at 0.10 significance level when they are measured at market values. It is consistent with the findings of Bevan and Danbolt .

However, the results show that one cannot say that growth opportunities have strong influence on the gearing of the firm economically. Despite the statistical significance, if the estimated coefficients have a modest effect on dependent variable, it may imply that they are not economically significant (Wooldridge, 2009). The 1% increase in growth opportunities imply decrease of only 0.112% when it is measured at book value, whereas 1% increase in growth opportunities will decrease the market gearing by only 0.135%. Overall, the findings suggest that gearing of the UK firms measured at book value are insensitive to the organization's development opportunities. Whereas there is significant negative connection between development opportunities and firm gearing measured at market value.

4.2.3 Tangibility

The anticipated positive connection between asset tangibility and total gearing of the firm is confirmed suggesting that more tangible assets the firm holds in asset structure, the more it holds debt in capital structure. And results for both of the models are consistent. Trade-off hypothesis claims that intangible assets will fall in value in times of financial problems and organizations will be reluctant to issue more debt (Miglo, 2014). Thus, the firms holding more tangible assets can prefer to have more debt than firms whose asset structure consists of mostly intangible assets

4.2.4 Profitability

The estimated coefficients for profitability are significant at 0.1 and 0.01 significance levels under the fixed effects and pooled OLS models respectively, and, moreover, in

line with the signs that were predicted. According to fixed model results, if the profitability increases by 1%, the market gearing decreases by almost 2.5%, whereas the book gearing decreases twice as market values, by 4.91%. The consequences for pooled OLS show the 1% increase in profitability decreases the book gearing by 13.1% and market value gearing by 4.94%. The findings are in concordance with pecking order hypothesis, which suggests that relatively profitable firms will resort to inward sources of funding like retained earnings rather than using external sources.

4.2.5 Liquidity

The findings for liquidity are in accordance with the hypothesis (H_5). The higher the liquidity of the firm, the less debt it holds. The outcomes support pecking order hypothesis , that recommends if the organization holds enough liquid assets to fund its future investments, it prefers to use them rather than issuing external sources of financing like debt or equity.

It can be concluded that no exact theory completely clarifies the variety UK organization's capital structure. In accordance with the expectations, the trade-off hypothesis could explain positive correlation between gearing and the size and tangibility of the firm, and negative correlation between gearing and development opportunities of the organization. Agency costs hypothesis could also clarify positive correlation between tangibility and gearing. Also it claims negative correlation between development opportunities and gearing of organization.

4.3 Capital structure alters over time

The next table provides the regression results where twelve annual year dummy variables added using LSDV model. The base year is 2001, because of the lagging variables. The adjusted R^2 for fixed model significantly increased when dummy variables added, from 0.0381 and 0.0303 to 0.0712 and 0.121, for book and market value gearing respectively. Adjusted R^2 under pooled OLS, for book value gearing is

0.185 and for market value gearing is 0.204. Signs remain in accordance with the expectations. Adding year dummies slightly changed the coefficients of the variables. The magnitude of size and development opportunities slightly decreases, their significance remain as they were, size is significant for both of the measures of gearing, and development opportunities is significant only for market value gearing. The tangibility becomes significant and increases in magnitude, implying that the increase of 1% in tangibility results in increase of 8.76% in gearing measured book value, and 8.48% in market value gearing. The coefficients of profitability and liquidity only slightly changed, and they remain significant.

As it can be seen from the table, the total gearing of firms across firms increases year by year. Years 2007, 2008, and 2009 are highly significant, moreover, it is clearly seen that in comparison with other years, the total gearing increased significantly in these years. In 2007 the total book value gearing increased by 6.41%, in 2008 by 7.37%, and in 2009 by 5.85% in comparison with year 2001. Whereas the total gearing measured market values in 2007 was bigger than total market value gearing in year 2001 by 4.66%, in 2008 by 9.53%, and in 2009 by 5.83%.

Both of the measures of gearing increased dramatically in years 2007 and 2008. The highly significance of 2007 and 2008 can be associated with 2007-2008 crisis. Furthermore, the possible reason could be the fall in interest rates (figure 3) which was put forward by the UK government in order to facilitate the recovery of financial stability from the financial crisis and encourage firms to borrow more in order to support their business operations and future investments. In those years the total issuance of debt increased across UK firms which influenced organization's capital structure (Figure 3).

To sum up, added year dummies did not alter the positive or negative correlation between gearing and explanatory variables. They remain the same. Moreover, one can say that during the crisis period the total gearing across firms significantly increased,

despite the measures applied. The impact of crisis on the total gearing of the UK firms is discussed next.

Table 6. Regression results with inclusion of time dummies

The table shows regression results for fixed and pooled OLS model using the following model:

$GEARi,t = \alpha it + \beta 1\ SIZEi,t\text{-}1 + \beta 2\ GROWTHi,t\text{-}1 + \beta 3\ TANGi,t\text{-}1 + \beta 4\ PROFi,t\text{-}1 + \beta 5\ LIQi,t\text{-}1 + time\ dummies + \varepsilon it.$

Base year is 2001, because of lagging variables. t-statistics are robust to heteroskedasticity and provided in parentheses below the coefficients. *, **, *** represents the significance levels for coefficients at 0.10, 0.05 and 0.01 respectively.

	Fixed effects		Pooled OLS	
	Gearing (BV)	Gearing (MV)	Gearing (BV)	Gearing (MV)
SIZEt-1	0.0095*	0.0115***	0.0146***	0.0092***
	(2.17)	(3.56)	(16.84)	(13.18)
GROWTHt-1	-0.0012	-0.0012***	-0.00098	-0.0038***
	(-1.70)	(-3.33)	(-1.29)	(-9.57)
TANGt-1	0.0876*	0.0848**	0.148***	0.148***
	(2.58)	(3.03)	(16.71)	(17.73)
PROFt-1	-0.0560**	-0.0329**	-0.136***	-0.0549***
	(-2.58)	(-2.99)	(-9.56)	(-7.68)
LIQt-1	-0.00796***	-0.00298**	-0.0162***	-0.0115***
	(-5.03)	(-2.86)	(-18.96)	(-17.87)
2002	0.0214	0.0336*	-0.0221	-0.0329
	(1.45)	(2.43)	(-1.02)	(-1.75)
2003	0.0209	0.0118	0.00026	-0.0250**
	(1.38)	(0.84)	(0.03)	(-3.05)
2004	0.0153	0.0102	-0.0017	-0.0212**
	(1.00)	(0.71)	(-0.17)	(-2.61)
2005	0.0328*	0.0160	0.0201*	-0.0112
	(2.10)	(1.08)	(2.03)	(-1.41)
2006	0.0379*	0.0135	0.0293**	-0.0102
	(2.39)	(0.90)	(2.99)	(-1.32)
2007	0.0641***	0.0466**	0.0568***	0.0236**
	(3.94)	(3.04)	(5.80)	(2.94)
2008	0.0737***	0.0953***	0.0676***	0.0711***
	(4.53)	(6.16)	(6.99)	(8.29)
2009	0.0585***	0.0583***	0.0521***	0.0326***
	(3.59)	(3.79)	(5.59)	(4.08)
2010	0.0416*	0.0399*	0.0342***	0.0137
	(2.54)	(2.56)	(3.78)	(1.76)
2011	0.0382*	0.0482**	0.0316***	0.0229**
	(2.33)	(3.08)	(3.53)	(2.92)
2012	0.0385*	0.0412**	0.0316***	0.0152
	(2.39)	(2.66)	(3.46)	(1.93)
2013	0.0319	0.0229	0.0244*	-0.0045
	(1.93)	(1.46)	(2.52)	(-0.55)
Constant	-0.0571	-0.135*	-0.137***	-0.0570***
	(-0.71)	(-2.25)	(-7.44)	(-3.80)
N	6932	6932	6932	6932
R^2	0.0735	0.123	0.187	0.206
adj. R^2	0.0712	0.121	0.185	0.204
F	9.103	24.92	101.9	106.0

4.4 Capital structure and crisis

In order to analyze the influence of the financial crisis on level of gearing, crisis year dummy is added which incorporates two years of 2007 and 2008. The reason taking the 2007 year as a start of financial crisis is that as it was aforementioned in section 2, in August of the year 2007 interest rates on loans increased which put borrowers in

difficult position, they were unable to fulfil their obligations towards creditors. As a result it caused housing bust (Goodhart, 2008).

Table 8 shows the regression results that include crisis dummy. As it can be seen from the table under fixed model, four of all variables except tangibility are significant. In the crisis period as for the result for full sample period, the total gearing measured at book and market values increases with size of the firms and tangibility, and decreases with development opportunities, productivity and liquidity.

The 1% increase in size and tangibility results in increase of total gearing measured at book values by 1.29% and 5.64%, respectively, while market value gearing increases by 1.69% and 4.35%, respectively. The increase of 1% of development opportunities of the organization and its liquidity, the total book value gearing of the firm falls by 0.15% and 0.823% respectively. And market value gearing falls by 0.182% with the 1 % increase in growth opportunities. And it falls by 0.330% with the 1% increase in liquidity factor.

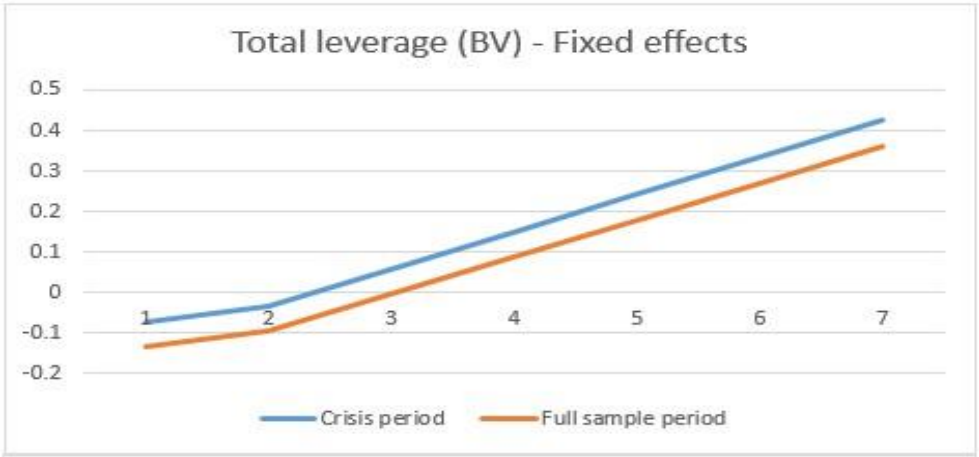
Pooled OLS results indicate that all variables are significant at 0.05 and 0.01 significance levels. Under pooled OLS, tangibility is one of the factors that significantly influences both statistically and economically. It is significant at 0.01 level, and 1% increase in tangibility results in increase of total gearing of firms approximately by 14% for both of the gearings. The possible explanation could be that during the crisis period, UK firms may use tangible assets as a collateral in order to borrow more debt.

Crisis dummy is highly significant at 0.01 significance level and in accordance with hypothesis (H_6) that during crisis, the total gearing of the firms increased. The estimated coefficients show during crisis, the total book and market value gearing across UK firms increased by 3.27% and 3.99%, respectively, under fixed effect

model. Pooled OLS results show that during the crisis the total book gearing increased by 3.67%, whereas market gearing by 4.40%.

Figures 4 and 5 represent the regression models for determining total gearing measured at book and market values for the full sample period and for the crisis period, under the both fixed effects and pooled OLS models. From the figures it is clearly seen that during crisis.

Figure 4. Total gearing (BV and MV) under fixed effects model



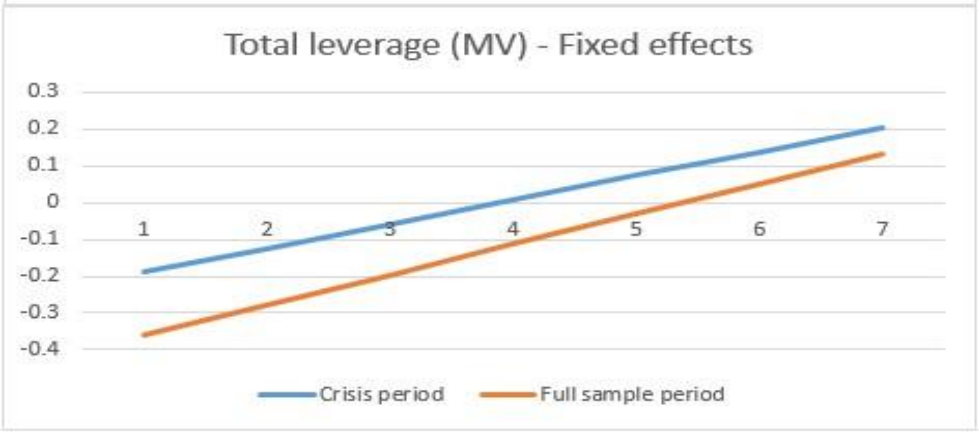
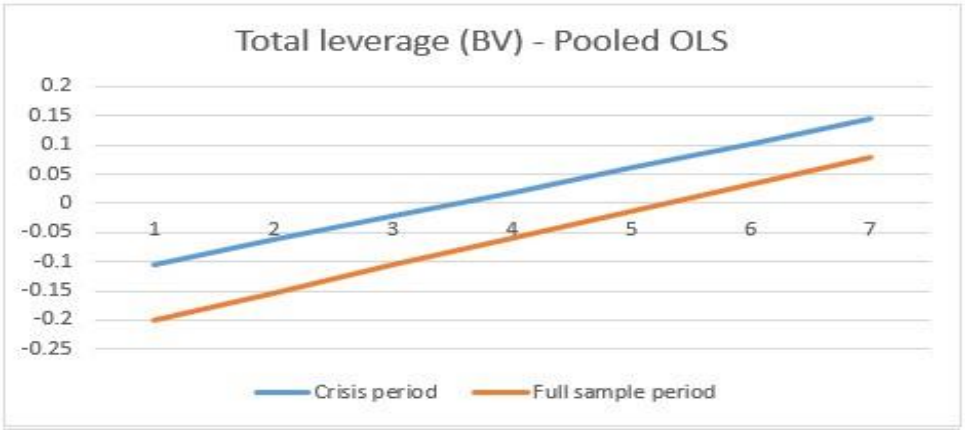


Figure 5. Total gearing (BV and MV) under pooled OLS model



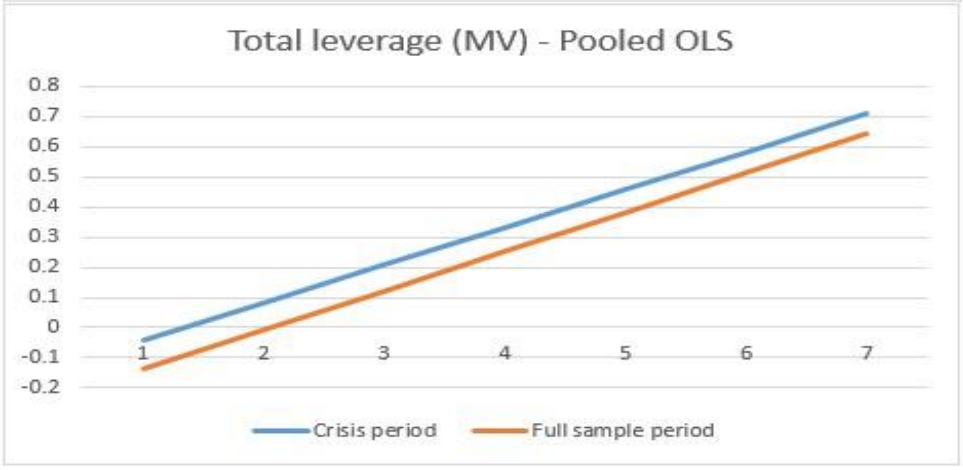


Table 7. Regression results with inclusion of crisis dummy

The table shows regression consequences for fixed effects using the following model: Also it present results for pooled OLS model

$$GEARi,t = \alpha it + \beta 1\ SIZEi,t\text{-}1 + \beta 2\ GROWTHi,t\text{-}1 + \beta 3\ TANGi,t\text{-}1 + \beta 4\ PROFi,t\text{-}1 + \beta 5\ LIQi,t\text{-}1 + crisis\ dummy + \varepsilon it.$$

Crisis dummy (CD) is dummy variable: if year is 2007 and 2008, CD equals to 1, otherwise 0. t-statistics are robust to heteroskedasticity and provided in parentheses below the coefficients. *, **, *** represents the significance levels for coefficients at 0.10, 0.05 and 0.01 respectively.

	Fixed effects		Pooled OLS	
	Gearing (BV)	Gearing (MV)	Gearing (BV)	Gearing (MV)
SIZEt-1	0.0129**	0.0169***	0.0144***	0.009***
	(3.19)	(5.46)	(16.59)	(12.71)
$GROWTH_{t-1}$	-0.0015*	-0.0018***	-0.00123	-0.0043***
	(-2.15)	(-4.72)	(-1.61)	(-10.45)
TANGt-1	0.0564	0.0435	0.141***	0.140***
	(1.69)	(1.61)	(16.00)	(16.79)
PROFt-1	-0.0531*	-0.0297**	-0.133***	-0.0518***
	(-2.43)	(-2.65)	(-9.29)	(-7.16)
LIQt-1	-0.0082***	-0.0033**	-0.0163***	-0.0115***
	(-5.13)	(-3.19)	(-19.03)	(-17.82)
Crisis Dummy	0.0327***	0.0399***	0.0367***	0.0440***
	(8.76)	(12.27)	(7.33)	(10.33)
Constant	-0.0741	-0.189***	-0.105***	-0.0447**
	(-0.98)	(-3.24)	(-6.20)	(-3.27)
N	6932	6932	6932	6932
R^2	0.0599	0.0727	0.178	0.186
adj. R^2	0.0591	0.0719	0.178	0.185
F	18.94	33.56	281.6	281.7

capital structure across UK firms apparently increased.

It can be concluded that, crisis in 2007 and 2008 significantly influenced capital structure of organizations in the United Kingdom. It led to the significant increase of capital structure across organizations. Inclusion of interaction variables gives one to see the additional impact of control variables during the crisis (Table 8). With the addition of cooperation variables with crisis dummy, two interaction variables growth with crisis dummy and liquidity with crisis dummy are significant, under both of models. With the exception of asset tangibility, all the determinants (size, liquidity, development opportunities, productivity) are significant, under the fixed effects model. Whereas, pooled OLS results show that all the determinants are significant, except growth opportunities measured at book value.

During crisis years 2007 and 2008 after controlling for firm effects, one gets results showing that the 1% increase in growth decreases total book gearing by 0.14% (estimated coefficient for growth opportunities) and on top of that by 0.49% (estimated coefficient for interaction of growth factor with crisis dummy), which in total is 0.63%. Whilst total market gearing decreases by in total of 0.53%.

Under pooled OLS, one gets aggregate decrease of 0.57% and 0.854% for book and market value gearings respectively, during the crisis years.

Table 8. Regression results with the inclusion of crisis dummy and interaction variables The table shows regression results for fixed effects using the following model: It also shows results for pooled OLS.

$$GEAR_{i,t} = \alpha_{it} + \beta_1 SIZE_{i,t-1} + \beta_2 GROWTH_{i,t-1} + \beta_3 TANG_{i,t-1} + \beta_4 PROF_{i,t-1} + \beta_5 LIQ_{i,t-1} + CrisisDummy +$$

$$CrisisDummy\ X\ SIZE_{i,t-1} + CrisisDummy\ X\ GROWTH_{i,t-1} + CrisisDummy\ X\ TANG_{i,t-1} + CrisisDummy\ X\ PROF_{i,t-1} +$$

$$CrisisDummy\ X\ LIQ_{i,t-1} + \varepsilon_{it}$$

Crisis dummy (CD) is dummy variable: if year is 2007 and 2008, CD equals to 1, otherwise 0. t-statistics are robust to heteroskedasticity and provided in parentheses below the coefficients. *, **, *** represents the significance levels for coefficients at 0.10, 0.05 and 0.01 respectively.

	Fixed effects		Pooled OLS	
	Gearing (BV)	Gearing (MV)	Gearing (BV)	Gearing (MV)
SIZEt-1	0.0125**	0.0165***	0.0144***	0.0085***
	(3.07)	(5.33)	(15.47)	(11.62)
$GROWTH_{t-1}$	-0.0014*	-0.0017***	-0.00092	-0.004***
	(-2.05)	(-4.73)	(-1.17)	(-9.70)
TANGt-1	0.0560	0.0436	0.137***	0.139***
	(1.69)	(1.62)	(14.33)	(15.36)
PROFt-1	-0.0493*	-0.0274*	-0.122***	-0.0448***
	(-2.31)	(-2.42)	(-7.92)	(-8.89)
LIQt-1	-0.0029**	-0.0023*	-0.0149***	-0.0104***
	(-2.81)	(-2.16)	(-17.11)	(-16.20)
CrisisDummy (CD)	0.0625	0.0221	0.0576	0.0138
	(1.74)	(0.70)	(1.22)	(0.35)
$SIZE_{t-1}$ X CD	-0.00034	0.0022	0.00019	0.0029
	(-0.19)	(1.31)	(0.08)	(1.39)
$GROWTH_{t-1}$ X CD	-0.0049**	-0.0036***	-0.0047*	-0.0046***
	(-3.27)	(-5.60)	(-2.25)	(-4.19)
$TANG_{t-1}$ X CD	0.0066	-0.0087	0.0306	0.0107
	(0.44)	(-0.54)	(1.27)	(0.48)
$PROF_{t-1}$ X CD	-0.0130	-0.0120	-0.0538	-0.0363
	(-0.43)	(-0.80)	(-1.62)	(-1.87)
LIQ_{t-1} X CD	-0.0077***	-0.0063**	-0.0104***	-0.0076***
	(-4.64)	(-4.90)	(-4.56)	(-4.28)
Constant	-0.0675	-0.182**	-0.107***	-0.0387**
	(-0.89)	(-3.12)	(-5.96)	(-2.74)
N	6932	6932	6932	6932
R^2	0.0844	0.0766	0.184	0.192
adj. R^2	0.0829	0.0751	0.183	0.191
F	22.31	20.66	158.5	160.9

The possible reason for development opportunities to be significant during the crisis is the fall of FTSE all-share Index by almost one-thirds (Banks et al., 2012). The share prices dropped, which led to the fall of market capitalization of firms which incorporates the organization's development opportunities. Consequently, it significantly affected the capital structure decisions of the organizations.

The interaction variable with liquidity factor and crisis dummy is significant at 0.01 and 0.05 significance levels for total gearing measured at book and market value. The explanation for that could be that one of the reasons of crisis was liquidity dry-up (Berg, 2011). Many financial institutions suffered from the shortage of liquidity. The increase in liquidity factor, thus, decreases the gearing across firms on average by 1.051% and 0.863% measured at book and market values, respectively. Whereas, under the pooled OLS, the aggregate impact of liquidity factor is larger, total book gearing decreases by 2.53%, total market value gearing by 1.8% with the 1% increase in liquidity.

On the whole, findings suggest that the financial crisis in UK significantly affected capital structure decisions. Due to crisis, the firms possibly were forced to resort to external financing sources as debt in order to stay afloat, fund business operations and invest in future investments. Or possibly, the endorsement of UK government to reduce interest rates induced firms to take advantage of low interest rates. As a result, there was a substantial increase in capital structure over UK firms. Furthermore, findings show that the development opportunities and liquidity are the factors that were significant during the crisis period. This may be associated with the dramatic fall in FTSE All-Share Index and liquidity shortages, as it was aforementioned.

4.5 Robustness Checks

In order to check whether the regression model applied is robust under the different measures and periods, two ways of robustness checks are employed.

First of all, two different value measurements of dependent variables are used in regression model as a proxy for total gearing. As it can be seen, the regression results are robust under the different measurements of gearing and are jointly significant at 0.01 significance level in Table 6. All the variables are of the same signs.

The second is the inclusion of crisis dummy variable for the years 2007 and 2008. Table 8 presents the results with the crisis dummy. The table shows that the results are robust under both fixed effects and pooled OLS models. And models are significant at 0.01 significance level.

Section 5. Conclusion

5.1 Findings

This paper analyses the correlation of capital structure with possible determinants for all UK firms with the exception of firms that operate in financial and utilities sectors. It also tries to find out how alter capital structure over UK organizations during the crisis period, in the years 2007 and 2008. The paper aims to provide additional evidence on decisions of capital structure of organizations operating in the UK covering the recent time period from 2000 to 2013. Moreover, as financial crisis that happened in the late 2000s, there are no academic papers that studied the effect of crisis. That is why, it is believed that this paper will contribute and provide additional evidence on the influence of financial crisis on the level of gearing of the UK firms.

With a view to uncover the connection between the level of gearing and its determinants, the fixed effects and pooled OLS panel estimation models are applied for the unbalanced panel data containing 820 UK firms, in total of 8014 firm-year observations, for the period of 2000-2013. The paper uses total gearing measured at book and market values as a measurement for capital structure across UK firms. Five factors as development opportunities, asset tangibility, productivity and liquidity, size are used as possible determinants explaining the variation in the level of gearing across firms. In addition, the paper analyses specifically years 2007 and 2008 and take them as a crisis dummy variable, in order to examine the effect of crisis on the UK firms' capital structure decisions .The firm size is found to be positively correlated with total gearing measured at book , market values under the both models. Development opportunities is negatively associated with the level of gearing, The findings for growth opportunities show that development opportunities are significant when the level of gearing is measured at market value. The possible explanation for this could be the mechanical relationship of market–based gearing and market-to-book ratio.

The results for asset tangibility show that firms holding more tangible assets are prone to hold more debt. After controlling for firm fixed and time-invariant factors, the asset tangibility does not have significant explanatory power in explaining capital structure variation. However, under the pooled OLS, it is highly significant at 0.01 significance level. Profitability and liquidity are significantly and adversely corresponded with the level of gearing. The theory suggests that relatively profitable firms and which has enough inward funds would rather resort to them than using external sources of financing.

When analyzing the period of crisis one gets results that are consistent with the expectations, which suggests that during the crisis period the level of gearing increased significantly. The reason behind that could be the UK government's cutting interest

rates in order to encourage firms to borrow more to fund business operations and future investments.

On the whole, findings suggest that total gearing of UK firms, notwithstanding the measures applied, increases with the increase in firm size, whereas it decreases with the increase in development opportunities, productivity, and liquidity of organizations. Moreover, findings for financial crisis impact suggest that financial crisis had a significant impact on borrowing capabilities of UK firms.

5.2 Research Limitations and Further Recommendations

This paper attempts to provide additional evidence on UK organization's capital structure and shed light on impact of crisis during the years 2007 and 2008. However, this research as many previous researches has its own limitations that are mostly due to data and time constraints. First of all, although the data is extracted from the financial database Thomson One Banker. Because of restriction in time, the all data has not been counterchecked with data in financial reports of UK firms. Therefore, the financial data could be suffering from miscoding error in a sort.

Secondly, due to time constraints, this paper does not examine industry effects which could be one of the important factors effect capital structure over UK firms. The first reason is that, fixed effects controls for any firm-fixed and time-invariant (e.g., industry effects) and gives the net results after controlling for them. However, it does not show regression results separately for each of them. In order to analyse each sector by itself requires separate regression for each of the sectors. Thus, due limited time, the industry effects are not included in this study. Therefore, further researches including the industry specifications could analyze capital structure differs over industries and, moreover, analyze whether the financial crisis has had and a strong impact on some sectors or moderate impact on others.

Even though this paper employs the most commonly utilized factors in deciding capital structure of firms, there are different elements like uniqueness of products, non-debt tax shield, average tax rate and many others that could be employed as determinants. However, because of limited time and unavailability of financial data for some factors, other determinants were not included. Therefore, the inclusion of other factors may give a better explanation of variation in capital structure over UK firms. Furthermore, this paper investigates only firm-specific determinants. It does not incorporate the macroeconomic conditions that could have an impact on the level of firms' gearing. The environment where the firms operate also play a substantial role in decision making of firms. There could be direct or indirect influence of macroeconomic conditions on capital structure decision. Therefore, the inclusion could be a new opportunity to be undertaken in order to shed light on capital structure determinants.

Finally, this paper only investigates the impact of crisis during the crisis period itself, that is, it only looks for the influence of years 2007 and 2008. And it attempts to find out whether the capital structure of UK firms decreases or increases during the financial crisis. Thus, it does not answer the question whether organizations alter their capital structure decisions after the crisis.

So, there is a space to further researches to conduct analysis in order to answer the above question.

Appendix

Section 2. Table 1. Bank of England (BoE) Bank Rates for the period 2000-2009

Year	Bank Rate

2000		
Jan 13, 2000	5.75	-0.25
Feb 10, 2000	6.00	+0.25
2001		
Feb 08, 2001	5.75	-0.25
Apr 05, 2001	5.50	-0.25
May 10, 2001	5.25	-0.25
Aug 02, 2001	5.00	-0.25
Sep 18, 2001	4.75	-0.25
Oct 04, 2001	4.50	-0.25
Nov 08, 2001	4.00	-0.25
2003		
Feb 06, 2003	3.75	-0.25
Jul 10, 2003	3.50	-0.25
Nov 06, 2003	3.75	+0.25
2004		
Feb 05, 2004	4.00	+0.25
May 06, 2004	4.25	+0.25
Jun 10, 2004	4.50	+0.25
Aug 05, 2004	4.75	+0.25
2005		
Aug 04, 2005	4.50	-0.25
2006		
Aug 03, 2006	4.75	+0.25
Nov 09, 2006	5.00	+0.25
2007		
Jan 11, 2007	5.25	+0.25
May 10, 2007	5.50	+0.25
Jul 05, 2007	5.75	+0.25
Dec 06, 2007	5.50	-0.25

2008		
Feb 07, 2008	5.25	-0.25
Apr 10, 2008	5.00	-0.25
Oct 08, 2008	4.50	-0.50
Nov 06, 2008	3.00	-1.50
Dec 04, 2008	2.00	-1.00
2009		
Jan 08, 2009	1.50	-0.50
Feb 05, 2009	1.00	-0.50
Mar 05, 2009	0.50	-0.50

Data source: Bank of England

Section 3. Data and Methodology

Table 2. Regression results before and after winsorizing at 0.01 level.

Table shows the results before and after winsorizing all the control variables. As tangibility remains the same to some extent before and after winsorizing, it is not winsorized for further regression, in order to preserve the integrity of original data.

	Pooled OLS			
	Before winsorizing		After winsorizing	
Variable	(1) Gearing (BV)	(2) Gearing (MV)	(1) Gearing (BV)	(2) Gearing (MV)
SIZEt-1	0.0162***	0.0089***	0.0142***	0.0087***
	(13.23)	(6.43)	(16.25)	(12.05)
GROWTHt-1	0.000002	-0.000006	-0.0009*	-0.0039***
	(0.04)	(-0.10)	(-1.97)	(-10.15)
TANGt-1	0.139***	0.170***	0.139***	0.138***
	(11.14)	(12.05)	(16.86)	(20.09)
PROFt-1	-0.202***	-0.0180	-0.131***	-0.0493***
	(-22.72)	(-1.80)	(-13.78)	(-6.25)
LIQt-1	-0.0083***	-0.0047***	-0.0163***	-0.0115***
	(-10.06)	(-5.04)	(-18.65)	(-15.91)
Constant	-0.141***	-0.0667**	-0.0942***	-0.0320*
	(-6.20)	(-2.59)	(-5.70)	(-2.33)
N	6932	6932	6932	6932
R^2	0.114	0.0423	0.171	0.170
adj. R^2	0.114	0.0416	0.170	0.169
F	178.6	61.22	285.2	283.5

t-statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.001

Section 3. Data and Methodology

Table 3. Variance inflation factor test

The table shows the results for VIF test which detects correlation between variables.

Variable	VIF	1/VIF
Size	1.64	0.6095
Growth	1.42	0.9906
Tangibility	1.21	0.9459
Profitability	1.06	0.7019
Liquidity	1.01	0.8259
Mean VIF	1.27	

References

Arellano, M. (2003) Panel data econometrics.

Banks, J., Crawford, R., Crossley, T. and Emmerson, C. (2012) 'The effect of the financial crisis on older households in England*', (No. W12/09) IFS Working Papers*.

Blundell-Wignall, A., Atkinson, P. and Lee, S. (2009) 'The Current Financial Crisis: Causes and Policy Issues', *OECD Journal: Financial Market Trends*, *2008*(2).

Bowen, R., Daley, L. and Huber Jr, C. (1982) 'Evidence on the existence and determinants of interindustry differences in leverage', *Financial Management*, 10-20.

Chakraborty, I. (2013) 'Does capital structure depend on group affiliation? An analysis of Indian firms', *Journal of Policy Modelling*, *35*(1), 110-120.

Dougherty, C. (2010) Introduction to Econometrics: EC220 (Chapter 14).

Fosberg, R. (2012) 'Capital structure and the financial crisis', *Journal of Finance & Accountancy*, *11*.

Gajurel, D. (2005) 'Capital Structure Management in Nepalese Enterprises', *Corporate Finance Journals*, *Forthcoming*.

Goodhart, C. (2008) 'The regulatory response to the financial crisis', *Journal of Financial Stability*, *4*(4), 351-358.

Harris, M. and Raviv, A. (1991) ‘The theory of capital structure’, T*he Journal of Finance*, *46*(1), 297355.

Kashefi, P. (2011) ‘The determinants of capital structure across firms’ sizes: the U.K evidence’, I*nternational Journal of Finance, Accounting and Economics Studies (IJFAES).*

Kayo, E. and Kimura, H. (2011) ‘Hierarchical determinants of capital structure’, *Journal of Banking & Finance*, *35*(2), 358-371.

Kraus, A. and Litzenberger, R. (1973) ‘A state - preference model of optimal financial leverage’, *The Journal of Finance*, *28*(4), 911-922.

Long, M. and Malitz, I. (1985) Investment patterns and financial leverage In *Corporate capital structures in the United States* (pp. 325-352), University of Chicago Press.

Miglo, A. (2014) ‘The Capital Structure Theory: Where Do We Stand After Crisis?’, *Journal of Capital Structure*, *1*, 1-32.

Myers, S. (1984) ‘The capital structure puzzle’, *The journal of finance*, *39*(3), 574-592.

Myers, S. (2001) ‘Capital structure’, *Journal of Economic perspectives*, 81-102.

Niu, X. (2008) ‘Theoretical and practical review of capital structure and its determinants’, *International Journal of Business and Management*, *3*(3), P133.

Wooldridge, J. (2009) Introductory Econometrics: A Modern Approach (Mason, OH: SouthWestern).